DESIGN/BUILD AGREEMENT

NIAGARA TUNNEL FACILITY PROJECT

August 18, 2005

Between

ONTARIO POWER GENERATION INC.

and

STRABAG AG

Design Build Agreement
Niagara Tunnel Facility Project
Between **Ontario Power Generation**
and **Strabag AG**

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DESIGN/BUILD AGREEMENT

This Agreement is made as of **[■]**, 2005, between

> **ONTARIO POWER GENERATION INC.,** a corporation existing under the laws of Ontario ("**OPG**" or "**Owner**"),
>
> and
>
> **STRABAG AG**, a corporation existing under the laws of Austria (the "**Contractor**").

RECITALS

(A) OPG owns the Sir Adam Beck generating stations 1 and 2 and the pump generating stations (the "Sir Adam Beck Generating Complex") located in Niagara Falls, Ontario.

(B) OPG is retaining the Contractor to perform the Work in connection with the Tunnel Facility Project for the Contract Price and according to the Contract Schedule.

(C) This Agreement is a conformed document and all the terms between the Parties respecting the Project are set out in this Agreement.

For value received, the Parties agree as follows.

SECTION 1. INTERPRETATION

1.1 Definitions

In this Agreement, the following terms have the respective meanings set out below.

(a) **Agreement** means this design/build agreement, including any recitals, schedules, Appendices and Final Submittals, as amended or restated from time to time by an Amendment.

(b) **Amendment** means a written amendment agreement signed by the Parties, in the form of document attached as Appendix 1.1(b), which makes any change to this Agreement.

(c) **Applicable Laws**, in respect of any Person, property, transaction or event, means all applicable laws, statutes, regulations, treaties, judgments and decrees applicable to that Person, property, transaction or event at the applicable time and, whether or not having the force of law, all applicable Approvals, requirements, requests, directives, rules, guidelines, codes, standards, instructions, circulars, manuals, and policies of any Governmental Authority having or purporting to have authority over that Person, property, transaction or event at the applicable time.

(d) **Application for Payment** means the application for payment delivered by the Contractor to OPG's Representative in accordance with Section 7.2, accompanied by completed forms of the documents set out in Appendix 1.1(d) or Appendix 7.11, as applicable.

(e) **Approvals** means any permits, licences, consents, approvals, clearances, orders, ordinances, registrations, filings or other authorizations respecting the Work or Tunnel Facility Project as may be required from any applicable Governmental Authorities or by this Agreement and, for greater certainty, includes the Environmental Assessment and the Environmental Assessment Approval, and all approvals, programs, plans, procedures and clearances required thereunder.

(f) **Business Day** means any day other than a Saturday, Sunday, New Year's Day, Good Friday, Easter Monday, Victoria Day, Canada Day, Civic Holiday, Labour Day, Thanksgiving Day, Christmas Day and Boxing Day. Each Business Day will end at 5:00 p.m. on that day.

(g) **Community Impact Agreement** means the agreement made December 22, 1993 between The Corporation of the Regional Municipality of Niagara, the Corporation of the Town of Niagara-on-the-Lake, the Corporation of the City of Niagara Falls and Ontario Hydro.

(h) **Concept Drawings** means the drawings provided to the Contractor by OPG and listed in Appendix 1.1(h).

(i) **Confidential Information** is defined in Section 2.17(a).

(j) **Contract Price** means the total fixed amount set out on Appendix 1.1(j) to be paid by OPG under this Agreement, as amended from time to time in accordance with an Amendment.

(k) **Contract Schedule** means Appendix 1.1(k) which sets out the numbers of days and/or the dates to achieve certain milestones, including Substantial Completion and the Final Completion Date, as amended and/or restated from time to time in accordance with an Amendment.

(l) **Contractor's Personnel** means all personnel, including the Contractor's representative and the site manager, used by the Contractor or assisting the Contractor in the performance of the Work, including any personnel, staff, labour, employees, shareholders, directors, officers, partners, members, representatives, agents, consultants, experts and any other workers, of the Contractor or a Subcontractor, any Subcontractor who is an individual, and any other Person for whom the Contractor or any Subcontractor is responsible.

(m) **Contractor's Proposal Documents** means the Preliminary Design and Construction Approach, the Outline Specifications, the GBR, the Draft Drawings, the Draft Specifications for the TBM, the Outline Environmental Management Plan, the Outline Quality Assurance/Quality Control Program, the Preliminary

Project Specific Site Safety, Security, Public Safety and Emergency Response Plan, the Preliminary INCW Part Project Specific Site Safety, Security, Public Safety and Emergency Response Plan, the on-Site total monthly trade labour hours set out in Appendix 1.1(hhhh), the Acknowledgment of Labour Requirements Clause and the list of Key Personnel, all as appended to this Agreement and provided by the Contractor to OPG in response to OPG's request for proposals for performance of the Work (which may or may not have been amended through negotiations between the Parties prior to being incorporated into this Agreement).

(n) **Defective** means:

(1) any part of the Work or Tunnel Facility Project that is defective in whole or in part, is inoperative, fails in any way to perform to specification or meet design tolerances because of any defect or does not comply with this Agreement, including any failure to comply with any requirement of the Owner's Mandatory Requirements or any Final Submittal, reference standard, inspection, test or Approval required for the Work or otherwise referred to in this Agreement, including whether or not the non-compliance is the result of defective Work (including design, workmanship and installation); or

(2) any part of the Goods or Tunnel Facility Project that was damaged on or before the Final Completion Date (but excluding damage that was caused by OPG and occurred after Substantial Completion to a part of the Tunnel Facility Project for which OPG was responsible at the time the damage occurred).

(o) **Dispute** is defined in Section 11.1(a).

(p) **Dispute Review Board** is defined in Section 11.1(a).

(q) **Dispute Review Board Agreement** is defined in Section 11.1(a).

(r) **Preliminary Design and Construction Approach** means the design and construction approach prepared by the Contractor and set out in Appendix 1.1(r).

(s) **Draft Drawings** means the 30% complete drawings prepared by the Contractor and listed in Appendix 1.1(s).

(t) **Draft Specifications for the TBM** means the specifications prepared by the Contractor and set out in Appendix 1.1(t).

(u) **Drawings** means the drawings to be provided by the Contractor in accordance with this Agreement.

(v) **Environmental Assessment** (or **EA**) means the Niagara River Hydroelectric Development Environmental Assessment dated March 1991, including the update

of July 13, 1992, and the amendment of June 3, 1993, all as approved by the Environmental Assessment Approval.

(w) **Environmental Assessment Approval** (or **EA Approval**) means the environmental assessment approval, dated October 14, 1998, approved by Order in Council Number 2283/98.

(x) **Escrow Information** is defined in Section 12.1.

(y) **Final Completion Date** means the day which is the later of:

(1) the day on which OPG accepts the Work as being entirely finished under Section 7.10(a);

(2) the day on which the Contractor has delivered to OPG the Maintenance Bond described in Section 4.1(f); and

(3) the day on which the Contractor, subject to the maximum liquidated damages set out in Section 8.5, has paid to OPG all amounts owing to OPG pursuant to Sections 8.1 and 8.3.

(z) **Final Submittal** is defined in Section 2.8(g).

(aa) **Flow Verification Test** means the test and procedures described in Appendix 1.1(aa).

(bb) **Geotechnical Baseline Report** (or **GBR**) means the geotechnical baseline report which establishes the geotechnical baseline for the anticipated subsurface conditions at the Site, a copy of which is attached as Appendix 5.4.

(cc) **Goods** means any goods, materials, instruments, devices, articles, supplies, equipment, machinery, structures and assemblies, or components of any of them, including the TBM, delivered or required to be delivered to the Site, to OPG or to such place or Person as OPG may direct, under this Agreement, whether or not incorporated into the Project.

(dd) **Governmental Authority** means any domestic or foreign government, including, any federal, provincial, state, territorial, municipal or local government, and any government established court, agency, tribunal, commission or other authority exercising or purporting to exercise executive, legislative, judicial, regulatory or administrative functions respecting government.

(ee) **Guaranteed Flow Amount** (or **GFA**) means 500 cubic meters per second (m^3/s) at the reference hydraulic head and the reference elevation of energy grade line defined in Appendix 1.1(aa).

(ff) **Hazardous Material** means any substance, material, solid, liquid or gas, waste (including "subject waste", as defined in Regulation 347 under the *Environmental*

Protection Act (Ontario)) exposure to which is prohibited, limited or regulated by any Applicable Law or the Contractor's environmental management plan.

(gg) **INCW** means the International Niagara Control Works Structure.

(hh) **INCW Part Project** means the portion of the Work that is described in Appendix 1.1(sss), Section 3.1(h) under the heading "INCW Part Project Area" and on the Concept Drawings as the "INCW Part Project Area".

(ii) **INCW Part Project Area** means the area defined on the Concept Drawings.

(jj) **INCW Part Project Specific Site Safety, Security, Public Safety and Emergency Response Plan** is defined in Section 2.20(d).

(kk) INTENTIONALLY DELETED.

(ll) **Lien** means any:

(1) lien, charge, attachment, security interest, mortgage, hypothec, claim, deemed trust or other encumbrance, whether fixed or floating, including any lien arising in respect of the *Construction Lien Act* (Ontario);

(2) pledge or hypothecation; or

(3) deposit arrangement, priority, conditional sale agreement or other title retention agreement, equipment trust, capital lease or other security arrangement of any kind,

respecting any property, whether real, personal or mixed, tangible or intangible.

(mm) **Losses** means all claims, demands, costs, penalties, expenses, liabilities, injuries, fines, losses and damages (including all fees and charges of engineers, architects, accountants, lawyers and other professionals and experts (in each case on a dollar for dollar full indemnification basis) and all court, arbitration and other dispute, mediation or resolution costs and charges), whether incurred through settlement or otherwise, together with interest at the rate equivalent to the prevailing Bank of Canada Prime Lending Rate plus 2% annually, compounded monthly, and calculated from the date that the Losses were suffered or incurred, in each case whether arising before or after the termination of this Agreement.

(nn) INTENTIONALLY DELETED.

(oo) **Notice** means any notice, approval, demand, direction, instruction, consent, designation, request, document, instrument, certificate or other communication required or permitted to be given under this Agreement.

(pp) **OPG Group** means OPG, each of OPG's wholly-owned subsidiaries and each of OPG's and each such subsidiary's shareholders, directors, officers, employees,

representatives, agents and advisors, including OPG's Representative and OPG's Designated Delegates, but, for greater certainty, excluding the Contractor, each Subcontractor and each of the Contractor's and each Subcontractor's shareholders, directors, officers, partners, members, employees, representatives, agents, advisors, the Contractor's Personnel and any other Person for whom the Contractor or any Subcontractor is responsible at law.

(qq) **OPG's Designated Delegates** means Persons, who may or may not be employees of OPG, who have been designated, from time to time, in writing by OPG's Representative, in a Notice in the form of document attached as Appendix 1.1(qq) as delegates of OPG, within a specified scope and limits of authority, by OPG's Representative or are otherwise named as OPG's delegates in this Agreement.

(rr) **OPG's Representative** means the individual designated in writing by OPG from time to time to act as OPG's representative for all purposes in dealings with the Contractor under this Agreement.

(ss) **Outline Environmental Management Plan** means the plan prepared by the Contractor and set out in Appendix 2.5(a)(2).

(tt) **Outline Quality Assurance/Quality Control Program** means the outline of the quality assurance and quality control program prepared by the Contractor and set out in Appendix 2.12(c)(2).

(uu) **Outline Specifications** means the specifications prepared by the Contractor and set out in Appendix 1.1(uu).

(vv) **Owner's Mandatory Requirements** means OPG's minimum mandatory requirements for the Work set out in Appendix 1.1(vv), as amended or restated by an Amendment from time to time.

(ww) **Party (or Parties)** means OPG and/or the Contractor together with their respective successors and permitted assigns.

(xx) **Performance LC(s)** is defined in Section 4.1(d).

(yy) **Performance Test Water Flow Amount** (or **PTWFA**) means the water flow amount determined by the water flow performance test performed in accordance with the Flow Verification Test.

(zz) **Person** means any individual, sole proprietorship, partnership, corporation or company, with or without share capital, trust, foundation, joint venture, Governmental Authority or any other incorporated or unincorporated entity or association of any nature.

(aaa) **Preliminary INCW Part Project Specific Site Safety, Security, Public Safety and Emergency Response Plan** means the preliminary project specific site

safety, security, public safety and emergency response plan prepared by the Contractor for the INCW Part Project and set out in Appendix 2.20(d).

(bbb) INTENTIONALLY DELETED.

(ccc) **Preliminary Project Specific Site Safety**, **Security, Public Safety and Emergency Response Plan** means the preliminary project specific site safety, security, public safety and emergency plan prepared by the Contractor and set out in Appendix 2.4(d).

(ddd) INTENTIONALLY DELETED.

(eee) **Professional** means a licensed professional, including engineers and architects, duly licensed in Ontario, and designated by the Contractor, to provide, in whole or in part, any of the Professional Services.

(fff) **Professional Services** means all the services in respect of this Agreement, including respecting documents, designs, drawings (including as built drawings), diagrams, illustrations, schedules, performance charts, brochures, specifications, plans, progress photographs, reports, manuals (including operating and maintenance manuals), information, data or other deliverables, models or samples whether in a written, graphic, physical, electronic or other format provided, or required to be provided, by the Contractor to OPG under this Agreement, that are:

(1) required under Applicable Laws or any Approvals to be provided by a Professional;

(2) required by this Agreement to be provided by a Professional;

(3) provided by a Professional retained by the Contractor, including by the Contractor's Personnel; or

(4) necessary for performance of the Work.

(ggg) **Project** means all of the planning, approvals, design and construction elements contemplated for the diversion tunnel and associated works of which the Tunnel Facility Project forms a part.

(hhh) **Project Change Directive** means a written directive or consent signed by OPG's Representative, in the form of document attached as Appendix 1.1(hhh).

(iii) **Project Change Notice** means a written notice signed by the Contractor, in the form of the document attached as Appendix 1.1(iii).

(jjj) **Project Specific Site Safety, Security, Public Safety and Emergency Response Plan** is defined in Section 2.4(d).

(kkk) INTENTIONALLY DELETED.

(lll) **Schedule of Values** is defined in Section 7.1.

(mmm) **Site** means (a) the areas identified in the Concept Drawings (including the INCW Part Project Area) and (b) all the subsurface areas where Work is performed.

(nnn) **Specifications** means the specifications to be provided by the Contractor in accordance with this Agreement.

(ooo) **Subcontractor** means a Person (including the Person's successors and permitted assigns) who supplies Work under an agreement with the Contractor, another Subcontractor or a combination of the Contractor and another Subcontractor.

(ppp) **Submittal** means:

(1) a document, design, drawing (including as built drawings), diagram, illustration, schedule, performance chart, brochure, specification, plan, progress photograph, report or manual (including operating and maintenance manuals);

(2) information, data or other deliverable; or

(3) model or sample,

whether in a written, graphic, physical, electronic or other format, prepared by or for the Contractor which illustrates details of a portion of the Work or is otherwise required by this Agreement, or is reasonably requested by OPG, and is to be submitted by the Contractor to OPG, or as OPG directs, under this Agreement.

(qqq) **Submittal Schedule** means the schedule of Submittals referred to in Section 2.7(a)(2) as finalized by the Contractor and submitted to OPG's Representative in accordance with Section 2.7(a), as amended from time to time in accordance with an Amendment.

(rrr) **Substantial Completion** is defined in Section 7.9(a).

(sss) **Summary of Work** means the summary of the Work set out in Appendix 1.1(sss).

(ttt) **Start Date** means September 1, 2005.

(uuu) **Tax** means all present and future taxes, surtaxes, duties, levies, imposts, rates, fees, premiums, assessments, withholdings, dues and other charges of any nature imposed by any Governmental Authority (including income, capital (including large corporations), gross receipts, consumption, sales, use, transfer, goods and services or other value-added, excise, customs or other import, anti-dumping, countervail, net worth, alternative or add-on minimum, windfall profits, stamp, registration, franchise, payroll, employment insurance, Canada Pension Plan, workers' compensation, health, education, school, business, property, local

improvement, environmental, development and occupation taxes) together with all fines, interest, penalties in respect thereof, or in lieu of or for non-collection thereof.

(vvv) **TBM** means the tunnel boring machine used for performing the Work.

(www) **TBM Accessories** is defined in Section 2.10(a).

(xxx) **TBM Completion Date** is defined in Section 2.10(b).

(yyy) INTENTIONALLY DELETED.

(zzz) INTENTIONALLY DELETED.

(aaaa) INTENTIONALLY DELETED.

(bbbb) INTENTIONALLY DELETED.

(cccc) INTENTIONALLY DELETED.

(dddd) INTENTIONALLY DELETED.

(eeee) **Tunnel Facility Project** means the portion of the Project which the Contractor is responsible for under this Agreement, and includes the INCW Part Project.

(ffff) **Warranty Period** is defined in Section 9.8(a).

(gggg) **Work** means providing to OPG entirely finished and fully functional tunnel diversion facilities and all associated and related facilities necessary to divert the GFA, over a distance of approximately 10.3 km from the upper Niagara River to the Sir Adam Beck Generating Complex. The Work includes providing the Goods, and a facility that is designed and constructed in accordance with, and that is fit for the purposes intended by, this Agreement, whether express or implied, including those components described in the Summary of Work attached as Appendix 1.1(sss).

(hhhh) **Man-Hour Breakdown** means the man-hour breakdown by unionized trade category and calendar month for on-Site trade labour during the term of this Agreement, to be submitted by the Contractor to OPG as a Submittal in accordance with Section 7.13(g) and consistent with the per month on-Site total trade labour hours attached hereto as Appendix 1.1(hhhh).

1.2 Headings and Table of Contents

The division of this Agreement into sections, the insertion of headings and the provision of a table of contents are for convenience of reference only and are not to affect the construction or interpretation of this Agreement.

1.3 Expanded Definitions

Unless otherwise specified, words importing the singular include the plural and vice versa and words importing gender include all genders. The term "**including**" means "including without limitation", and the terms "**include**", "**includes**" and "**included**" have similar meanings. The term "**will**" means "**shall**". Any reference in this Agreement to any other agreement, is deemed to include a reference to that other agreement, as amended or restated from time to time. When words that have a well-known technical, construction industry or trade meaning are used in this Agreement to describe any Work, such words will be interpreted in accordance with that meaning.

1.4 Time of Day

Unless otherwise specified, references to time of day or date mean the local time or date in Niagara Falls, Ontario. When any period of time is referred to in this Agreement by days, it will be computed to exclude the first and include the last day of such period. A day is 24 hours measured from midnight to the next midnight.

1.5 Business Days

If under this Agreement any payment or calculation is to be made on or as of a day which is not a Business Day, that payment or calculation is to be made on or as of the next day that is a Business Day.

1.6 Governing Law

This Agreement and each of the documents contemplated by this Agreement are governed by, and are to be construed and interpreted in accordance with, the laws of Ontario and the laws of Canada applicable in Ontario. Each of the Parties irrevocably submits to the non-exclusive jurisdiction of the courts of Ontario. No Party will oppose the enforcement against it in any other jurisdiction of any judgment or order duly obtained from an Ontario court respecting this Agreement. A Party may effect service of summons or any other legal process that may be served in any action, suit or other proceeding by delivering any such process to another Party in accordance with Section 14.4. Nothing in this Section 1.6 will affect the rights of a Party to serve legal process in any other manner permitted by law.

1.7 Conflict

If there is a conflict between any term in one part of this Agreement and any term in another part of this Agreement, the relevant term in the part of this Agreement or other document listed first in this Section 1.7 is to prevail:

(a) Amendments, excluding any part of an Amendment that applies to an Appendix;

(b) this Agreement, excluding the Appendices and Final Submittals;

(c) the Owner's Mandatory Requirements;

(d) the Geotechnical Baseline Report (GBR);

(e) Amendments to any other Appendix (for greater clarity, an Amendment to any Appendix other than Appendix 1.1(vv), Appendix 5.4 and the Contractor's Proposal Documents);

(f) any other Appendix (for greater clarity an Appendix other than Appendix 1.1(vv), Appendix 5.4 and the Contractor's Proposal Documents);

(g) Final Submittals, as amended or restated; and

(h) Contractor's Proposal Documents.

1.8 Severability

If any term of this Agreement is or becomes illegal, invalid or unenforceable, the illegality, invalidity or unenforceability of that term will not affect the legality, validity or enforceability of the remaining terms of this Agreement and the Parties will, if necessary, amend this Agreement to accomplish the intent of the Parties as originally set out in this Agreement to the maximum extent allowed by Applicable Laws.

1.9 Time

All references in this Agreement to time are intended by the Parties to be the actual time designated without the application of any principles of equity.

1.10 Statutory and Technical References

Each reference to a statute in this Agreement is deemed to be a reference to that statute, and to the regulations made under that statute, all as amended or re-enacted from time to time. Each reference, whether express or implied, to a standard, specification, manual or code of any technical organization or Governmental Authority is deemed to be a reference to that standard, specification, manual or code as amended or re-published from time to time.

1.11 Entire Agreement

This Agreement constitutes the entire agreement between the Parties regarding the subject matter and, except for any Amendment or Project Change Directive, supersedes all other agreements, negotiations, discussions, undertakings, representations, warranties and understandings, whether written or verbal, including any OPG invitation to submit design-build proposals, any Contractor proposal and any amendments or restatements of any such request. Specifically, except as expressly provided in this Agreement, OPG has not made any representations or warranties whatsoever respecting the Tunnel Facility Project, the Project or this Agreement, including any minimum or maximum hours of employment or respecting any information previously provided to the Contractor, physical conditions, labour conditions or scheduling, including subsurface conditions.

1.12 Appendices

The following Appendices are attached to and form part of this Agreement.

Appendix		**Description**
Appendix 1.1(b)	—	Amendment Form
Appendix 1.1(d)	—	Payment Related Documents
Appendix 1.1(h)	—	Concept Drawings
Appendix 1.1(j)	—	Contract Price
Appendix 1.1(k)	—	Contract Schedule
Appendix 1.1(r)	—	Preliminary Design and Construction Approach
Appendix 1.1(s)	—	Draft Drawings
Appendix 1.1(t)	—	Draft Specifications for the TBM
Appendix 1.1(aa)	—	Flow Verification Test
Appendix 1.1(nn)	—	INTENTIONALLY DELETED
Appendix 1.1(qq)	—	OPG's Delegation Notice
Appendix 1.1(uu)	—	Outline Specifications
Appendix 1.1(vv)	—	Owner's Mandatory Requirements
Appendix 1.1(hhh)	—	Project Change Directive Form
Appendix 1.1(iii)	—	Project Change Notice
Appendix 1.1(sss)	—	Summary of Work
Appendix 1.1(hhhh)	—	On-Site Total Monthly Trade Labour Hours
Appendix 2.2(a)	—	Organizational Chart
Appendix 2.2(b)	—	Scopes of Authority for Contractor's Delegates
Appendix 2.4(c)	—	Contractor's Safety Program
Appendix 2.4(d)	—	Preliminary Project Specific Site Safety, Security, Public Safety and Emergency Response Plan
Appendix 2.4(g)(3)	—	Elements of the Project Specific Site Security, Public Safety and Emergency Response Plan
Appendix 2.4(m)	—	Designated Substances Present at Site
Appendix 2.5(a)(2)	—	Outline Environmental Management Plan
Appendix 2.5(b)	—	Environmental Notice
Appendix 2.7(a)(3)	—	INTENTIONALLY DELETED

Appendix		**Description**
Appendix 2.8(a)	—	Submittal Requirements
Appendix 2.9(c)	—	Notice of Error in the Contractor's Proposal Documents or the Final Submittals
Appendix 2.12(c)(2)	—	Outline Quality Assurance/Quality Control Program
Appendix 2.12(c)(4)	—	Non-Conformance Notice
Appendix 2.13(f)	—	Non-Compliance Notice
Appendix 2.14(c)	—	Subcontractors
Appendix 2.14(e)	—	Labour Obligations
Appendix 2.14(f)	—	INTENTIONALLY DELETED
Appendix 2.18	—	Conflict of Interest Declaration
Appendix 2.20(d)	—	Preliminary INCW Part Project Specific Safety, Security, Public Safety and Emergency Response Plan
Appendix 2.20(o)	—	Designated Substances Present at INCW Part Project Area
Appendix 4.1(a)	—	INTENTIONALLY DELETED
Appendix 4.1(b)	—	INTENTIONALLY DELETED
Appendix 4.1(d)	—	Letter of Credit
Appendix 4.1(e)	—	Indemnity Agreement
Appendix 4.1(f)	—	Maintenance Bond
Appendix 5.3	—	Notice of Change in Applicable Laws
Appendix 5.4	—	Geotechnical Baseline Report
Appendix 5.7(a)	—	Dispute Notice
Appendix 6.2(b)	—	Excusable Delay Notice
Appendix 7.1	—	INTENTIONALLY DELETED
Appendix 7.2	—	Measurement for Payment Schedule
Appendix 7.3(a)	—	Approval Form for Applications for Payment
Appendix 7.3(b)	—	Retail Sales Tax Exemption
Appendix 7.9(a)	—	Substantial Completion Form
Appendix 7.9(a)(8)	—	Affidavit of Design Professional
Appendix 7.9(b)	—	Substantial Completion Confirmation Form
Appendix 7.10	—	Final Completion Form
Appendix 7.11	—	Final Payment Related Documents

Appendix		Description
Appendix 7.12	—	Final Payment Form
Appendix 7.13(b)	—	EPSCA and BACU Wage Rates
Appendix 10.7	—	Breach Form
Appendix 11.1(a)	—	Dispute Review Board Agreement

SECTION 2. CONTRACTOR'S OBLIGATIONS

2.1 Intent and Initial Actions

(a) **General.** The Contractor will, safely and diligently, perform and complete the Work in an organized and timely manner and in accordance with this Agreement and, to the extent not inconsistent with this Agreement, good industry practices. The Contractor will ensure that all Work is performed in accordance with and complies with the Owner's Mandatory Requirements, the Contractor's Proposal Documents, Final Submittals, Applicable Law and the other terms of this Agreement.

(b) **Bargain.** This Agreement contains certain allocations of risk which reflect an informed and voluntary allocation of risk between OPG and the Contractor. This allocation represents a material part of this Agreement.

(c) **Intent.** The Contractor will provide all work, services and goods of any kind (which are deemed to be part of the Work), whether or not specifically required under this Agreement, which are evidently necessary, usually provided by prevailing custom or trade usage, or can be reasonably implied for the proper performance of the Work and the safe and proper operation of the Tunnel Facility Project.

(d) **Acknowledgement.** The Contractor acknowledges that OPG may, from time to time, have representatives present on Site or at off site locations where Goods are being manufactured or fabricated, to monitor performance of the Work and compliance with this Agreement.

(e) **Representations Regarding the Tunnel Facility Project.** The Contractor represents and warrants to OPG that the Contractor:

(1) is, and will, throughout the term of this Agreement, be sufficiently experienced and properly qualified, licensed, equipped, organized and financed to perform, or cause to be performed, the Work;

(2) has engaged and will engage only Subcontractors that are competent, properly qualified, licensed, equipped, organized and financed, and has made appropriate enquiries and exercised appropriate due diligence to

confirm the competence, qualification, licensing, organization and financing of the Subcontractors;

(3) has examined and has satisfied itself in respect of all matters respecting the Work and Tunnel Facility Project, including:

(A) all necessary information respecting the risks, contingencies and other circumstances which may affect the Contract Schedule, Contract Price, the Work or the Tunnel Facility Project;

(B) the nature, location and physical conditions of the Site, including, surface conditions and the location of all above and below surface buildings, utilities, structures, pipes, conduits and works except the existing tunnel routes and except to the extent such matters are addressed in the GBR;

(C) working and storage space, access, transportation, delivery and construction facilities;

(D) the general and local conditions, particularly those bearing upon labour, transportation, delivery, roads and uncertainties of weather;

(E) all Applicable Laws, including any restrictions on hours of work, and any required Approvals; and

(F) the goods, equipment and facilities needed to perform the Work.

(4) has satisfied itself that it can perform and entirely finish the Work in accordance with the Contract Schedule;

(5) has prepared the Contractor's Proposal Documents in accordance with the degree of care and skill used by leading members of the professional engineering profession practicing in Canada and the United States for a similar type of project, in accordance with all Applicable Laws and engineering practices and industry standards and specifications as they apply to tunnel projects and in a manner that complies with the Owner's Mandatory Requirements (including any requirements relating to the Environmental Assessment);

(6) having done all things necessary to inform itself, is not aware of any error or omission in the Owner's Mandatory Requirements, or elsewhere in this Agreement or any inconsistency between the Owner's Mandatory Requirements and this Agreement, between this Agreement and the Appendices, or between Appendices (and if an error, omission or inconsistency is subsequently discovered, will promptly provide a Notice to OPG of such error, omission or inconsistency);

(7) has reviewed the Owner's Mandatory Requirements and is satisfied, based upon those requirements and the Contractor's investigations and analyses, that upon performing the Work the water flow from the tunnel following the completion of the Tunnel Facility Project will meet the Guaranteed Flow Amount;

(8) has carefully studied all reports of explorations and tests of surface and subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site which have been identified or made available by OPG;

(9) is aware of the general nature of work to be performed by OPG and others at the Site that relates to the Work;

(10) has disclosed in writing to OPG the names of each of the Contractor's Personnel who will be performing Work at the Site continuously, who is a former OPG employee and who received a severance package from OPG, is receiving pension payments from OPG or is receiving a non-working pension bridge from OPG or is on a paid leave of absence from OPG; and

(11) is not aware of any legal action instituted, threatened or pending against the Contractor that could have a material adverse effect on its ability to perform its obligations under this Agreement.

(f) **Financial Information.** The Contractor authorizes OPG to make credit enquiries about the Contractor or any of its affiliates from time to time and to receive and exchange credit information from credit reporting agencies or other Persons with which the Contractor or any of its affiliates has or may expect to have financial dealings. The Contractor has provided OPG with the Contractor's audited financial statements for the last three financial years. Such financial statements have been prepared in accordance with the requirements of the Austrian Commercial Code, consistently applied. Such financial statements fairly reflect the consolidated financial position and results of operations of the Contractor as at the dates and for the periods set out in such statements. The Contractor will provide OPG with its audited financial statements and unaudited quarterly consolidated financial statements promptly after each such statement becomes available. The Contractor will also provide OPG with any other financial information respecting the Contractor or any of its affiliates that OPG may reasonably request to assist OPG in its ongoing evaluation of the value of the indemnifications and other rights provided to OPG by the Contractor under this Agreement.

(g) **Information Waiver.** The Contractor acknowledges that the Contract Price was determined on the basis that some or all of the information provided by OPG may contain errors, omissions or inaccuracies and that the Contractor waives any claim arising therefrom unless the error, omission or inaccuracy was the result of gross

negligence on the part of OPG or Persons providing services to OPG, provided that nothing in this Section 2.1(g) is intended to affect the operation of Sections 5.4 and 5.5 (which are the only provisions of this Agreement governing changes in or differing geotechnical subsurface conditions).

2.2 Tunnel Facility Project Organization

(a) **Personnel.** Appendix 2.2(a) sets out an organizational chart identifying some of the Contractor's Personnel by name, title and contact information. At OPG's request, the Contractor will provide OPG with résumés for any such personnel indicating his or her qualifications for the performance of the Work. The names on the chart that are followed by an asterisk are considered key personnel. The Contractor will not remove any such key personnel from the performance of the Work, or materially reduce the responsibilities respecting the performance of the Work unless:

(1) OPG's Representative consents in advance in writing to such removal or reduction; or

(2) any such key personnel leave the employ of the Contractor (and all its affiliates) or the applicable Subcontractor (and all its affiliates), the Contractor delivers a Notice to OPG regarding such departure.

The Contractor will replace any such key personnel with an individual who is at least equally qualified and experienced, and will update Appendix 2.2(a) to reflect such changes from time to time or at any time on request by OPG. The Contractor will obtain OPG's consent in advance in writing to any individual who replaces any such key personnel. The names on the chart that are followed by a (1) are to be interviewed by OPG and OPG has the right to approve such Person prior to such Person being involved in any material way in performing the Work.

(b) **Site Manager.** The Contractor will keep on the Site at all times during the performance of Work on Site a competent and efficient resident site manager.

(1) The Contractor will not replace this site manager unless the Contractor delivers a Notice to OPG's Representative at least 25 days before the replacement and OPG's Representative consents in writing to such replacement.

(2) This site manager will be the Contractor's representative at the Site and will have authority to act on behalf of the Contractor.

(3) The site manager may delegate duties to superintendents, health and safety supervisors, account managers, records managers and other Persons designated by name and shown on Appendix 2.2(a) or as otherwise approved in writing by OPG.

(4) The site manager will specify in writing, in the form of document attached as Appendix 2.2(b), the scope and the limits of authority of each of his or her designated delegates.

(5) Any changes to or revocation of any delegations will also be specified by the site manager in writing to OPG's Representative in the form of document attached as Appendix 2.2(b).

(6) All Notices delivered to the site manager, or, in OPG's sole and absolute discretion, to his or her designated delegates (provided that the notice relates to a matter within the designated delegate's scope of authority), by OPG will be as binding on the Contractor as if given to the Contractor under Section 14.4.

(7) OPG may rely on any written instructions, directions or approvals provided by the site manager or his or her designated delegates (provided that such instructions, directions or approvals are within the designated delegate's scope of authority).

(8) OPG's determination as to whether or not a matter is within the scope of authority of a designated delegate of the Contractor's representative will be conclusive, so long as OPG has acted in good faith and does not have actual notice that the matter is not within the designated delegate's scope of authority.

(9) The Contractor will take all reasonable steps to ensure that the site manager and all designated delegates are accessible to OPG during the performance of the Work (including outside of normal working hours in cases of emergencies) and are available to render any necessary decisions or instructions promptly to avoid delays to the Contract Schedule.

2.3 Kick-Off and Subsequent Meetings

(a) **Kick-Off Meeting.** Within 10 Business Days after the Start Date, OPG's Representative will arrange a kick-off meeting. The Contractor will ensure attendance by its authorized representatives and any representatives of Subcontractors, including senior management, as required by OPG. At this meeting the Parties will discuss safety and environmental protection programs (including those of Subcontractors) and requirements, the hazards associated with the Work, labour matters, design concepts, schedules (including the schedules to be developed pursuant to Section 2.7), procedures for handling Submittals, communication protocols, procedures for processing each Application for Payment, delivery procedures for the Site, records maintenance, Site security, OPG's review of Site conditions and any other matter raised by a Party.

(b) **Meetings.** In addition to the kick-off meeting, the Contractor will schedule, attend and conduct such other project readiness, pre-construction, design review, construction, pre-job mark up (including resolution of jurisdictional issues),

hazard review, site co-ordination, weekly (or daily as required by OPG) progress review meetings and other meetings as requested by OPG or are otherwise desirable, including any meetings required by the Contractor's Proposal Documents or the Final Submittals. The Contractor will include in the agenda of any such meeting any issue requested by OPG. Progress review meetings will usually focus on safety, environmental matters, labour requirements, procedures, progress, clarifications of the requirements of this Agreement and scheduling (including interfaces between Persons providing services at the generating station). The Contractor will ensure that all Subcontractors and other Persons requested by OPG will attend these meetings. The Contractor will ensure that each representative of the Contractor and any Subcontractor attending meetings will be qualified and authorized to act on behalf of the Party each represents. The Contractor will provide the space for the meeting. Unless OPG otherwise requests regarding a particular meeting, OPG will prepare and distribute minutes of each meeting within 5 Business Days.

2.4 Safety - General

(a) **Primary Goal.** Safety of the Contractor's Personnel, individuals at or near the Site and the public is of paramount concern to OPG. In the performance of the Work, the Contractor will not in any manner endanger the safety of, or unlawfully interfere with other Persons on or off the Site, including the public.

(b) **Constructor.** The Contractor will be the "Constructor" in respect of the Work for the purposes of the *Occupational Health and Safety Act* (Ontario). The "Constructor" will submit the required notice of project and registration form to the applicable Governmental Authority. The Contractor will have complete and sole responsibility for all health and safety matters regarding the Tunnel Facility Project. The Contractor is not required to ask OPG for any input or recommendations (and OPG may not require the Contractor to take any specified actions) respecting any health or safety matter regarding the Tunnel Facility Project. OPG will not provide to the Contractor any personnel, equipment or services. Notwithstanding any term in this Section 2.4(b), OPG may at any time on delivery of a Notice to the Contractor, assume the role of the "Constructor".

(c) **Compliance.** The Contractor will perform all the Work in accordance with:

(1) all Applicable Laws and applicable collective agreements;

(2) and to the extent not inconsistent with Section 2.4(c)(1), the Project Specific Site Safety, Security, Public Safety and Emergency Response Plan, as described in Section 2.4(d);

(3) and to the extent not inconsistent with Sections 2.4(c)(1) and 2.4(c)(2), the Contractor's safety program (a copy of which is attached as Appendix 2.4(c)), as amended from time to time;

(4) and to the extent not inconsistent with Sections 2.4(c)(1), 2.4(c)(2) and 2.4(c)(3), the very best of practices respecting health and safety and in a manner that recognizes and minimizes the risks to workers, other individuals and property.

The Contractor will forward to OPG, without delay, any changes to its safety program made during the course of performing the Work. OPG will monitor the compliance of the Contractor and Subcontractors with these requirements through periodic audits from time to time during the course of the performance of the Work. The Contractor will forward to OPG, without delay, any change to the Council Amendment to Draft #7 (CAD-7) rating of the Contractor or to any Subcontractor performing Work at the Site.

(d) **Project Specific Site Safety, Security, Public Safety and Emergency Response Plan.** The Contractor has performed a safety hazard analysis to identify all significant safety hazards in respect of the Work. Based on this analysis and the Preliminary Project Specific Site Safety, Security, Public Safety and Emergency Response Plan, the Contractor will prepare, in accordance with the standards described in Section 2.8(b) and the procedures described in Section 2.8(c), a detailed project specific site safety plan (the plan, as amended from time to time, the "**Project Specific Site Safety, Security, Public Safety and Emergency Response Plan**") which will document how the Contractor will address all significant safety hazards including the methodology for safe work planning and will include provision for the regular and systematic review and audit of the plan elements by the Contractor to determine whether the Project Specific Safety, Security, Public Safety and Emergency Response Plan requires modification to more appropriately and effectively address all safety hazards associated with the Work. The Contractor will provide for the communication of the Project Specific Site Safety, Security, Public Safety and Emergency Response Plan to all workers performing Work on the Site and all Subcontractors. The Contractor will submit the Project Specific Site Safety, Security, Public Safety and Emergency Response Plan to OPG within 30 days after the Start Date and such plan will be deemed to form part of this Agreement. The Project Specific Site Safety, Security, Public Safety and Emergency Response Plan will be implemented by the Contractor. To the extent the Contractor's review and audit of the Project Specific Site Safety, Security, Public Safety and Emergency Response Plan reveals that the Project Specific Safety, Security, Public Safety and Emergency Response Plan requires modification to more appropriately and effectively address all safety hazards associated with the Work, the Contractor will modify the Project Specific Safety, Security, Public Safety and Emergency Response Plan within 5 days after such review and audit. The Contractor will submit to OPG the results of its regular review and audit of the Project Specific Safety, Security, Public Safety and Emergency Response Plan, including modifications thereto, within 10 days after each review and audit. OPG may monitor the compliance of the Contractor and Subcontractors with the Project Specific Site Safety, Security, Public Safety and Emergency Response Plan through periodic audits from time to time during the course of the performance of the Work.

(e) **Safety Representative.** The Contractor will provide a qualified and experienced full time health and safety representative for the Site. The Contractor will make this representative's sole obligation the training of the Contractor's Personnel in safety, prevention of accidents and the maintaining, reviewing and revising of safety precautions and programs. The Contractor will form a joint health and safety committee that will include representatives of the Contractor and the trades.

(f) Safety Precautions and Remedies.

(1) **Protection.** The Contractor will be solely responsible for initiating, maintaining, reviewing, revising and supervising all safety precautions and programs in respect of the Work. The Contractor will take all necessary precautions (including ensuring that all of the Contractor's Personnel are equipped with, and properly use, all safeguards and personal protective equipment necessary for the performance of the Work) for the safety of, and will provide the necessary protection to prevent damage, injury or loss resulting from the performance of the Work to:

(A) each Person who is on the Site or who may otherwise be affected by the performance of the Work, including the Contractor's Personnel and members of the public;

(B) any of the Goods, whether in storage on or off Site;

(C) the Tunnel Facility Project; and

(D) any other property on, under, over or near the Site, whether belonging to OPG or to any other Person, including buildings and other structures, facilities, fences, gates, pavements, roadways, sidewalks, walks, vegetation, utilities and underground facilities that are not designated for removal and disposal in the course of performing the Work.

(2) **Lock-Out Provisions.** The Contractor will perform all Work under applicable lock-out procedures stipulated in the *Occupational Health and Safety Act* (Ontario) ensuring that equipment being worked on is safely isolated and de-energized.

(3) **Notification of Owners.** The Contractor will promptly deliver a Notice to OPG's Representative as the Contractor becomes aware of, and indicating the identity of, each utility, owner of underground facilities and owner of property (excluding OPG and its subsidiaries) on, under, over or near the Site that may be affected by the Work and how each such utility or owner may be affected. OPG will deliver a Notice to the Contractor confirming the identity of each such Person and the Contractor will, at OPG's direction, deal with or co-operate with OPG in dealing with settling all issues respecting the performance of the Work, including the protection, removal, relocation or replacement of the property of any such Person.

(4) **Repair of Damage.** To the extent that any third party, such as a utility, owner of underground facilities or owner of property (excluding OPG and its subsidiaries) on, under, over or near the Site suffers or incurs any Losses to any property caused by the Contractor or a Subcontractor, the Contractor will remedy such Losses in a timely manner and at the Contractor's expense. The Contractor will indemnify and hold harmless each member of the OPG Group, from and against all Losses suffered or incurred by a member of the OPG Group and all claims, demands, actions, suits or proceedings for Losses made against any member of the OPG Group by a third party in connection with Losses suffered or incurred to any property of such third party caused by the Contractor or a Subcontractor.

(g) **Site Security, Public Safety and Emergency Response**. The Contractor has performed a security, public safety and emergency response analysis to identify all public safety hazards associated with the Site and the Work and to identify all potential means of unauthorized access to the Site. Based on this analysis and the Preliminary Project Specific Site Safety, Security, Public Safety and Emergency Response Plan, the Contractor will prepare, in accordance with the standards described in Section 2.8(b) and the procedures described in Section 2.8(c), a project specific site security, public safety and emergency response plan. Such plan, as amended from time to time will be included in the Project Specific Site Safety, Security, Public Safety and Emergency Response Plan and will document, among other things, how the Contractor will address all significant public safety hazards and prevent unauthorized access to the Site, the matters described in Appendix 2.4(g)(3) and will include provision for the regular and systematic review and audit of the plan elements to determine whether the Project Specific Site Safety, Security, Public Safety and Emergency Response Plan requires modification. The Contractor will provide for the communication of the Project Specific Site Safety, Security, Public Safety and Emergency Response Plan to all workers performing Work on the Site and all Subcontractors. The Contractor will submit the Project Specific Site Safety, Security, Public Safety and Emergency Response Plan to OPG within 30 days after the Start Date and such plan will be deemed to form part of this Agreement . The Project Specific Site Safety, Security, Public Safety and Emergency Response Plan will be implemented by the Contractor. To the extent the Contractor's review and audit of the Project Specific Site Safety, Security, Public Safety and Emergency Response Plan reveals that the Project Specific Site Safety, Security, Public Safety and Emergency Response Plan requires modification to more appropriately and effectively address all public safety hazards associated with the Site and the Work and/or all potential means of unauthorized access to the Site, the Contractor will modify the Project Specific Site Safety, Security, Public Safety and Emergency Response Plan within 5 days after such review and audit. The Contractor will submit to OPG the results of its regular review and audit of the Project Specific Site Safety, Security, Public Safety and Emergency Response Plan, including modifications thereto, within 10 days after each review and audit. OPG may monitor the compliance of the Contractor and Subcontractors with the Project

Specific Site Safety, Security, Public Safety and Emergency Response Plan through periodic audits from time to time during the course of the performance of the Work.

(h) **Safety Reports.** During the performance of the Work, the Contractor will provide OPG's Representative with:

(1) a verbal report immediately of any serious incident requiring off-site medical attention or near miss incidents which do or could have resulted in the death of, or serious injury to, a worker or other Person on or off the Site or an incident which has resulted in the death of or serious injury to a worker or other Person on or off the Site;

(2) within 24 hours of an accident, construction occurrence or incident report, a copy of all accident, construction occurrence and incident reports which the Contractor, any Subcontractor, or OPG is required to submit in respect of the Work under the *Occupational Health and Safety Act* (Ontario) or the *Workplace Safety and Insurance Act, 1997* (Ontario);

(3) within 24 hours, Notice of any visits by the Ministry of Labour and copies of any reports, orders to comply, charges, stop work orders, and notices of compliance under the *Occupational Health and Safety Act* (Ontario) or other Applicable Laws;

(4) a copy of the minutes of each meeting of the joint health and safety committee; and

(5) a monthly report within ten days of each month's end with safety statistics for the Contractor and all Subcontractors performing Work at the Site. The Contractor will include in this report, with a brief description of each incident and injury:

(A) the number of injuries resulting in a worker requiring medical aid;

(B) the number of near miss incidents which could have resulted in the death of, or serious injury to, a worker;

(C) the number of injuries resulting in a worker's absence from one or more complete shifts;

(D) the time each worker takes off from work for each injury;

(E) the number of Ministry of Labour orders to comply; and

(F) the total number of person hours worked by the Contractor's Personnel at the Site broken down between the Contractor and each Subcontractor.

(i) **Stop Work Orders.** Where an order to comply, stop work order or any similar order or notice respecting the Work is issued by the Construction Health and Safety Branch of the Ontario Ministry of Labour or any other Governmental Authority, such order or notice will not be grounds for any change to the Contract Schedule or any other claim for delay or compensation, except to the extent that an action of OPG or another member of the OPG Group has resulted in such order or notice. To the extent OPG or another member of the OPG Group was immediately and directly responsible for causing the underlying circumstances giving rise to such order or notice, this situation will be deemed to constitute an excusable delay for the purposes of Section 6.2(a). The Contractor will promptly deliver to OPG's Representative a copy of any such order or notice.

(j) **Emergencies.** In emergencies affecting the safety or protection of individuals, the Work or Tunnel Facility Project or property on, under, over or near the Site, the Contractor, without the express consent of OPG, will take reasonable actions to prevent or minimize all threatened or actual damage, injury and loss. The Contractor will indemnify and hold harmless each member of the OPG Group, from and against all Losses suffered or incurred by a member of the OPG Group and all claims, demands, actions, suits or proceedings for Losses made against any member of the OPG Group by any Person, to the extent arising in respect of any emergency medical treatment provided by any member of the OPG Group to any of the Contractor's Personnel or any invitee of the Contractor or any Subcontractor.

(k) **Requirement to Leave.** In the case of an emergency requiring the Contractor to leave the Site at the direction of OPG, the Contractor will put all equipment in a safe state in accordance with the *Occupational Health and Safety Act* (Ontario) and leave the Site in an orderly fashion pending further instructions from OPG's Representative.

(l) **Hazard Communication Programs.** The Contractor will co-ordinate all exchanges of material safety data sheets and other hazard communication information related to the Work required to be made available to, or exchanged between or among, Persons at the Site.

(m) Designated Substances and Other Hazardous Materials.

(1) The Contractor is solely responsible for any "designated substances" (as defined under the *Occupational Health and Safety Act* (Ontario)) brought onto the Site by it, and shall fully remove any remaining amounts prior to or upon completion of the Work. The Contractor shall also ensure that in no event will designated substances be incorporated into the permanent facilities.

(2) Any other potentially hazardous materials or substances to which OPG personnel may be exposed during operation and maintenance of the

facility must be in conformance with OPG's HAZMAT approved material list.

(3) The Contractor acknowledges that prior to execution of this Agreement, OPG provided the Contractor with a list of designated substances present at the Site (a copy of which is attached as Appendix 2.4(m)), as required pursuant to the *Occupational Health and Safety Act* (Ontario). OPG is not aware of any other designated substances at the Site.

(n) **Indemnity Relating to Safety**. To the extent that the Contractor is responsible for, caused or contributed to, in whole or in part, the circumstances giving rise to a violation, charge, fine, order, direction, stop work order or other consequence pursuant to legislation applicable to worker health and safety, including the *Occupational Health and Safety Act* (Ontario) or its Regulations, the Contractor will indemnify and hold harmless each member of the OPG Group from and against all Losses suffered or incurred by a member of the OPG Group and from and against all claims, demands, actions, suits or any other proceedings for Losses made against any member of the OPG Group in connection with such violation, charge, fine, order, direction, stop work order or consequence.

(o) **General.** The provisions of this Section 2.4 shall not apply with respect to that portion of the Work required for the INCW Part Project and carried out in the INCW Part Project Area. For greater certainty, the provisions set out in Section 2.20 shall apply to the portion of the Work required for the INCW Part Project and carried out in the INCW Part Project Area.

2.5 Environment

(a) **Compliance and Protection.** In addition to the Contractor's obligation to comply with all Applicable Laws, the Contractor will perform the Work in a manner that:

(1) protects health and the environment;

(2) complies with the requirements of the Environmental Assessment, the Environmental Assessment Approval, the Approvals held or to be obtained by OPG in relation to the Project, the Community Impact Agreement, and the Approvals held or to be obtained by Contractor in relation to the Project;

(3) complies with the Outline Environmental Management Plan attached as Appendix 2.5(a)(2);

(4) complies with the Contractor's environmental management plan, which plan will be based on the Outline Environmental Management Plan, which shall be submitted as a Submittal within 60 days after the Start Date;

(5) complies with the plans, which shall be submitted to OPG as Submittals, as required by OPG to comply with the Environmental Assessment, the Environmental Assessment Approval or required by the Owner's Mandatory Requirements;

(6) adequately anticipates, protects and plans for impacts to the environment, including spills, erosion and sedimentation, waste disposal and the use, storage and disposal of hazardous materials; and

(7) uses all commercially reasonable efforts to reduce, reuse or recycle non-hazardous waste.

(b) **Notices.** The Contractor will immediately provide OPG's Representative with Notice in the form attached as Appendix 2.5(b):

(1) of any changes to its environmental management plan made during the course of performing the Work for OPG's review and prior approval;

(2) of any discharge, spill, release, emission, deposit or leak of:

(A) fuels, oils, hydraulic fluid, herbicides; or

(B) any substance whether solid, liquid, gas, odour, heat, sound, vibration or radiation or any combination thereof, exposure to which is prohibited, limited or regulated by any Applicable Law, or the Contractor's environmental management plan,

that occur at or near the Site or that occur with the Goods or materials owned or controlled by the Contractor or a Subcontractor; and

(3) upon receipt of any order, directive, notice or other communication whatsoever received from any Governmental Authority respecting any substance whether solid, liquid, gas, odour, heat, sound, vibration or radiation or any combination thereof, exposure to which is prohibited, limited or regulated by any Applicable Law, together with a copy of such order, directive, notice or other communication.

(c) **Disposal.** The Contractor is responsible for the transport, receipt, inspection, use, storage and disposal of all hazardous and non-hazardous substances, materials, solids, liquids and gases that are brought on to the Site or created at the Site during performance of the Work. Without limiting the generality of the foregoing, the disposal of any excavated material produced in the performance of the Work will be carried out in accordance with:

(1) Applicable Laws;

(2) to the extent not inconsistent with Section 2.5(c)(1), the Contractor's environmental management plan as approved by OPG, and as amended in accordance with Section 2.5(b)(1); and

(3) any order, directive, notice or other communication whatsoever received from any Governmental Authority, subject to direction by OPG's Representative following notification in accordance with Section 2.5(b).

(d) **Discharges and Spills.** The Contractor will, to the satisfaction of all applicable Governmental Authorities and OPG, in a timely manner, at the Contractor's expense, prevent all discharges, spills, releases, emissions, deposits or leaks contrary to:

(1) Applicable Laws; and

(2) to the extent not inconsistent with Sections 2.5(d)(1) , the Contractor's environmental management plan as approved by OPG, and as amended in accordance with Section 2.5(b)(1);

and, at the Contractor's expense, clean up, dispose of and otherwise comply with all requirements of:

(3) Applicable Laws;

(4) to the extent not inconsistent with Section 2.5(d)(3), the Contractor's environmental management plan as approved by OPG, and as amended in accordance with Section 2.5(b)(1); and

(5) any order, directive, notice or other communication whatsoever received from any Governmental Authority, subject to direction by OPG's Representative following notification in Section 2.5(b);

respecting all discharges, spills, releases, emissions, deposits or leaks of any substances, materials, solids, liquids, gases or wastes whatsoever that are caused by the Contractor and that occur at or near the Site or that occur with materials owned or controlled by the Contractor.

(e) **Disposal of Hazardous Material.** Unless otherwise specifically provided for in this Agreement, the Contractor may not dispose of any Hazardous Material on, under, over or near any property owned, leased or licensed by OPG or any of its subsidiaries or in which OPG or any of its subsidiaries has an interest, in whole or in part, including the Site.

(f) **Remedy for Breach.** The Contractor will indemnify and hold harmless each member of the OPG Group from and against all Losses suffered or incurred by a member of the OPG Group and all claims, demands, actions, suits or proceedings for Losses made against any member of the OPG Group by any Person in respect

of any breach by the Contractor of any of its obligations under Sections 2.5(a) to 2.5(e) inclusive.

2.6 Applicable Laws and Approvals

(a) **Applicable Laws.** The Contractor will comply with all Applicable Laws and all applicable standards, specifications, manuals or codes of any technical organization or Governmental Authority and, to the extent not inconsistent with Applicable Laws or applicable standards, specifications, manuals or codes of any technical organization or Governmental Authority, good industry practices, in respect of the Work. Without limiting the generality of the foregoing, the TBM will comply with all Applicable Laws and all applicable standards, specifications, manuals or codes of any technical organization or Governmental Authority. OPG will not be responsible for ensuring the Contractor's compliance with any Applicable Laws, or applicable standards, specifications, manuals or codes of any technical organization or Governmental Authority or good industry practices. Except as expressly set out in this Agreement, the Contractor will submit, and provide a copy to OPG of, all notices, requests, documents, instruments and certificates to all applicable Governmental Authorities as may be required in respect of the Work including, for greater certainty, any applications or other submissions in respect of Approvals. Notwithstanding any reference in the Contractor's Proposal Documents to DIN or other international standards when an applicable Canadian standard exists (such as CSA), the Contractor agrees to abide by the Canadian standard.

(b) **Approvals.** Except as set out in Section 3.1(e) and 3.1(f), the Contractor will obtain and pay all the expenses in connection with all Approvals required to carry out the Work in compliance with Applicable Laws, including those Approvals to be issued in the name of OPG, in a timely manner in order to meet the Contract Schedule. For greater clarity, the identification of required Approvals shall be the responsibility of the Contractor. The Contractor will provide technical criteria, written descriptions and design data required for obtaining all such Approvals. OPG will support the Contractor as and when the Contractor requests to obtain such Approvals in order to meet the common objective of obtaining the Approvals within the expected time periods. To the extent an Approval is to be issued in the name of OPG, the Contractor will obtain OPG's prior written approval to all terms and conditions of such Approval. The Contractor will pay all fees and other charges respecting all such Approvals obtained by the Contractor. The Contractor and the Subcontractors will comply with the terms and conditions of all Approvals. The Contractor will indemnify and hold harmless each member of the OPG Group from and against all Losses suffered or incurred by a member of the OPG Group and all claims, demands, actions, suits or proceedings for Losses made against any member of the OPG Group by any Person arising as a result of the failure of the Contractor to comply with the terms and conditions of any Approval issued in the name of OPG. The Contractor will provide a copy to OPG of all Approvals.

(c) **OPG Code of Conduct.** The Contractor will not take any action that would cause any member of the OPG Group to breach an obligation set out in OPG's code of business conduct, as amended from time to time.

2.7 Schedules

(a) **Development of Schedules.** The Contractor will complete and submit to OPG's Representative as Submittals the following documents within the following time periods:

(1) within 10 days after the Start Date, a 3-month detailed schedule indicating the dates for starting (and finishing, if applicable) each component of the Work (including the INCW Part Project) to be commenced within such period;

(2) within 30 days after the Start Date, a schedule to provide the Submittals, which will include at a minimum the Submittals listed in Appendix 2.8(a), setting out the dates for the Contractor to submit and finalize each Submittal. The Contractor will ensure that the Submittal Schedule provides for sufficient time for review of Submittals by OPG and for the Contractor to revise Submittals in accordance with the terms of this Agreement; and

(3) within 60 days after the Start Date, a detailed contract schedule indicating the dates for starting and entirely finishing each component of the Work (including the INCW Part Project), including a reference to each milestone set out in the Contract Schedule and Submittal Schedule so that this contract schedule incorporates, and integrates with, the Contract Schedule and Submittal Schedule.

OPG will review these schedules within 10 Business Days after receipt and provide the Contractor with a Notice setting out any comments on these schedules. The Contractor will then have 5 Business Days from the receipt of such Notice to respond to OPG's comments and make any necessary amendments to these schedules. At least 20 Business Days before submission of the first Application for Payment, the parties will meet with all appropriate Persons, including OPG's Representative, to review the status of and attempt to resolve any outstanding issues regarding these schedules. Except for the first three monthly payments made under Section 7.3, which payments shall be contingent upon agreement of the schedule described in Section 2.7(a)(1) above, OPG will make no payment to the Contractor until OPG's review is complete, issues have been resolved and the final schedules have been delivered to OPG.

(b) **Initially Acceptable Schedules.** Any review, comment, acceptance, rejection or failure to review, comment, accept or reject by OPG of the schedules referred to in Section 2.7(a), in whole or in part, will not:

(1) impose on OPG responsibility for the sequencing, scheduling or progress of the Work;

(2) be deemed to confirm that any schedule is a reasonable plan for performing the Work in accordance with the detailed contract schedule;

(3) affect or change the Contractor's obligation to perform the Work in accordance with this Agreement; or

(4) otherwise have the effect of transferring any obligation under this Agreement from the Contractor to OPG or otherwise have the effect of amending this Agreement.

(c) **Adherence to Schedules.** The Contractor will adhere to the Contract Schedule. The Contractor will provide OPG with a monthly progress schedule, setting out the status and progress of the Work and any deviations or anticipated deviations from the Contract Schedule or the detailed contract schedule described in Section 2.7(a)(3). To the extent that the Contract Schedule has not been, or is anticipated not to be, satisfied, the Contractor will indicate the total number of days set aside for contingencies that will be used and will provide OPG with satisfactory assurances, including, at the Contractor's cost, recovery plans, involving all necessary additional resources, acceptable to OPG, that the Contract Schedule will be restored. There will be no changes to the Contract Schedule except as provided by Section 5 and Section 6 of this Agreement. OPG may refuse to approve any changes to the Contract Schedule in its sole and absolute discretion.

(d) **Daily Record.** The Contractor will maintain a detailed daily record of the progress of the Work, the number of personnel of all categories at the Site, the Goods delivered to the Site and all such other items deemed necessary to record.

(e) **Continuing the Work.** Notwithstanding any term in this Agreement, the Contractor will not stop or delay the performance of Work, in whole or in part, on account of any Dispute or pending resolution of any such Dispute between the Contractor and OPG or between the Contractor and any other Person and will continue to perform the Work in a timely manner and continue to adhere to the Contract Schedule, except to the extent, if any, expressly directed to do so by OPG in a Project Change Directive, provided that the Contractor may suspend the performance of the Work, if OPG has not paid the amounts required under Section 7.3(b) within 30 days of the date OPG is required to make payment under Section 7.3(b).

2.8 Submittals

(a) **Submission of Submittals.** The Contractor agrees to provide each Submittal described in Appendix 2.8(a), in addition to other Submittals as required pursuant to this Agreement all in accordance with the requirements set out in Appendix 2.8(a). The Contractor agrees to provide each Submittal to OPG (as set

out in the Submittal Schedule) in a timely manner and orderly sequence and in accordance with the Submittal Schedule, so as not to cause any delay in the Work. Unless otherwise authorized by OPG's Representative, all Submittals will comply with Appendix 2.8(a).

(b) **Submittals Prepared by Professionals.** The Contractor will prepare the Submittals required to be prepared by a Professional, including the Drawings and Specifications as more fully described in Appendix 2.8(a), in accordance with the degree of care and skill used by leading members of the professional engineering profession practicing in Canada and the United States for a similar type of project, in accordance with all Applicable Laws and engineering practices and industry standards and specifications as they apply to tunnel projects and in a manner that complies with the Owner's Mandatory Requirements (including any requirements relating to the Environmental Assessment and EA Approval) and the Contractor's Proposal Documents.

(c) **Review of Submittals.** The Contractor will review and approve all Submittals before submission to OPG. The Contractor's review and approval of each Submittal will be indicated by stamp, seal (if applicable), date and a signature of a responsible and qualified Person. Any Submittals not stamped, sealed (if applicable), signed, dated and identified may be returned to the Contractor without being examined and will be considered not to have been submitted. By this review and approval, the Contractor will be deemed to represent to OPG that it has diligently determined and verified all necessary requirements including field measurements, field construction criteria, materials, catalogue numbers and similar data and has checked and coordinated all Submittals with the requirements of the Contractor's Proposal Documents and the remainder of this Agreement and that OPG can and will rely upon this deemed representation. Together with any Submittal, the Contractor will notify OPG's Representative of, and clearly show or describe, any deviation of that Submittal from any requirement under this Agreement.

(d) **Return of Submittals.** OPG's Representative will return Submittals to the Contractor marked "Reviewed as Submitted", "Revise as Noted - Do not Resubmit", "Revise and Resubmit" or "Review not Required". However, if OPG, acting reasonably, determines that a Submittal is not suitable for review and does not meet the basic requirements for such Submittal, the Submittal will be returned to the Contractor and the time period for review of such Submittal by OPG pursuant to the Submittal Schedule will be deemed not to have commenced.

(e) **Non-Compliance.** The Contractor will respond, in a timely manner, to queries from OPG's Representative respecting its review of the Submittals and provide, in a timely manner, all such other documentation and information requested by OPG's Representative to finish its review of the Submittals. Where any Submittal delivered by the Contractor deviates from the requirements of this Agreement, OPG's Representative may require the Contractor to conform that Submittal to the requirements of this Agreement. Unless otherwise directed by

OPG's Representative, the Contractor will promptly, and in any event within the time period required by the Contract Schedule and the detailed contract schedule described in Section 2.7(a)(3), correct all items in a Submittal, whether or not raised by OPG's Representative, which do not conform to the requirements of this Agreement. The Contractor will then return to OPG's Representative the required number of corrected copies of the Submittal clearly identifying any revisions to the Submittal and such Submittal will continue to be subject to this Section 2.8(e) until there is no requirement to resubmit. The Contractor will be responsible for recovering any time lost in the review process by reason of error or defect in the Submittals and, in any event, the Contractor will maintain the dates set out in the Contract Schedule. If the Parties dispute the conformity of a Submittal and it is subsequently determined by the Parties or through dispute resolution under Section 11 that the Submittal was in conformity with the Agreement, any delay attributable to such dispute will be treated as a delay caused by OPG pursuant to Section 6.2(c).

(f) **Work Before Review by OPG.** Where a Submittal is required by this Agreement including the Submittal Schedule, any Work relating to that Submittal which is performed before OPG's Representative has completed its review of the Submittal (including any required revisions to the Submittal) will be at the sole risk, responsibility and expense of the Contractor.

(g) **Effect of Review.** Notwithstanding any term of this Agreement, if OPG reviews, comments on, accepts or rejects or fails to review, comment on, accept or reject any Submittal or any item in a Submittal, any such action or failure to act:

(1) will not have the effect of transferring any obligation under this Agreement from the Contractor to OPG or otherwise have the effect of amending this Agreement; and

(2) will not affect or change in any way,

(A) the Contractor's obligation to entirely finish the Work, or

(B) the Contractor's responsibility for any error or omission in any Submittal or any deviation in a Submittal from the requirements of this Agreement, unless in each case OPG's Representative gives express written acceptance of the error, omission or deviation.

Review of Submittals by OPG's Representative will be for conformity to the Contractor's Proposal Documents, the Owner's Mandatory Requirements and this Agreement and for general arrangement only. In addition, any such review will generally not extend to means, methods, techniques, sequences or procedures of construction or to related safety precautions or programs, other than for compliance with this Agreement (for example, with respect to the INCW Part Project), and will not indicate OPG's approval of such item or OPG's acceptance or approval of the

assembly in which the item in the Submittal functions. Once a Submittal is reviewed by OPG's Representative and no longer requires revision, or once a Submittal is submitted where such Submittal does not require OPG's review, such Submittal will become a **"Final Submittal"** and will be deemed to be incorporated into this Agreement.

(h) **Manuals.** All manuals will be in sufficient detail for OPG to operate, maintain, commission, refurbish, replace and alter the Tunnel Facility Project.

2.9 Professional Services

(a) **Provision.** The Contractor will provide all the Professional Services necessary or desirable to perform the Work, including all design required for a tunnel that delivers the Guaranteed Flow Amount. The Contractor will ensure that all Work is designed in accordance with Applicable Laws.

(b) **Standard of Care.** The Contractor will provide all the Professional Services necessary or desirable to entirely finish the Work and Tunnel Facility Project. The standard of care used for all the Professional Services provided under this Agreement will be the degree of care and skill used by leading members of the profession practicing in Canada and the United States for a similar type project and in accordance with all Applicable Laws, prudent practices and professional practices and industry standards and specifications as they apply to tunnel projects.

(c) **Error in Contractor's Proposal Documents or Final Submittals.** The Contractor will promptly provide Notice, in the form of document attached as Appendix 2.9(c), to OPG's Representative of any error, deficiency, defect, inconsistency, discrepancy, omission or deviation from the requirements of this Agreement or the Owner's Mandatory Requirements in the Contractor's Proposal Documents or the Final Submittals of which the Contractor becomes aware. After the Contractor provides OPG's Representative with all information reasonably requested by it, OPG's Representative will discuss the error, deficiency (excluding those related to health and/or safety, except for the INCW Part Project), defect, inconsistency, discrepancy, omission or deviation and provide a prompt direction to the Contractor resolving the issue by way of a Project Change Directive. If the Contractor's Proposal Documents or the Final Submittals, or any portion of them, are found to be in error, deficient, defective, inconsistent, incomplete or deviate from the requirements of this Agreement or the Owner's Mandatory Requirements in any way, the Contractor will perform, at its cost, having regard to the terms of this Agreement and prudent practices, any corrective work to remedy the erroneous, deficient, defective, inconsistent or incomplete part of the Contractor's Proposal Documents or the Final Submittals and take any other remedial action with respect to the Work arising in respect of such error, deficiency, defect, inconsistency, discrepancy, omission or deviation, unless the error, deficiency, defect, inconsistency, discrepancy, omission or deviation in the Contractor's Proposal Documents or the Final Submittals is as a result of an error

in the Owner's Mandatory Requirements. All Work performed after the Contractor became aware of the error, deficiency, defect, inconsistency, discrepancy, omission or deviation from the requirements of this Agreement will be at the Contractor's sole risk until OPG's Representative makes a decision as to how to reconcile or fix the error, deficiency, defect, inconsistency, discrepancy, omission or deviation. If the Contractor fails to so provide Notice to OPG's Representative under this Section 2.9(c) respecting any such error, deficiency, defect, inconsistency, discrepancy, omission or deviation, the Contractor may not make any claim whatsoever against OPG respecting or resulting, from such error, deficiency, defect, inconsistency, discrepancy, omission or deviation.

2.10 Tunnel Boring Machine

(a) **Transfer of Title to OPG.** Notwithstanding any other provision of this Agreement, the Contractor hereby transfers to OPG all of the Contractor's right, title and interest in and to the TBM, all trailing gear and tunnel transportation systems (collectively, the "**TBM Accessories**") and any right, title or interest in and to the TBM and the TBM Accessories that it may acquire hereafter, free and clear of all Liens. The transfer of title to the TBM and TBM Accessories shall in no way detract from the Contractor's obligations in Section 2.12(a).

(b) **License to Contractor.** OPG hereby grants the Contractor a license to the use of the TBM and the TBM Accessories for all purposes that the Contractor deems necessary to perform the Work and complete the Tunnel Facility Project, which license will terminate on the date on which all of the Work to be performed by the TBM and the TBM Accessories to complete the Tunnel Facility Project has been completed in accordance with the requirements of this Agreement (the "**TBM Completion Date**").

(c) **Maintenance and Repair.** The Contractor shall be responsible for the maintenance, repair and refurbishment of the TBM and the TBM Accessories and any costs, charges, liabilities or expenses related thereto or incurred in connection therewith and OPG shall have no liability in respect thereof or in any way related thereto.

(d) **Transfer of Title to Contractor.** On the earlier of

(1) the TBM Completion Date; and

(2) the date for transfer set out in a written Notice from OPG to the Contractor which written Notice states that OPG will be transferring, conveying and assigning the TBM and the TBM Accessories to the Contractor,

OPG will be deemed to have transferred, conveyed and assigned to the Contractor all of OPG's right, title and interest in the TBM and the TBM Accessories. For greater certainty, all costs, charges, liabilities or expenses related to or incurred in

connection with decommissioning or dismantling the TBM and the TBM Accessories shall be for the account of the Contractor.

(e) **Assignment Agreement.** The Contractor will enter into an assignment agreement in form and substance satisfactory to OPG, acting reasonably, which will assign to OPG, as security for the performance of the obligations of the Contractor hereunder, all rights, benefits and entitlements under any agreement with a Subcontractor relating to the TBM and the TBM Accessories (the "**TBM Agreement(s)**") and will obtain any consents from third parties necessary in connection with such assignment.

(f) **Creditors of the Contractor.** The Contractor will require any creditor of the Contractor having or purporting to have any Lien respecting the TBM and the TBM Accessories to enter into an acknowledgement, in form and substance satisfactory to OPG, acting reasonably, which will acknowledge OPG's interest in the TBM and the TBM Accessories.

(g) **Further Assurances.** The Contractor covenants and agrees to do such acts and enter into such agreements and other documents as OPG may reasonably require to preserve, protect and perfect OPG's interest in the TBM, the TBM Accessories and the TBM Agreement(s).

2.11 Commissioning and Completion

(a) **Commissioning Phase.** During the commissioning phase of the Work as set out in the detailed contract schedule, the Contractor will

(1) be responsible for the testing, verification, calibrating, refining, adjusting and watering-up of all mechanical or electrical elements, equipment or systems in the presence of OPG's personnel, to ensure that installation and performance are as specified in this Agreement and suitable for use by OPG;

(2) demonstrate operation of equipment and systems for the Tunnel Facility Project and train OPG's staff to operate and maintain the Tunnel Facility Project;

(3) develop systems and procedures for use by OPG in the control of the operation and maintenance of, and record keeping for, the Tunnel Facility Project; and

(4) provide manufacturers' authorized representatives, specialists and/or representatives of Subcontractors as may be required by OPG for the Work.

(b) **Demonstrations.** The Contractor will, before any demonstrations, inspect and put into operation all equipment and systems in accordance with the Final Submittals and this Agreement; perform testing, adjusting and balancing; ensure

equipment and systems are fully operational; and provide to OPG copies of completed operation and maintenance manuals for use in demonstrations. The Contractor will submit a schedule, for OPG's approval, with the time and date for the demonstration of each item of equipment and each system, with a list of all personnel to be present, not more than one month and not less than two weeks before designated dates.

(c) **Post Substantial Completion Date.** Commencing on Substantial Completion, the Contractor will provide to OPG at the Site a representative, qualified to operate the Tunnel Facility Project, at all reasonable times. The Contractor will cause this representative to advise OPG in respect of the operation of the Tunnel Facility Project. The Contractor will provide this representative for a reasonable period satisfactory to OPG's Representative, such period not to be less than one week. During such period, the Contractor's representative will not make, or direct the making of, any change or adjustment to any part of the Goods or Tunnel Facility Project without the prior written approval of OPG's Representative.

2.12 Procurement

(a) **Goods.** Except to the extent otherwise expressly provided in this Agreement, the Contractor will be responsible, at its cost, for manufacturing or supplying or procuring, factory testing, transporting, delivering, inspecting, receiving and installing all Goods, and providing all construction equipment, tools, transportation, fuel, construction and start-up power, air, light, heat, communications, water (including potable water), sewer connections and temporary structures and facilities, including for offices, lunchrooms, canteens, sanitation, showers, change rooms, accommodations, shops, warehouses and garbage disposal, and all other goods and services reasonably required in respect of the Work. The Contractor will maintain all construction equipment, tools and such temporary structures and facilities in good working order. The Contractor will conduct all these activities in accordance with this Agreement. The Contractor will maintain absolute control over, and exclusive responsibility for, the Contractor's own, and each Subcontractor's own, operations and the Contractor's Personnel.

(b) **Warranty on Goods.** The Contractor will ensure that all Goods will be fit for the purposes intended by this Agreement, new, unused, not Defective and free from all Liens, of good quality and comply with all requirements under this Agreement. All warranties and guarantees set out in this Agreement are for the benefit of OPG. If required by OPG, the Contractor will provide satisfactory evidence (including reports of required inspections, tests and approvals) as to the kind and quality of all Goods. The Contractor will ensure that all Goods will be constructed, applied, assembled, erected, installed, used, connected, adjusted, field tested, conditioned, cleaned, commissioned and cleaned up in accordance with instructions of the applicable Subcontractor, except to the extent as may otherwise be provided in this Agreement.

(c) **Quality Assurance.**

(1) **Quality Assurance Program.** The Contractor will submit a quality assurance program for review to OPG as a Submittal within 60 days after the Start Date which program will be based on the Outline Quality Assurance/Quality Control Program attached hereto as Appendix 2.12(c)(2). Once accepted as a Final Submittal pursuant to Section 2.8(g), such quality assurance program will be deemed to form part of this Agreement , and will be implemented by the Contractor. The quality assurance program of the Contractor will accord with the Contractor's own internal program and the other requirements, if any, set out in this Agreement. If there are any conflicts between the Contractor's internal program and this Agreement, this Agreement will prevail. Compliance with these quality assurance requirements will not relieve the Contractor of any of its obligations or liabilities under this Agreement. The Contractor will ensure that all of the Work is provided in accordance with the applicable quality assurance program. OPG may have any aspect of the quality assurance program of the Contractor reviewed by any auditors designated by OPG. The Contractor will, at its expense, provide such auditors prompt access to all premises and documents required for such review.

(2) **Independent Inspection Agencies.** OPG may engage independent inspection or testing agencies for the purpose of inspecting and testing the quality of portions of the Work. The engagement of independent inspection or testing agencies by OPG will not relieve the Contractor of any of its obligations or liabilities under this Agreement. If the Work or the Tunnel Facility Project, in whole or in part, is found to be Defective during inspection or testing, the appointed agency will request additional inspection or testing to ascertain the full degree of the Defect. The Contractor will promptly correct Defective Work in accordance with Sections 9.7 and 9.8. The Contractor shall submit such samples and materials required for testing as may be reasonably required by OPG. The Contractor will submit such samples and/or materials with reasonable promptness and in an orderly sequence so as not to cause delay in the Work. The Contractor will provide labour and facilities to obtain and handle samples and materials on Site and shall provide sufficient space to store and cure test samples.

(3) **Quality Documents.** The Contractor will provide OPG with signed and dated legible copies or originals of all inspection documents pertaining to the Work, including installation and testing. The Contractor will retain all quality assurance documentation and records for seven years after the Final Completion Date or for any longer period specified in the Contractor's Proposal Documents or the Final Submittals.

(4) **Effects of Non-Conformance.** If the Contractor identifies anything which does not conform to the quality assurance program set out in Section 2.12(c)(1), the Contractor will promptly correct such non-conformance (unless the Contractor proposes to "use as is") and deliver a Notice in the form of Appendix 2.12(c)(4) to OPG's Representative reporting the corrective action taken by the Contractor or that the Contractor proposes to "use as is". OPG's Representative will return the Notice in the form of Appendix 2.12(c)(4) to the Contractor indicating OPG's agreement with the proposed disposition (with or without additional terms detailed in Appendix B to the Notice) or directing the Contractor to comply with the Contractor's Proposal Documents or the Final Submittals, as the case may be.

2.13 Construction

(a) **Direction and Competent Supervision.** The Contractor will perform (including all direction, supervision and inspection of) the Work competently and efficiently, devoting such attention and applying such skills and expertise as may be necessary to perform the Work in accordance with this Agreement. The Contractor will at all times maintain good discipline and order at the Site. The Contractor will be solely responsible for the means, methods, techniques, sequences and procedures used to perform the Work (except with respect to the INCW Part Project, in which case OPG will be the "constructor" and will have the control necessary to effectively carry out that role, as described more particularly in Section 2.20). The Contractor will keep OPG advised as to the quality and progress of the Work and the Tunnel Facility Project in such manner and at such times as OPG may request from time to time.

(b) **Temporary Structures and Facilities.** Except with respect to the INCW Part Project (as discussed on Section 2.20), the Contractor will have the sole responsibility for:

(1) the design, erection, operation, maintenance and removal of all temporary structures and facilities at the Site; and

(2) the design and execution of construction methods required in the use of such structures and facilities.

(c) **Time for Performance of the Work.** The Contractor may perform the Work at any time except to the extent that performing the Work is prohibited or restricted:

(1) by Applicable Laws;

(2) by the Approvals;

(3) in the Summary of Work; or

(4) elsewhere in this Agreement.

(d) **Control Monuments.** The Contractor will establish the lay out for the Tunnel Facility Project and will maintain and protect the control monuments established by OPG. The Contractor will ensure that such control monuments are not changed or relocated without the prior written consent of OPG's Representative. The Contractor will promptly report to OPG's Representative whenever any control monuments are lost or destroyed or require relocation because of necessary changes in grades or locations. If OPG's Representative provides consent to any change to, or relocation of, a control monument, the Contractor will cause such change or relocation to be carried out accurately by professionally qualified individuals.

(e) **Survey Verification.** OPG may periodically review the survey and setting out of the Tunnel Facility Project and calculations conducted by the Contractor, and will promptly provide the results of such reviews to the Contractor. In the event of discrepancy, the Contractor and OPG will collaborate to resolve the discrepancy. Unless otherwise directed by OPG in writing, successive setting out operations, that depend on previous work, shall not proceed until the discrepancy has been resolved.

(f) **Non-Compliance.** If the Contractor becomes aware of any Work which does not comply with any of the Owner's Mandatory Requirements, the Contractor's Proposal Documents, the Final Submittals or any provision of this Agreement, the Contractor will promptly correct such non-compliance (unless the Contractor proposes to "use as is") and deliver a Notice in the form of Appendix 2.13(f) to OPG's Representative reporting the corrective action taken by the Contractor or that the Contractor proposes to "use as is". OPG's Representative will return the Notice in the form of Appendix 2.13(f) to the Contractor indicating OPG's agreement with the proposed disposition (with or without additional terms detailed in Appendix B to the Notice) or directing the Contractor to comply with the Owner's Mandatory Requirements, the Contractor's Proposal Documents, the Final Submittals or any provision of this Agreement, as the case may be.

2.14 Labour and Subcontractors

(a) **Competent Workers.** The Contractor will ensure all of the Contractor's Personnel assigned to the Work or the Site, including any site manager and his or her delegates,

(1) are qualified because of knowledge, training and experience to organize the Work and perform the Work;

(2) are familiar with the *Occupational Health and Safety Act* (Ontario) provisions that apply to the Work;

(3) understand, and have the necessary skills to perform, their roles and obligations under this Agreement including those relating to safety, the

environment, quality assurance, labour requirements, and Site rules and procedures; and

(4) have knowledge of any potential or actual danger to health or safety in the workplace and the plans and programs in place to address such danger.

(b) **Contractor Fully Responsible for Workers and Subcontractors.** The Contractor will be solely responsible for providing, scheduling and coordinating the Subcontractors and the Contractor's Personnel unless otherwise provided in this Agreement. The Contractor will cooperate with other Persons in all matters of common interest pertaining to services being provided under agreements between OPG and such other Persons, and ensure that the Work being performed on the Site does not obstruct the operations of OPG or other Persons providing services at or near the Site. Except where OPG's Representative requests in writing a specified form of communication, the Contractor will communicate with OPG and all such other Persons solely through OPG's Representative. Except where OPG's Representative requests in writing a specified form of communication, the Contractor will ensure that all Subcontractors communicate with OPG solely through the Contractor. The Contractor will be fully responsible for all acts and omissions of each member of the Contractor's Personnel and each of the Subcontractors and any such acts and omissions will be deemed to be those of the Contractor. Accordingly, respecting each obligation of the Contractor under this Agreement, the Contractor will ensure that no worker of the Contractor, no Subcontractor and no worker of any Subcontractor will breach any such obligation. In addition, respecting each action which the Contractor is not permitted to take under this Agreement, the Contractor will ensure that no worker of the Contractor, no Subcontractor and no worker of any Subcontractor will take any such action that is not permitted. Where any Subcontractor performs any of the Work, the Contractor will ensure that the Subcontractor names OPG as a beneficiary/obligee under any performance, labour and material payment or lien bond posted in respect of that Work.

(c) **Identity of Subcontractors.** Set out in Appendix 2.14(c) is a list of each Subcontractor performing any of the Work. Where the value of all contracts with a Subcontractor exceeds 1% of the Contract Price (a "Major Subcontractor"), Appendix 2.14(c) also includes a summary of the Work to be performed by each such Subcontractor. OPG reserves the right to require the Contractor to provide such information with respect to any Subcontractor. The Contractor will not:

(1) change any such Major Subcontractor;

(2) change in a material manner the Work performed by any Major Subcontractor; or

(3) add any new Subcontractor who will be performing any Work where the value of all contracts with such new Subcontractor exceeds 1% of the Contract Price,

unless OPG's Representative consents, in advance, in writing to such change or addition.

(d) **Subcontracts.** The Contractor will ensure that all Subcontractors and all Contractor's Personnel comply with the terms of this Agreement as are applicable to them, including the terms relating to safety, environment, quality assurance, labour requirements and Site rules and procedures. The Contractor will enter into a written contract with each Subcontractor performing any of the Work that specifically binds the Subcontractor to the applicable terms of this Agreement, including the terms relating to safety, environment, quality assurance, labour requirements, and Site rules and procedures and this Section 2.14, for the benefit of OPG. The Contractor will ensure that each such contract contains a term stating: "Notwithstanding any term in this Agreement, the parties commit to each other and to Ontario Power Generation Inc. that each Party will comply in all respects with Section 2.14(d) of the Design/Build Agreement dated as of **[insert date]** between Ontario Power Generation Inc. and Strabag AG." The Contractor will ensure that each contract with a Subcontractor respecting the Work or Tunnel Facility Project will give OPG the right to continue the contract with the Subcontractor in the place of the Contractor if OPG decides to entirely finish the Work in accordance with Section 9.8(c) or 10.3. In the case of assumption of a subcontract by OPG, all invoices submitted by the Subcontractor will be in the name of OPG. At the request of OPG, the Contractor will provide unpriced copies of any subcontract (or evidence otherwise acceptable to OPG that such subcontract complies with this Section 2.14(d)). Notwithstanding the foregoing, the Contractor will provide unpriced copies to OPG of any subcontract with the manufacturer of the TBM.

(e) **Labour Obligations.** The Contractor will comply with all obligations set out in Appendix 2.14(e) including those set out in the "Labour Requirements Clause - Form 1" attached to Appendix 2.14(e). The Contractor will indemnify and save harmless all members of the OPG Group from and against any and all Losses suffered or incurred by any member of the OPG Group on account of claims made or grievances filed by any unions on account of any breach by the Contractor or any Subcontractor of the obligations set out in Appendix 2.14(e) in the course of performing the Work or on account of other non-unionized labourers performing portions of the Work.

(f) **WSIB.** The Contractor shall submit as a Submittal the Contractor's Workplace Safety and Insurance Board account number promptly after the account number has been obtained. The Contractor will be and remain at all times in good standing with the Workplace Safety and Insurance Board. Upon initial arrival on the Site, and from time to time at the request of OPG, the Contractor will submit a certificate of compliance from the Workplace Safety and Insurance Board as to the Contractor's status and that of all Subcontractors that will be performing Work at the Site. Together with the certificate, the Contractor will submit a list of the Workplace Safety and Insurance Board registration numbers of each of the

Contractor's Personnel who will be employed at the Site, and will thereafter update the list as the Work progresses.

(g) **Foreign Nationals.** The Contractor will be solely responsible for taking all necessary steps and actions to obtain at its cost all Approvals from all applicable Governmental Authorities respecting all foreign nationals who may be engaged in performing the Work in Canada.

(h) **Reasonable Objections by OPG.** The Contractor will not use, as part of the Contractor's Personnel, any individual against whom OPG has a reasonable objection. The Contractor will promptly remove from the Site any such Person whom OPG's Representative does not consider competent or otherwise considers unsuitable for performing the applicable Work, including for failure to comply with any applicable health or safety obligations or any other obligations under this Agreement.

(i) **Payment of Subcontractors.** The Contractor will pay in a timely manner all costs (including Taxes) respecting Work performed or caused to be performed by a Subcontractor on the Site which could result in any Lien being filed under the *Construction Lien Act* (Ontario) or otherwise against any property owned, leased or licensed by OPG or any of its subsidiaries or in which OPG or any of its subsidiaries has an interest, in whole or in part, including the Site. If the Contractor fails to make, any such payment in a timely manner, OPG may make payment directly to the applicable Subcontractor. At the request of OPG, the Contractor will cause the Subcontractor to issue any unpaid invoice directly to OPG. Section 7.5(e) will apply in respect of any such payment and the Subcontractor will be deemed to be the Contractor in respect of any applicable withholdings by OPG under Section 7.5(e). Where OPG makes any such payment, OPG may set off the full amount of any such payment against any amount otherwise owing by OPG to the Contractor.

(j) **Liens.** The Contractor will keep title to the Site and every part of the Site free and clear of all Liens respecting the performance of the Work. The Contractor will indemnify and hold harmless each member of the OPG Group from and against all Losses suffered or incurred by a member of the OPG Group and all claims, demands, actions, suits or proceedings for Losses made against any member of the OPG Group by any Person in respect of any Liens registered by a Subcontractor against any property owned, leased or licensed by OPG or any of its subsidiaries or in which OPG or any of its subsidiaries has an interest, in whole or in part, including the Site. The Contractor will immediately notify OPG of any such Lien, claim of Lien or other action of which it has knowledge and which affects the title to any property owned, leased or licensed by OPG or any of its subsidiaries or in which OPG or any of its subsidiaries has an interest, in whole or in part, including the Site. If any Lien is registered against any such property, in whole or in part, including the Site, by a Subcontractor, the Contractor will cause the Lien to be vacated or discharged from title within 10 Business Days of registration. If the Contractor fails to vacate or discharge any such Lien in a

timely manner, OPG may vacate or discharge that Lien by paying into court any sum or providing such security as may be necessary to vacate or discharge the Lien. In addition, the Contractor will immediately reimburse OPG on demand for all OPG's costs and expenses respecting the discharge, including the amount of the payment into court, the cost of any such security, OPG's legal fees and expenses and a reasonable charge for time spent by OPG personnel. OPG may set off the full amount of any such reimbursement obligation against any amount otherwise owing by OPG to the Contractor.

(k) **Local Community**. The Contractor will use its best efforts to provide opportunities to local residents to work on the Tunnel Facility Project and to acquire goods and services necessary in regard to the Tunnel Facility Project, including construction material and aggregate, from within the Regional Municipality of Niagara, all as more particularly described in the Community Impact Agreement. The Contractor will ensure that local contractors are provided with information about the Tunnel Facility Project and its labour requirements, and will be provided with timely bidding opportunities, all as more particularly described in the Community Impact Agreement.

2.15 Use of Site and Other Areas

(a) **Documents to be Maintained on Site.** The Contractor will maintain in a safe place on the Site one record copy of this Agreement (including all Amendments), the Owner's Mandatory Requirements, Submittals, Final Submittals, Project Change Directives, Project Change Notices, the Contractor's Proposal Documents, the Concept Drawings, the daily records described in Section 2.7(d) and quality assurance documentation, in good order and annotated to show all changes made during the performance of the Work. The Contractor will make all these documents available to OPG at any time for reference at the Site. On Substantial Completion, the Contractor will deliver those documents requested by OPG to OPG at the time and place designated by OPG.

(b) **Access to Areas.** If the Contractor requires access to any area outside of the Site, the Contractor will obtain, at its cost, such access for such purposes as the Contractor requires.

(c) **Designated Areas.** The Contractor will ensure that:

(1) all Goods, construction equipment, tools, fuel and temporary structures and facilities, including for offices, lunchrooms, canteens, sanitation, showers, change rooms, accommodations, shops, warehouses and garbage disposal, whether in use or in storage; and

(2) the operations of the Contractor and all Subcontractors,

will be restricted only to those areas designated "as available" on the Concept Drawings in Appendix 1.1(h) and any other areas outside of the Site permitted by Applicable Laws and will comply with the requirements set out in the Summary

of Work and the Owner's Mandatory Requirements. The Contractor will ensure that all such temporary structures and facilities will be of metal construction and will be removed from OPG's property when any such structure or facility is no longer needed, and in any event, within 60 days after the Final Completion Date. If the Contractor does not so remove any such structure or facility, OPG may remove such structure or facility at the Contractor's cost. The Contractor will conduct all activities in the areas designated in accordance with this Agreement.

(d) **Surrounding Community and Environment.** The Contractor recognizes that the Site is located in an urban/tourist area and recognizes the potential intrusiveness of construction on the activities of the local residents and that the Tunnel Facility Project is subject to the constraints set out in the Summary of Work. The Contractor will ensure that the Contractor's Personnel and each of the Subcontractors are aware of these conditions and the corresponding restrictions placed on them (e.g. noise limitations, transportation routes, respect for the local population and tourists, dust concerns) and that cooperation with local authorities and the public is essential. The Contractor will perform the Work in accordance with the Community Impact Agreement and conduct or attend meetings, participate in local committees, respond to information requests and do such other things as may be beneficial in maintaining a co-operative relationship with the local community. The Contractor will promptly notify OPG's Representative of any complaints it receives from the public. The Contractor will co-operate fully with OPG's Representative in responding to all complaints.

(e) **Site Conditions.** The Contractor will keep all of the Contractor's Personnel fully informed in a timely manner of all Site rules and conditions and any changes to such rules and conditions.

(f) **Contractor Responsibility for Damages.** The Contractor will have exclusive responsibility for any damage, injury or loss to any area on the Site or to OPG or any other occupant of the Site or to any adjacent area, respecting the performance of the Work. The Contractor will make good and pay all costs incurred by others in making good any such damage, injury or loss. If any claim, demand, action, suit or proceeding is made against OPG by any Person for any Losses arising in respect of the Work, the Contractor will promptly resolve the claim. The Contractor will indemnify and hold harmless each member of the OPG Group, from and against all Losses suffered or incurred by a member of the OPG Group and all claims, demands, actions, suits or proceedings for Losses made against any member of the OPG Group by any Person in connection with any damage, injury or loss to any area on the Site or to OPG or any other occupant of the Site or to any adjacent area, to the extent arising in respect of the Work, including in respect of any breach of any Applicable Laws.

(g) **Clean Site.** During the performance of the Work on the Site, the Contractor will keep the Site, and any roads, Site accesses, sidewalks and walkways used in the course of performing the Work, free from accumulations of snow, ice, water, rubbish, debris and other waste materials. The Contractor will implement a

housekeeping program to ensure that all rubbish and debris is kept to a minimum and cleared away daily and that all materials are stored in a safe manner. Promptly following Substantial Completion, the Contractor will remove all rubbish, debris and other waste or surplus Goods from and about the Site as well as all applicable construction equipment, tools, fuel, temporary structures and facilities, including for offices, lunchrooms, canteens, sanitation, showers, change rooms, accommodations, shops, warehouses and garbage disposal, and all other Goods not otherwise necessary to complete punch list items. Except as set out in Section 2.15(c), any materials remaining to complete punch list items will be removed by no later than the Final Completion Date. The Contractor will leave the Site clean and ready for occupancy by OPG once the Tunnel Facility Project is entirely finished. The Contractor will restore to original condition, as at the date of this Agreement, all property not designated for alteration by this Agreement. In addition, the Contractor will provide any other cleaning activities required by this Agreement.

(h) **Signage on Site.** The Contractor will not erect signage on the Site directed to the public without OPG's prior written approval.

(i) **Load Limits.** The Contractor will not load the Project, the Site or any roads used in the course of providing the Work and will ensure that no part of the Project, Site or such roads will be loaded in any manner that will endanger the Project, Site or such roads. The Contractor will not subject any part of the Project or any property on, under, over or near the Site to unsafe stresses or pressures.

(j) **Natural and Historical Objects.** All fossils, coins, articles of value or antiquity and structures and other remains or things of geological or heritage interest discovered on the Site shall be the absolute property of OPG. The Contractor will take all reasonable precautions and any precautions required by OPG to prevent the Contractor's Personnel or other Persons from removing or damaging any such article or thing and immediately on discovery and before removal acquaint OPG of such discovery and carry out at the expense of OPG, OPG orders as to the preservation and disposal of the same. OPG will provide direction to the Contractor in connection with the precautions required by OPG to prevent the Contractor's Personnel or any other Person from removing or damaging any such article or thing and in connection with the preservation and disposal of such article or thing and to the extent such direction has the effect of materially increasing the cost or time of performing the Work, then such direction will be treated as a Project Change Directive issued by OPG under Section 5.1.

(k) **Lands.** In addition to the Contractor's obligations in Section 2.15(b), if, in the performance of the Work, the Contractor makes use of any interest, right of way, easement, license or other use right for access (an "**Interest**") in land which is not required to be provided by OPG pursuant to Section 3.1(i), then the Contractor shall be responsible for acquiring the necessary Interest in such land at the Contractor's cost. For greater certainty, this Section 2.15(k) will apply if the as-

built tunnel alignment deviates from the Interest required to be provided by OPG pursuant to Section 3.1(i).

2.16 Intellectual Property

(a) **Grant of Intellectual Property Rights.** The Contractor grants to OPG all rights (including ownership of the physical property) in the Work, Tunnel Facility Project, Submittals, results of the Work, and all other documents of any kind, designs, drawings (including as built drawings), inventions, ideas, processes, discoveries, techniques, diagrams, illustrations, schedules, performance charts, brochures, specifications, plans, photographs and other recordings, reports, manuals (including operating and maintenance manuals), software (hard copies and machine readable formats), information, data, models, samples and other deliverables whether complete or incomplete, provided or required to be provided by the Contractor to OPG under this Agreement (collectively the "**Property**"). Without limiting the foregoing, this grant includes all intellectual property rights (including all trade secrets, confidential information, patents, patent applications, rights to file patents, trade-marks, trade-mark applications, rights to file trade-marks, copyrights, industrial and similar designs, rights to file for industrial and similar designs, and know-how) contained, embedded or disclosed in or otherwise existing in respect of, used in the production of, or required or desirable for the provision, use, reproduction, modification, maintenance, servicing, improvement or continued operation of the Property (collectively, the "**Intellectual Property**"). Effective on the date of each such grant, each such item will be deemed to be Confidential Information owned by OPG, despite Section 2.17(a)(2).

(b) **No Diminishing of Intellectual Property Rights.** The Contractor will not take any action that may compromise or diminish the grant to OPG of rights in the Property. The Contractor will perform any acts required to confirm or document OPG's rights in the Property. These acts include obtaining, at the request of OPG and at the Contractor's expense, assignments of rights from the Contractor's Personnel, as applicable, any applicable Subcontractor's employees and any applicable Subcontractor. These acts also include providing, at OPG's expense, access to the Contractor's Personnel, as applicable, and any applicable Subcontractor to assist OPG to protect fully its rights in the Intellectual Property.

(c) **Exception and Licence.** Notwithstanding any term in Section 2.16(a), the Contractor and each Subcontractor retains its rights in its part of the Intellectual Property, so long as the Contractor or the applicable Subcontractor can establish through written records that such Intellectual Property existed before the earlier of, the date of this Agreement or the date that the Contractor commenced the Work (the "**Retained Intellectual Property**"). In respect of all such Retained Intellectual Property that the Contractor or a Subcontractor owns or claims to own, the Contractor grants to OPG, or, in the case of a Subcontractor, the Contractor will provide to OPG, at the Contractor's cost, a perpetual, irrevocable, royalty-free, non-exclusive, fully paid up, freely assignable licence to:

(1) use all such Retained Intellectual Property in respect of the operation and maintenance, construction, commissioning, refurbishment, replacement, alteration, relocation, decommissioning, dismantling or demolition of the Sir Adam Beck Generating Complex and related facilities (including the Tunnel Facility Project), in whole or in part, to which the Retained Intellectual Property applies;

(2) use all such Retained Intellectual Property in respect of any transaction relating to the financing, sale, lease or other transfer of rights to a successor in interest involving the Sir Adam Beck Generating Complex and related facilities (including the Tunnel Facility Project), in whole or in part, to which the Retained Intellectual Property applies;

(3) disclose any Retained Intellectual Property to any Person who requires such Retained Intellectual Property in respect of any of the actions referred to in Section 2.16(c)(1) or 2.16(c)(2);

(4) use, reproduce, copy, transmit, modify and create derivative works from any Retained Intellectual Property; and

(5) sublicence any or all rights granted to OPG under this Section 2.16(c) to an affiliate of OPG or to any Person who provides goods or services to OPG.

(d) **Representation and Warranty.** The Contractor represents and warrants to OPG as follows.

(1) **No Suits.** There is no claim, demand or suit respecting any part of the Property, the Intellectual Property or the Retained Intellectual Property.

(2) **No Potential Claims.** There is no potential claim, demand or suit respecting the Property, the Intellectual Property or the Retained Intellectual Property, in whole or in part, that could affect the performance, function or use of the Property, Intellectual Property or Retained Intellectual Property, in whole or in part, as intended by this Agreement.

(3) **Ownership.** Before transferring ownership in the Property (including the Intellectual Property) to OPG, the Contractor is the exclusive owner of, and has good and marketable title to, all the Property. Except in regard to the Retained Intellectual Property, there is no ownership interest, agreement option or other right, title, benefit, interest or privilege outstanding in favour of any Person for the purchase or licence from the Contractor of, or any Lien in favour of any other Person in, any of the Property.

(4) **Right to Grant Licence.** The Contractor has the right to grant the licence rights in the Retained Intellectual Property and will obtain such rights from Subcontractors as contemplated by this Agreement.

(e) **OPG's Remedy for Breach.** The Contractor will indemnify and hold harmless each member of the OPG Group from and against all Losses suffered or incurred by a member of the OPG Group and all claims, demands, actions, suits or proceedings for Losses made against any member of the OPG Group by any Person arising in respect of any breach or infringement or alleged breach or infringement by any member of the OPG Group of any right of any third party in any of the Property, the Intellectual Property or the Retained Intellectual Property. If any such claim, demand, action, suit or proceeding arises, the Contractor will, at its own cost:

(1) obtain the right for OPG to continue using the Property, the Intellectual Property and the Retained Intellectual Property in the manner intended by this Agreement;

(2) make such modifications to the Property, the Intellectual Property and the Retained Intellectual Property so that it becomes non-infringing, without incurring any diminution in the performance, function or use of the Property, the Intellectual Property or the Retained Intellectual Property, as intended by this Agreement; or

(3) replace the Property, the Intellectual Property and the Retained Intellectual Property to the extent necessary with non-infringing substitutes, so long as such substitutes do not result in a diminution in the performance, function or use of the Property, the Intellectual Property or the Retained Intellectual Property as intended by this Agreement.

2.17 Confidential Information

(a) **Definition of Confidential Information.** In preparation for, and in the course of, performing the Work, OPG and OPG's Representative will disclose to the Contractor certain OPG information which is confidential, a trade secret or otherwise proprietary to OPG, including this Agreement and the fact that the Contractor is performing the Work (collectively, the "**Confidential Information**"). Confidential Information does not include, however, information that the Contractor is able to demonstrate to OPG's satisfaction, acting reasonably:

(1) was or becomes generally known to the public through no fault of the Contractor, a Subcontractor or their respective shareholders, directors, officers, partners, members, representatives, agents, advisors or any of the Contractor's Personnel or any other Person for whom the Contractor or any Subcontractor is responsible at law; or

(2) was specifically known by the Contractor before disclosure by OPG and was not subject to any confidentiality obligation.

(b) **Ownership and Treatment of Confidential Information.** All Confidential Information remains, at all times, the exclusive property of OPG. Except as expressly set out in this Section 2.17(b), the Contractor has no licence or other right to use or disclose any Confidential Information for any purpose whatsoever. The Contractor may use Confidential Information only in respect of the preparation for, and the performance of, the Work, including in negotiations with proposed Subcontractors. The Contractor will ensure that none of its or any Subcontractor's current or former shareholders, directors, officers, partners, members, representatives, agents and advisors or any of the Contractor's Personnel or any other Person for whom the Contractor or any Subcontractor is responsible at law will use any of the Confidential Information for any purposes other than those expressly set out in this Section 2.17(b).

(c) **Return of Confidential Information.** At any time, at OPG's request, the Contractor will deliver promptly to OPG all, or an OPG-specified portion of, the Confidential Information, together with all copies, extracts or other reproductions in whole or in part of such Confidential Information. In addition, at any time, at OPG's request, the Contractor will destroy, demonstrably, promptly and irrevocably:

(1) all such copies, extracts or other reproductions of Confidential Information, or an OPG-specified portion of Confidential Information, which cannot, because of the device on which such Confidential Information is stored, be removed from the possession of the Contractor by delivery to OPG; and

(2) all documents, designs, drawings, specifications, plans, reports, information and other deliverables or data whatsoever (regardless of the form, medium or device on or in which such Confidential Information is written, recorded, stored or reproduced) prepared in respect of the Work and which is based on any of the Confidential Information.

Following such delivery and destruction, the Contractor will promptly provide OPG with written confirmation of completion. In any event, the Contractor will complete all such actions within 10 Business Days of receipt of OPG's initial request.

(d) **Remedies.** The Contractor acknowledges that OPG would not have an adequate remedy at law for money damages if the Contractor fails to fulfill any of its obligations under this Section 2.17. Accordingly, in addition to any other remedies under this Agreement, OPG will be entitled to any injunction, specific performance or other remedy in law or equity (without being required to post a bond or other security), in respect of any breach or threatened breach of this Section 2.17 and in which case, the Contractor consents to any such injunction,

specific performance or other remedy in law or equity. The Contractor will indemnify and hold harmless each member of the OPG Group, from and against all Losses suffered or incurred by a member of the OPG Group and all claims, demands, actions, suits or proceedings for Losses made against any member of the OPG Group by any Person, to the extent arising in respect of a breach or threatened breach of this Section 2.17.

2.18 Conflicts of Interest

The Contractor has provided to OPG the declaration set out in Appendix 2.18, stating that, except as disclosed, the Contractor and all members of its consortium are free of actual or potential conflicts of interest. The Contractor will disclose any change in circumstance that may cause the declaration set out in Appendix 2.18 to be incorrect, inaccurate or incomplete. If the Contractor or consortium member discloses a change in circumstance during the course of the Tunnel Facility Project, OPG may request that the Contractor deliver further particulars regarding the conflict and may ask the Contractor to propose and institute measures which in OPG's opinion satisfactorily address the conflict.

2.19 Language and Units of Measure

(a) **Use of English Language.** The Contractor will ensure that all communication between OPG and the Contractor and between the Contractor and each of the Subcontractors respecting the Work will be in English, including all drawings, notes on drawings and Submittals.

(b) **Units of Measurement.** The Contractor will ensure that the International System of Units (SI) will be used for all purposes with respect to the Work, including the calibration of any Goods.

(c) **Risk.** Any and all risk associated with language or units of measure shall be borne by and be for the account of the Contractor, howsoever the event may be caused.

2.20 Work Safety - INCW Part Project

The provisions in this Section 2.20 shall apply to the portion of the Work required for the INCW Part Project and carried out in the INCW Part Project Area.

(a) **Primary Goal**. Safety of the Contractor's Personnel, individuals at or near the INCW Part Project Area and the public is of paramount concern to OPG. In the performance of the relevant Work, the Contractor will not in any manner endanger the safety of, or unlawfully interfere with, Persons on or off the INCW Part Project Area, including the public.

(b) **Constructor**. OPG will be the "constructor" (as that term is defined in the *Occupational Health and Safety Act* (Ontario)) in respect of the Work required for the INCW Part Project and carried out in the INCW Part Project Area. As such, OPG will submit the required notice of project and registration form to the

applicable Governmental Authority. OPG will also have the authority necessary to carry out the role of "constructor" effectively.

(c) **Compliance**. The Contractor will perform all the Work required for the INCW Part Project in accordance with:

(1) all Applicable Laws and applicable collective agreements;

(2) and to the extent not inconsistent with Sections 2.20(c)(1), the INCW Part Project Specific Site Safety Plan, as described in Section 2.20(d);

(3) and to the extent not inconsistent with Sections 2.20(c)(1) and 2.20(c)(2), the Contractor's safety program (a copy of which is attached as Appendix 2.4(c), as amended from time to time); and

(4) and to the extent not inconsistent with Sections 2.20(c)(1), 2.20(c)(2) and 2.20(c)(3), the very best of practices respecting health and safety and in a manner that recognizes and minimizes the risks to workers, other individuals and property.

The Contractor will forward to OPG, for OPG's review and prior approval, without delay, any changes to the INCW Project Specific Site Safety Plan made during the course of performing the Work required for the INCW Part Project. OPG will monitor the compliance of the Contractor and Subcontractors with these requirements, including through field inspections during the course of the performance of the Work required for the INCW Part Project. The Contractor will rectify any deficiencies immediately upon written or verbal direction from OPG's Representative. OPG may also have any aspect of the INCW Project Specific Site Safety Plan reviewed by inspectors and other Persons designated by OPG. The Contractor will provide these inspectors and other Persons with prompt access to the INCW Part Project Area and all premises and documents required for such review. The Contractor will forward to OPG, without delay, any change to the Council Amendment to Draft #7 (CAD-7) rating of the Contractor or to any Subcontractor performing Work in the INCW Part Project Area.

(d) **INCW Part Project Specific Site Safety, Security, Public Safety and Emergency Response Plan**. The Contractor will have performed a safety hazard analysis to identify all significant safety hazards in respect of the Work required in the INCW Part Project Area. Based on this analysis and the Preliminary INCW Part Project Specific Site Safety, Security, Public Safety and Emergency Response Plan, the Contractor will prepare a detailed safety plan for the INCW Part Project (as amended from time to time, the "**INCW Part Project Specific Site Safety, Security, Public Safety and Emergency Response Plan**") which will document how the Contractor will address all significant safety hazards related to the INCW Part Project, including the methodology for safe work planning and will include provision for the regular and systematic review and

audit of the plan elements by the Contractor to determine whether the INCW Part Project Specific Site Safety, Security, Public Safety and Emergency Response Plan requires modification to more appropriately and effectively address all safety hazards associated with the Work required in the INCW Part Project Area. The Contractor will provide for the communication of the INCW Part Project Specific Site Safety, Security, Public Safety and Emergency Response Plan to all workers performing Work on the INCW Part Project Area and all Subcontractors. The Contractor will submit the INCW Part Project Specific Site Safety, Security, Public Safety and Emergency Response Plan to OPG as a Submittal within 30 days after the Start Date for review and comment and such plan will be deemed to form part of this Agreement. The INCW Part Project Specific Site Safety, Security, Public Safety and Emergency Response Plan will be implemented by the Contractor. OPG retains the right to require modification of the INCW Part Project Specific Site Safety, Security, Public Safety and Emergency Response Plan, to its sole satisfaction, including in order to ensure that the plan meets OPG's safety requirements. To the extent OPG requires modification of the plan, the Contractor will modify the plan within 5 days after receiving Notice to do so from OPG. The Contractor will also submit to OPG the results of its own regular review and audit of the INCW Part Project Specific Site Safety, Security, Public Safety and Emergency Response Plan, including modifications thereto, within 10 days after each review and audit. OPG will monitor the compliance of the Contractor and Subcontractors with the INCW Part Project Specific Site Safety, Security, Public Safety and Emergency Response Plan through field inspections during the course of the performance of the Work required in the INCW Part Project Area.

(e) **Effect of Review**. If OPG reviews, comments on, accepts, rejects or fails to review, comment on, accept or reject any aspect of the Contractor's or a Subcontractor's safety program or the INCW Part Project Specific Site Safety Plan (including at a meeting or as part of OPG's inspections or reviews), or if the Contractor or a Subcontractor satisfies or fails to satisfy any comments or concerns of OPG, such action or failure to act will not in any way relieve the Contractor from any of its safety obligations under this Agreement.

(f) **Safety Representative**. The Contractor will provide a qualified and experienced health and safety representative that will be responsible for the INCW Part Project Area. The Contractor will make this representative responsible for training the Contractor's Personnel in safety, prevention of accidents and the maintaining, reviewing and revising of safety precautions and programs.

(g) **Safety Precautions and Remedies**.

(1) **Protection**. Subject to a written or verbal direction from OPG's Representative to the Contractor, the Contractor will be responsible for initiating, maintaining, reviewing, revising and supervising all safety precautions and programs in respect of the Work required for the INCW Part Project. The Contractor will take all necessary precautions (including

ensuring that all of the Contractor's Personnel are equipped with, and properly use, all safeguards and personal protective equipment necessary for the performance of the relevant Work) for the safety of, and will provide the necessary protection to prevent damage, injury or loss resulting from the performance of the Work required for the INCW Part Project to:

(A) each Person who is in the INCW Part Project Area or who may otherwise be affected by the performance of the Work required for the INCW Part Project, including the Contractor's Personnel and members of the public;

(B) any of the Goods, whether in storage on or off the INCW Part Project Area;

(C) the Tunnel Facility Project; and

(D) any other property on, under, over or near the INCW Part Project Area, whether belonging to OPG or to any other Person, including buildings and other structures, facilities, fences, gates, pavements, roadways, sidewalks, walks, vegetation, utilities and underground facilities that are not designated for removal and disposal in the course of performing the relevant Work.

(2) **Work Protection**. The Contractor will carry out the Work required in the INCW Part Project Area under work protection ensuring that equipment being worked on is safely isolated and de-energised. OPG will provide isolation and de-energisation, provided that the Contractor is responsible for co-ordinating all work protection with OPG's Representative. Where the Contractor is required to perform elements of the Work under OPG's Work Protection Code, the Contractor's personnel directly involved in execution of the Work must complete required mandatory training as outlined in OPG, Electricity Production, Work Protection Code Training Requirements NPG-LP-HS-007 (current version dated April 15, 2003). All individuals who will be required to work as a work group member under a Work Protection must complete Level 2 - Worker Training (up to 1 hour). All individuals who will be required to hold Work Protection, and their supervisors, must successfully complete Level 5 - Instructor Led - Holder of Record Training (3 days plus field assignments). Requalification training is required every 2 years. The Contractor acknowledges that it has reviewed OPG's Work Protection Code.

(3) **Notification of Owners**. The Contractor will promptly deliver a Notice to OPG's Representative as the Contractor becomes aware of, and indicating the identity of, each utility, owner of underground facilities and owner of property (excluding OPG and its subsidiaries) on, under, over or near the INCW Part Project Area that may be affected by the relevant Work and

how each such utility or owner may be affected. OPG will deliver a Notice to the Contractor confirming the identity of each such Person and the Contractor will, at OPG's direction, deal with or cooperate with OPG in dealing with settling any issue with such Person, including the protection, removal, relocation or replacement of the property of any such Person.

(4) **Repair of Damage**. To the extent that any third party, such as a utility, owner of underground facilities or owner of property (excluding OPG and its subsidiaries) on, under, over or near the INCW Part Project Area suffers or incurs any Losses to any property caused by the Contractor or a Subcontractor, the Contractor will remedy such Losses in a timely manner and at the Contractor's expense. The Contractor will indemnify and hold harmless each member of the OPG Group from and against all Losses suffered or incurred by a member of the OPG Group and all claims, demands, actions, suits or proceedings for Losses made against any member of the OPG Group by a third party in connection with Losses suffered or incurred to any property of such third party caused by the Contractor or a Subcontractor.

(h) **INCW Part Project Specific Site Security, Public Safety and Emergency Response**. The Contractor will have performed a security, public safety and emergency response analysis to identify all public safety hazards associated with the INCW Part Project Area and the relevant Work and to identify all potential means of unauthorized access to the INCW Part Project Area. Based on this analysis and the Preliminary INCW Part Project Specific Site Safety, Security, Public Safety and Emergency Response Plan, the Contractor will prepare a detailed project specific site security, public safety and emergency response plan for the INCW Part Project. Such plan as amended from time to time will be included in the INCW Part Project Specific Site Safety, Security, Public Safety and Emergency Response Plan and will document, among other things, how the Contractor will address all significant public safety hazards and prevent unauthorized access to the INCW Part Project Area, the matters described in Appendix 2.4(g)(3) (which shall apply to the INCW Part Project, *mutatis mutandis*) and will include provision for the regular and systematic review and field inspection of the plan elements to determine whether the INCW Part Project Specific Site Safety, Security, Public Safety and Emergency Response Plan requires modification. The Contractor will provide for the communication of the INCW Part Project Specific Site Safety, Security, Public Safety and Emergency Response Plan to all workers performing Work on the INCW Part Project Area and all Subcontractors. The Contractor will submit the INCW Part Project Specific Site Safety, Security, Public Safety and Emergency Response Plan to OPG as a Submittal within 30 days after the Start Date for review and comment and such plan will be deemed to form part of this Agreement. The INCW Part Project Specific Site Safety, Security, Public Safety and Emergency Response Plan will be implemented by the Contractor. OPG retains the right to require modification of the INCW Part Project Specific Site

Safety, Security, Public Safety and Emergency Response Plan, to its sole satisfaction. To the extent OPG requires modification of the plan, the Contractor will modify the plan within 5 days after receiving Notice to do so from OPG. The Contractor will also submit to OPG the results of its own regular review and audit of the INCW Part Project Specific Site Safety, Security, Public Safety and Emergency Response Plan, including modifications thereto, within 10 days after each review and audit. OPG will monitor the compliance of the Contractor and Subcontractors with the INCW Part Project Specific Site Safety, Security, Public Safety and Emergency Response Plan through field inspections during the course of the performance of the Work required in the INCW Part Project Area.

(i) **Safety Reports**. During the performance of the Work in the INCW Part Project Area, the Contractor will provide OPG's Representative with:

(1) a verbal report immediately of all accidents, near misses or "High Maximum Reasonable Potential for Harm" incidents (which are defined to be incidents that result in, or could reasonably be expected to result in, death from either immediate or delayed effects or permanent total disability, that is, where an individual is disabled to the point where maintaining gainful employment is unlikely) which the Contractor is required to provide to OPG in accordance with OPG's safety incident management standard, as amended from time to time (which the Contractor has reviewed), including any serious incident requiring off-site medical attention or near miss incidents which do or could have resulted in the death of, or serious injury to, a worker or other Person on or off the INCW Part Project Area or an incident which has resulted in the death of or serious injury to a worker or other Person on or off the INCW Part Project Area;

(2) an immediate verbal report of all High Maximum Reasonable Potential for Harm incidents (as that term is defined in Section 2.20(i)(1)) and evidence that a senior executive of the Contractor has also made this report immediately to OPG's Representative;

(3) within 24 hours of an accident, construction occurrence or incident report, a copy of all accident, construction occurrence and incident reports which the Contractor, any Subcontractor, or OPG is required to submit in respect of the relevant Work under the *Occupational Health and Safety Act* (Ontario) or the *Workplace Safety and Insurance Act*, 1997 (Ontario);

(4) within 24 hours, Notice of any visits by the Ministry of Labour and copies of any reports, orders to comply, charges, stop work orders, and notices of compliance under the *Occupational Health and Safety Act* (Ontario) or other Applicable Laws;

(5) if there is a joint health and safety committee, a copy of the minutes of each meeting of the joint health and safety committee; and

(6) a monthly report within 10 days of each month's end with safety statistics for the Contractor and all Subcontractors performing Work at the INCW Part Project Area. The Contractor will include in this report, with a brief description of each incident and injury:

(A) the number of injuries resulting in a worker requiring medical aid;

(B) the number of near miss incidents which could have resulted in the death of, or serious injury to, a worker;

(C) the number of injuries resulting in a worker's absence from one or more complete shifts;

(D) the time each worker takes off from work for each injury;

(E) the number of Ministry of Labour orders to comply; and

(F) the total number of person hours worked by the Contractor's Personnel broken down between the Contractor and each Subcontractor.

(j) **Stop Work Orders**. Where an order to comply, stop work order or any similar order or notice respecting the relevant Work is issued by the Construction Health and Safety Branch of the Ontario Ministry of Labour or any other Governmental Authority or OPG, where in OPG's opinion, the stoppage is necessary to protect the safety of Persons or property, such order or notice will not be grounds for any change to the Contract Schedule or any other claim for delay or compensation, except to the extent that an action of OPG or another member of the OPG Group has resulted in such order or notice. To the extent OPG or another member of the OPG Group was immediately and directly responsible for causing the underlying circumstances giving rise to such order or notice, this situation will be deemed to constitute an excusable delay for the purposes of Section 6.2(a). The Contractor will promptly deliver to OPG's Representative a copy of any such order or notice. The Contractor will not recommence any Work that has been stopped or suspended without the prior written approval of OPG's Representative.

(k) **Investigations**. The Contractor will, at the Contractor's expense, participate in, co-operate with OPG in, at OPG's request, co-operate with any Governmental Authority in, and, at OPG's request, carry out, reporting and investigating safety violations caused by any act or failure to act of the Contractor or any Subcontractor. To the extent that the Contractor, any Subcontractor, the Contractor's Personnel or any of the Contractor's or any of a Subcontractor's shareholders, directors, officers, partners, members, representatives, agents, advisors or any other Person for whom the Contractor or any Subcontractor is responsible at law is responsible for the circumstances giving rise to a safety violation, the Contractor will pay OPG for the applicable portion of the costs and expenses incurred by OPG in respect of steps taken by OPG to investigate, report and/or alleviate the safety situation.

(l) **Emergencies**. In emergencies affecting the safety or protection of individuals, the relevant Work or the INCW Part Project or property on, under, over or near the INCW Part Project Area, the Contractor, without the express consent of OPG, will take reasonable actions to prevent or minimize all threatened or actual damage, injury and loss. The Contractor will indemnify and hold harmless each member of the OPG Group from and against all Losses suffered or incurred by a member of the OPG Group and all claims, demands, actions, suits or proceedings for Losses made against any member of the OPG Group by any Person, to the extent arising in respect of any emergency medical treatment provided by any member of the OPG Group to any of the Contractor's Personnel or any invitee of the Contractor or any Subcontractor.

(m) **Requirement to Leave**. In the case of an emergency requiring the Contractor to leave the INCW Part Project Area at the direction of OPG, the Contractor will put all equipment in a safe state in accordance with the Occupational Health and Safety Act (Ontario) and leave the INCW Part Project Area in an orderly fashion pending further instructions from OPG's Representative.

(n) **Hazard Communication Programs**. The Contractor will co-ordinate all exchanges of material safety data sheets and other hazard communication information related to the Work required in the INCW Part Project Area to be made available to, or exchanged between or among, Persons in the INCW Part Project Area.

(o) **Designated Substances and Other Hazardous Materials**.

(1) The Contractor is solely responsible for any "designated substances" (as defined under the *Occupational Health and Safety Act* (Ontario)) brought onto the INCW Part Project Area by it, and shall fully remove any remaining amounts prior to or upon completion of the Work required in the INCW Part Project Area. The Contractor shall also ensure that in no event will designated substances be incorporated into the permanent facilities.

(2) Any other potentially hazardous materials or substances to which OPG personnel may be exposed during operation and maintenance of the facility must be in conformance with OPG's HAZMAT approved material list.

(3) The Contractor acknowledges that prior to execution of this Agreement, OPG provided the Contractor with a list of designated substances present at the INCW Part Project Area (a copy of which is attached as Appendix 2.20(o)), as required pursuant to the *Occupational Health and Safety Act* (Ontario). OPG is not aware of any other designated substances at the INCW Part Project Area.

(p) **Direction from OPG**. Notwithstanding anything contained in this Section 2.20, as "constructor" (as defined under the *Occupational Health and Safety Act* (Ontario)) in respect of the Work required for the INCW Part Project, OPG retains the right to direct the Work performed on the INCW Part Project Area, in its sole discretion.

(q) **Indemnity Relating to Safety**. To the extent that the Contractor is responsible for, caused or contributed to, in whole or in part, the circumstances giving rise to a violation, charge, fine, order, direction, stop work order or other consequence pursuant to legislation applicable to worker health and safety, including the *Occupational Health and Safety Act* (Ontario) or its Regulations, the Contractor will indemnify and hold harmless each member of the OPG Group from and against all Losses suffered or incurred by a member of the OPG Group and from and against all claims, demands, actions, suits or any other proceedings for Losses made against any member of the OPG Group in connection with such violation, charge, fine, order, direction, stop work order or consequence.

SECTION 3. OPG'S OBLIGATIONS

3.1 Take Actions Promptly

OPG will take each of the following actions in a responsible manner so as not to materially delay the Contractor:

(a) designate in writing from time to time an individual to act as OPG's project representative to monitor performance of the Work and administer this Agreement;

(b) provide access to Site, subject to any restrictions respecting certain parts of the Site set out in the Summary of Work or otherwise set out in this Agreement;

(c) provide information known to OPG relating to the presence on the Site of Hazardous Material in addition to those described in this Agreement, in such quantities or circumstances that there is a material danger to any Person performing the Work;

(d) discharge its obligations under Section 2.8 with respect to Submittals;

(e) obtain those Approvals listed in the Summary of Work as being the responsibility of OPG, provided that the Contractor fulfills its responsibilities with respect to such Approval;

(f) obtain such other Approvals as Contractor may identify as being required to be obtained by OPG, provided that the Contractor prepares the required documentation, submits it to OPG and supports the obtaining of such Approvals;

(g) provide the Contractor with all reasonable information and the required documentation the Contractor, acting reasonably, identifies as being necessary to prepare applications for Approvals;

(h) support the Contractor as and when the Contractor requests to obtain Approvals;

(i) acquire sufficient interest in the lands upon which the Tunnel Facility Project is to be completed, the rights of way, easements, licenses and other use rights for access thereto indicated on the Concept Drawings as necessary for performance of Work; and

(j) furnish to the Contractor, as required for performance of the Work, the following, all of which the Contractor may use and rely upon in performing the Work under this Agreement:

(1) Environmental Assessment and Environmental Assessment Approval;

(2) property, boundary, easement, , right-of-way surveys, 1:2000 topographic information from aerial photographs dated 1989 at 1-m intermediate intervals and indexed every 5 m; and

(3) the first order control monuments which in OPG's judgment are necessary to enable the Contractor to proceed with the Work.

3.2 Designation of OPG's Representative and Delegation to OPG's Designated Delegates

OPG will designate in writing an individual to act as OPG's Representative. OPG may, from time to time change this designation, or delegate duties, to OPG's Designated Delegates by delivering a Notice in the form of Appendix 1.1(qq) to this effect to the Contractor. OPG's Representative will specify the scope and the limits of authority of each of OPG's Designated Delegates. Any changes to or revocations of any delegations will also be specified by OPG's Representative in writing in a Notice delivered to the Contractor. All Notices delivered to OPG's Representative, or OPG's Designated Delegates (provided that the notice relates to a matter within OPG's Designated Delegate's scope of authority), by the Contractor will be as binding on OPG as if given to OPG under Section 14.4. If OPG has provided the Contractor with a Notice delegating duties to OPG's Designated Delegate as described in this Section 3.2, the Contractor shall communicate solely with OPG's Designated Delegate to the extent specified in the Notice. The Contractor may rely on any written instructions, directions or approvals (excluding safety related matters) provided by OPG's Representative or OPG's Designated Delegates (provided such instructions, directions or approvals are within OPG's Designated Delegate's scope of authority). OPG will take all reasonable steps to ensure that OPG's Representative and OPG's Designated Delegates are accessible to the Contractor during the performance of the Work (including outside of normal working hours in cases of emergencies) and are available to render any necessary decisions or instructions promptly to avoid delays to the Contract Schedule.

3.3 No OPG Control Over the Work

Except as may be necessary to fulfill its role as "Constructor" with respect to the INCW Part Project, OPG will not supervise, direct, have control or authority over, or otherwise be responsible for:

(a) the Contractor's means, methods, techniques, sequences or procedures respecting the Work; or

(b) the safety programs and precautions used in respect of the Work, subject to OPG's rights and obligations under the *Occupational Health and Safety Act* (Ontario).

OPG will not be responsible for any failure of the Contractor to comply with any Applicable Laws, Approvals or this Agreement in performing the Work. The Contractor acknowledges exclusive control over and commercial responsibility for any and all means, methods, techniques, sequences or procedures employed or necessary to complete the Work, for the Contract Price and in accordance with the Contract Schedule.

3.4 Hazardous Conditions

(a) **Division of Responsibility.** OPG will be responsible for the costs of dealing with any Hazardous Materials to the extent such Hazardous Material presents a material danger to any Person performing the Work (a "**Hazardous Condition**") encountered at the Site that was not generally or specifically identified in this Agreement to be part of the Work. To the extent OPG is responsible for such costs and such Hazardous Condition has the effect of materially increasing the cost or time of performing the Work, then such change will be treated as a Project Change Directive issued by OPG under Section 5.1. Notwithstanding the previous sentence, the Contractor will be responsible for any Hazardous Condition caused by or resulting or arising from the performance of the Work or brought on the Site by or on behalf of the Contractor and no adjustment will be made to the Contract Price or Contract Schedule in respect of such Hazardous Condition.

(b) **Actions on Discovery.** Immediately on the discovery of a Hazardous Condition on the Site, the Contractor will:

(1) in accordance with prudent practices, act to contain the Hazardous Condition in order to minimize the impact of the Hazardous Condition;

(2) stop all Work in the area that could reasonably be affected by the Hazardous Condition, subject to Section 2.4(j); and

(3) verbally notify OPG of the discovery and confirm by Notice within 24 hours of the discovery.

(c) **Corrective Action Plan.** The Contractor will implement a corrective action plan (and engage a specialized Subcontractor) and obtain any required Approvals. Such corrective action plan will be in accordance with prudent practices and will minimize impact on the Contract Price and Contract Schedule.

3.5 INTENTIONALLY DELETED

3.6 INTENTIONALLY DELETED

3.7 Team Building Program

OPG seeks to encourage a voluntary team building program for the Project. This program will be a structured approach to improve communication between OPG and its representatives and the Contractor and its Subcontractors, and to facilitate problem solving, conflict avoidance, and issue resolution. The team building program objective is to maximize the effectiveness of each Project participant's resources to efficiently and safely achieve a quality end product, on time and within budget without unresolved disputes.

Participation in the program is totally voluntary. Any cost associated with program implementation will be agreed to by both parties and will be shared equally with no change in Contract Price. To implement this initiative, it is anticipated that within 60 days after the Start Date, the Contractor's site manager and OPG's on-site representative will develop a plan to hold a team building workshop to be attended by key staff of both Parties. Follow-up workshops will be held periodically throughout the duration of the Agreement as agreed to by the Contractor and OPG.

SECTION 4. SECURITY DOCUMENTS AND INSURANCE

4.1 Security Documents

(a) [INTENTIONALLY DELETED]

(b) [INTENTIONALLY DELETED]

(c) **Failure of Surety.** If the maintenance bond is cancelled for any reason or the surety issuing such bond is declared bankrupt, becomes insolvent, ceases to carry on any active business in Ontario or otherwise ceases to meet the requirements of this Agreement, the Contractor will notify OPG immediately and, within 60 days thereafter, deliver to OPG a substitute maintenance bond that complies with Section 4.1(f); provided that if the Contractor does not deliver the substitute bond to OPG prior to the 30th day after the maintenance bond is cancelled for any reason or the surety issuing such bond is declared bankrupt, becomes insolvent, ceases to carry on any active business in Ontario or otherwise ceases to meet the requirements of this Agreement, OPG will not be required to make payment to the Contractor under this Agreement unless and until the substitute bond is so delivered to OPG.

(d) **Letter of Credit.** On the Start Date, the Contractor will provide one or more letter(s) of credit in a total amount that is not less than $70 million (the "Performance LC(s)"). The Performance LC(s) shall be available for OPG for drawing (i) in the event of default by the Contractor hereunder; (ii) to satisfy any obligations of the Contractor in respect of Sections 8.1 and 8.3; or (iii) to be applied in respect of any obligations of the Contractor for which OPG has a right to set off hereunder. The Performance LC(s) and any other letter of credit to be delivered to OPG under this Agreement shall be a letter of credit acceptable to OPG substantially similar to the form set out in Appendix 4.1(d). The bank issuing the letter of credit must be acceptable to OPG and be set out in Schedule I of the *Bank Act* (Canada). Acceptance of any bank proposed by the Contractor shall not be unreasonably withheld, provided that acceptance may be withheld of a bank which does not have a credit rating of A- or higher by Standard & Poor's or A3 or higher by Moody's. Notwithstanding any term in this Agreement, OPG is not obliged to make any payment to the Contractor under this Agreement until the Contractor has delivered to OPG the Performance LC(s) and any other required letter of credit under this Agreement in accordance with this Section 4.1(d). The Contractor will maintain any letter of credit in force, at its expense, until the Final Completion Date. On the Final Completion Date, OPG will provide the Contractor with written confirmation addressed to the Contractor and the bank who issued the Performance LC, that the Performance LC is terminated.

(e) **Parental Indemnity.** On the date of this Agreement, the Contractor will provide to OPG the parental indemnities in the form set out in Appendix 4.1(e).

(f) **Maintenance Bond**. Prior to delivery of the Notice described in the first sentence of Section 7.10, the Contractor will deliver to OPG an original, signed maintenance bond in connection with the Contractor's obligations under Sections 7.4(a), 7.8(d), 9.7, 9.8, 9.9 and 9.10 of this Agreement, in the form set out in Appendix 4.1(f) (or in such other form acceptable to OPG) and in an amount that is 10% of the Contract Price. The surety must be acceptable to OPG and licensed to issue such bonds in Ontario. Acceptance of any surety proposed by the Contractor shall not be unreasonably withheld, provided that acceptance may be withheld of a surety with A.M. Best ratings of below A- or a Standard & Poor's rating below BBB. The Contractor will maintain the maintenance bond described in this Section 4.1(f) in force, at its expense, until the expiry of the Warranty Period as per Section 9.8(a)(1) (as such period may be extended in accordance with Section 9.8(d)).

4.2 Required Insurance

The Contractor will procure and maintain in full force and effect with financially responsible insurance carriers (with A.M. Best ratings of at least A- or a Standard & Poor's rating of at least BBB) of recognized standing acceptable to OPG, or with the appropriate Governmental Authorities, all coverages referred to in this Section 4.2. The Contractor will ensure that all such coverages cover all Subcontractors and that all insurance coverages applicable in Ontario will be

obtained from insurance carriers that are duly licensed in Ontario to issue insurance policies for the limits and coverages required under Sections 4.2(a) to 4.2(f).

(a) **Workers' Compensation.** The Contractor will maintain or cause to be maintained workers' compensation coverage as required by the *Workplace Safety and Insurance Act, 1997* (Ontario) or any other Applicable Laws respecting all of the Contractor's Personnel.

(b) **Additional US Requirements (as required).** In respect of all of the Contractor's Personnel whose domicile of hire is the United States, the Contractor will maintain or cause to be maintained workers' compensation coverage in each applicable state while any such Person is engaged in performing the Work. The Contractor will also ensure that any such coverage includes employer's liability with a minimum limit of US$1,000,000 and, to the extent applicable, a foreign coverage endorsement, *Merchant Marine Act* (United States), *Longshore and Harbor Workers' Compensation Act* (United States) and *Federal Employers' Liability Act* (United States) coverage.

(c) **Motor Vehicle Liability Insurance.** The Contractor will maintain or cause to be maintained motor vehicle liability insurance on licensed motor vehicles owned, rented or leased by the Contractor and Subcontractors and used in connection with the Work to be performed under this Agreement covering bodily injury and property damage liability to a combined inclusive limit of not less than $5,000,000 per occurrence and mandatory accident benefits, continuously from the date of this Agreement until the expiry of the Warranty Period.

(d) **Construction Equipment Insurance.** The Contractor will be permitted to self-insure for all construction equipment and tools owned, rented or leased by the Contractor or a Subcontractor and used in respect of performing the Work. .

(e) **Errors & Omissions Insurance.** Engineering consultants shall, at all times, maintain in full force and effect professional liability insurance in an amount not less than $10,000,000 per occurrence and in the aggregate, covering the period from start of conceptual design through to the Final Completion Date and for a further discovery period of five years from the Final Completion Date. Such insurance shall be obtained on or prior to November 1, 2005.

(f) **Marine Watercraft Hull and Liability Insurance (as required).** The Contractor will maintain hull and machinery insurance covering the full replacement cost of all barges, scows and other watercraft owned, rented or leased by the Contractor or any Subcontractor, and used in respect of performing the Work.

The Contractor will also maintain marine liability or protection indemnity insurance covering any barges, scows or other watercraft owned, rented or leased by the Contractor or any Subcontractor, and used in respect of performing the Work. The Contractor will ensure that this coverage covers special operations,

pollution liability and voluntary removal of wreck for limits that are the greater of those afforded under a protection and indemnity club and not less than $25,000,000 per occurrence.

OPG will procure and maintain in full force and effect with financially responsible insurance carriers (with A.M. Best ratings of at least A- or a Standard & Poor's rating of at least BBB) of recognized standing, all coverages referred to in Sections 4.2(g) to 4.2(i). OPG will ensure that the coverage referred to in: (1) Section 4.2(h) will be maintained in force continuously from the Start Date until 60 days after the Final Completion Date or such other later date as OPG may designate; (2) Section 4.2(g) will be maintained in force continuously from and after the date the Contractor requires such coverage to be obtained, but in no event earlier than November 1, 2005 until 60 days after the Final Completion Date or such other later date as OPG may designate; and (3) Section 4.2(i) during the time period contemplated in Section 4.2(i). OPG will ensure that all such coverages cover all Work performed by the Contractor during the Warranty Period. OPG will ensure that all such coverages cover all Subcontractors and that all insurance coverages applicable in Ontario will be obtained from insurance carriers that are duly licensed in Ontario to issue insurance policies for the limits and coverages required under Sections 4.2(g) to 4.2(i).

(g) **Builders' All Risks Insurance.** OPG will maintain builders' all risks insurance on a repair or replacement cost basis, including OPG, any applicable subsidiary of OPG, OPG's Designated Delegate, the Contractor and the Subcontractors as named insureds, to an aggregate limit of the Contract Price with a sublimit on Underground Work (as defined in the builders' all risk policy) of $80,000,000 and such other sublimits as are customary, covering physical loss or damage to the Work, the materials, operating equipment, and supplies for incorporation therein, expendable construction tools, the TBM (however, excluding coverage for the perils of mechanical and electrical breakdown) and all temporary structures used in the performance of the Work or for which OPG is responsible, including property while in transit or elsewhere (except property insured under Section 4.2(i) below) before and during erection and until completed and while awaiting tests and during tests and until the Final Completion Date. This insurance shall be subject to the LEG 2/96 (The London Engineering Group Model "Consequences" Defect Wording) defects exclusion or equivalent and will include a 24 month maintenance period unless similar coverage for the maintenance period is included under the wrap-up liability insurance described in Section 4.2(h) below in which case OPG may elect to maintain coverage during the maintenance period under either the Builder's All Risks Insurance policy or the Wrap-Up Liability Insurance policy.

(h) **Wrap-Up Liability Insurance.** OPG will maintain wrap-up liability insurance in the joint names of OPG, any applicable subsidiary of OPG, OPG's Designated Delegate, the Contractor and the Subcontractors. This coverage will include limits of no less than $25,000,000 inclusive per occurrence for bodily injury, death and damage to property. OPG will also ensure that this coverage specifically includes:

(1) blanket contractual liability;

(2) pollution liability coverage on at least a sudden and accidental basis;

(3) blasting, pile driving, caisson services, underground services;

(4) products and completed operations, including a term that such coverage will be maintained throughout the Warranty Period ;

(5) cross liability;

(6) severability of interests;

(7) employer's liability;

(8) non-owned automobile liability;

(9) broad form property damage; and

(10) hook liability, if applicable.

If the Wrap-Up Liability Insurance provides coverage for a 24-month maintenance period and such coverage is similar to the coverage provided for such maintenance period under the Builder's All Risk Insurance described in Section 4.2(g) above, OPG may elect to maintain coverage during the maintenance period under either the Builder's All Risk Insurance policy or the Wrap-Up Liability policy.

(i) **Marine Cargo Insurance (as required).** OPG will maintain marine cargo insurance for all Goods while in the course of marine transit. Marine Cargo insurance may also include, at OPG's option, inland transit. The Contractor will be an additional insured under the marine cargo insurance. OPG will ensure that this coverage will be in force from the time that such insured property leaves the last factory or warehouse of the Contractor or a Subcontractor, for shipment, and terminates after discharge at the Site. This insurance will include delay in start-up coverage.

4.3 General Insurance Terms

(a) **Certificates of Insurance.** Within 10 days after the date the Contractor is required to obtain insurance described in Sections 4.2(a) and 4.2(f), the Contractor will deliver to OPG certificates of insurance completed by a duly authorized representative of each of the Contractor's insurers certifying that at least the minimum coverages required under Sections 4.2(a) to 4.2(f) are in effect. OPG will review the certificates of insurance within 10 Business Days. The Contractor agrees that it will not, and will not allow any of its agents, representatives or any of the Subcontractors, to access or enter the Site (the foregoing shall not restrict the Contractor from conducting on-Site visits under the supervision of OPG) until such insurance certificates in respect of the coverage described in Sections 4.2(a) and 4.2(c) have been delivered to OPG, in a form acceptable to OPG, in

accordance with this Section 4.3(a) and until OPG has obtained the insurance coverage described in Section 4.3(h). The Contractor will ensure that each certificate will state that the coverages will not be cancelled, will not fail to be renewed and will not be materially changed by endorsement or through issuance of any other policy of insurance which restricts or reduces coverage, without 60 days advance written notice by courier given to OPG's Representative, with a copy delivered by fax as follows:

Ontario Power Generation Inc.
Risk Management & Insurance - Treasury
700 University Avenue H18-H17
Toronto, Ontario, Canada M5G 1X6

Attention: Director, Risk Management & Insurance
Fax: 416-592-4775

To the extent that the Contractor is required to maintain any coverages under Sections 4.2(a) to 4.2(f) in force after final payment of the Contract Price, the Contractor will deliver to OPG, at the time that the Contractor submits its Final Application for Payment for the Contract Price, a certificate of insurance completed by a duly authorized representative of such Person's insurer certifying that such insurance will remain in force for the period of time required under Section 4.2. Within 10 days after the Start Date, OPG will deliver to the Contractor a certificate of insurance completed by a duly authorized representative of OPG's insurers certifying that at least the minimum coverages required under Section 4.2(h) are in effect.

(b) **Copies of Policies.** Within 30 days after the date the Contractor is required to obtain the insurance described in each of Section 4.2(a) to 4.2(f), the Contractor will provide OPG with a certified copy of any insurance policy referred to in each of Sections 4.2(a) to 4.2(f). Within 90 days after a request by Contractor, OPG will provide Contractor with a certified copy of any insurance policy referred to in Section 4.2(h) and, if then in effect, Sections 4.2(g) and 4.2(i).

(c) **No Waiver by OPG.** If OPG fails to demand any certificate referred to in Section 4.3(a) or otherwise fails to demand other evidence of full compliance with Sections 4.2 or 4.3 or fails to identify a defect from evidence provided, OPG has not waived, and OPG will not be deemed to have waived, any of the Contractor's obligations. The Contractor's obligation to purchase and maintain insurance under this Agreement will in no way limit or otherwise qualify the liabilities or obligations of the Contractor under this Agreement.

(d) **No Approval by OPG.** If OPG receives, reviews and accepts any certificate or other evidence under this Section 4.3, OPG has not approved or agreed, and OPG will not be deemed to have approved or agreed, that the Contractor has satisfied any of its obligations under Sections 4.2 or 4.3.

(e) **OPG May Purchase Insurance.** If the Contractor fails to maintain any insurance required under Sections 4.2(a) to 4.2(f) or any such insurance is inadequate in its scope, OPG may purchase any such insurance, at the Contractor's sole expense, or OPG may terminate this Agreement immediately due to default by the Contractor in accordance with Section 10.1(m). In the event that OPG must purchase insurance under this subclause, OPG may set off the costs thereof against any monies then or thereafter due, owing or payable to the Contractor and may set off and retain, in addition, and in consideration for its services in procuring such insurance, an amount equal to the cost thereof, in addition to the cost of such insurance.

(f) **Deductibles.** The Contractor will pay the amount of all deductibles under this Agreement and, subject to the immediately following sentence, the Contractor may not charge back any such amount to OPG. In the event that the deductible in respect of a claim under:

(1) the Builder's All Risks Insurance described in Section 4.2(g) exceeds the amounts set out below for the coverage referred to:

Coverage	Deductible
TBM (as defined in the builders' all risk insurance policy)	greater of $500,000 or 10% of the value of the claim, per claim.
Underground Works ("as defined in the builders' all risk insurance policy")	$2,000,000 per claim
All Other ("as defined in the builders' all risk insurance policy")	$250,000 per claim

(as applicable, the "BAR Cap");

(2) the Wrap-Up Liability Insurance described in Section 4.2(h) exceeds $100,000 per claim (the "WUL Cap"); and

(3) the Marine Cargo Insurance described in Section 4.2(i) exceeds $50,000 per claim (the "MC Cap"),

the Contractor will pay the amount of the deductible for such claim but may charge back to OPG any amount actually paid by the Contractor as a deductible for such claim under such Builder's All Risk Insurance, Wrap-Up Liability Insurance, or Marine Cargo Insurance in excess of the BAR Cap, the WUL Cap or the MC Cap, respectively.

(g) **Insurance Not Contributory.** With the exception of the insurance referred to in Section 4.2(c), the Contractor will ensure that all other insurance referred to in

Sections 4.2(a) to 4.2(f) will specify that such insurance is primary coverage and not contributory with, or in excess of, any insurance that may be maintained by OPG.

(h) **Subrogation.** The Contractor will ensure that each insurer which provides insurance under Sections 4.2(b), 4.2(d) and 4.2(f) will provide a waiver of subrogation to OPG, any applicable subsidiary of OPG, OPG's Designated Delegates, the Contractor and all the Subcontractors.

(i) **OPG as Additional Insured.** The Contractor will ensure that each insurer that provides insurance under Sections 4.2(c), 4.2(e) and 4.2(f) will include OPG, any applicable subsidiary of OPG, OPG's Representative and OPG's Designated Delegates as an additional insured.

(j) **No Invalidation by OPG.** The Contractor will ensure that no insurance referred to in Sections 4.2(a) to 4.2(f) will be invalidated or vitiated by any action or failure to act by OPG, any applicable subsidiary of OPG, OPG's Representative or OPG's Designated Delegates, or by any breach by the Contractor or any other Person of any declarations, warranties or other terms in such policies.

(k) **Notice of Claim.** In connection with the insurance described in Sections 4.2(a) through 4.2(i), the Contractor will assert all of its claims directly to the insurer which provides such insurance and will be responsible to process and settle all such claims directly with the insurer; OPG will not be responsible to assert any of the Contractor's claims against the insurer nor will OPG be responsible for the processing or settlement of any such claim. The Contractor will deliver a Notice to OPG's Representative at least three Business Days prior to asserting any claim under any insurance referred to in Sections 4.2(g), 4.2(h) or 4.2(i). The Contractor will include in the Notice the date of the events giving rise to the claim, a summary of the circumstances respecting the claim and the amount of the claim. The Contractor will provide OPG any additional information respecting the claim that OPG's Representative may request. With respect to any assertion by the Contractor of a claim under any insurance referred to in Sections 4.2(g), 4.2(h) or 4.2(i), OPG will promptly review the claim to verify that the claim is in accordance with the requirements of the insurance policy. The Contractor will not be permitted to assert any claim under any insurance referred to in Sections 4.2(g), 4.2(h) or 4.2(i), until OPG has completed its review and verification of such claim.

4.4 Construction Equipment

In respect of each member of the OPG Group, the Contractor waives all Losses whatsoever arising in respect of loss of, loss of use of, or damage to any construction equipment, tools, fuel and temporary structures and facilities, including for offices, lunchrooms, canteens, sanitation, showers, change rooms, accommodations, shops, warehouses and garbage disposal.

SECTION 5. CHANGES IN WORK

5.1 Changes Requested by OPG

(a) **Issue Project Change Directive.** OPG may, without invalidating this Agreement, direct the Contractor to make changes in the Work by issuing a Project Change Directive. If OPG issues a Project Change Directive, the Parties will execute an Amendment made in accordance with this Section 5 covering the applicable changes to the Work and the changes, if any, to the Contract Price or Contract Schedule. OPG may include in any Project Change Directive, OPG's expectations as to the changes, if any, that the changes in the Work will cause to the Contract Price and Contract Schedule. OPG may amend the Owner's Mandatory Requirements by issuing a Project Change Directive.

(b) **Review of Project Change Directive.** At OPG's request, the Contractor will review the Project Change Directive before making the changes and advise OPG as to the Contractor's views as to:

(1) any impact of the change on the Tunnel Facility Project that the Contractor is aware of;

(2) any proposed change to the Contract Price, calculated in accordance with Section 7.7; and

(3) any proposed changes to the Contract Schedule and/or material changes to the detailed contract schedule described in Section 2.7(a)(3), that the Contractor estimates will occur as a result of such changes.

The Contractor acknowledges that a change in the Contract Schedule will not necessarily result in a change in the Contract Price. The Contractor will co-operate with OPG and will use all reasonable efforts to carry out each Project Change Directive in such a manner so as to avoid or minimize any additions to the Contract Price and changes to the Contract Schedule.

(c) **Obligation to Implement Project Change Directive.** OPG may require, in any Project Change Directive, that the Contractor proceed with the Project Change Directive before the Parties have agreed on the terms of an Amendment. Upon receipt of any such Project Change Directive, the Contractor will comply with the applicable Project Change Directive and any Dispute will be resolved in accordance with Section 5.7. Section 2.7(e) expressly applies to any changes set out in a Project Change Directive.

5.2 Changes Requested by the Contractor

The Contractor will not make any change in the Work except in accordance with this Section 5. The Contractor will ensure that no changes are made in the Work without the prior written consent of OPG's Representative in a Project Change Directive. If the Contractor desires to make any changes in the Work, in whole or in part, the Contractor must first advise OPG in a

Project Change Notice as to the matters referred to in Section 5.1(b) and obtain the prior written consent of OPG's Representative in a Project Change Directive. Nothing in this Agreement obliges OPG to agree to any change proposed by the Contractor. OPG may in its sole and absolute discretion refuse to agree to any change affecting quality of the Work (as determined by OPG), the Contract Schedule or the Contract Price. OPG will, however, act reasonably in approving any other change. Any written consent of OPG's Representative in a Project Change Directive to any such proposed change requested by the Contractor will constitute a Project Change Directive issued by OPG in accordance with Section 5.1. If the change requested by the Contractor results in cost savings and the Parties agree on such net amount of savings (calculated based on Section 7.7(b)), the Parties will execute an Amendment made in accordance with this Section 5 reducing the Contract Price by 50% of such net amount of savings and making all other necessary changes to this Agreement including changes to the Contract Schedule.

5.3 Changes in Applicable Laws

If, after the date of this Agreement, there is any:

(a) change in Applicable Laws (except those that relate to Taxes) or any applicable standards, specifications, manuals or codes of any technical organization or Governmental Authority; or

(b) new Canadian federal or provincial sales, use or excise taxes or any changes in the rates of such taxes,

which directly and materially impacts the Work or Contract Schedule that is neither known nor foreseeable on the date of this Agreement and that has the effect of materially increasing or decreasing the cost or time of performing the Work, then such change will be treated as a Project Change Directive issued by OPG under Section 5.1. The Contractor will promptly provide OPG's Representative with a Notice in the form of Appendix 5.3 detailing the impact the change described in Section 5.3(a) or 5.3(b) has on the Work, Contract Price and Contract Schedule. OPG's Representative will discuss the impact and provide a prompt direction to the Contractor resolving the issue by way of a Project Change Directive. Any dispute relating to changes to the Contract Schedule or Contract Price will be resolved in accordance with Section 5.7. Any other disputes relating to the impact of the change described in Section 5.3(a) or 5.3(b) will be resolved in accordance with Section 11.

5.4 Geotechnical Baseline Report

The GBR shall serve as the only basis for determining changes in or differing geotechnical subsurface conditions. The GBR has been developed jointly by OPG and the Contractor and, as such, describes anticipated behaviours and conditions that are dependent on the Contractor's selected designs, means, methods, sequences, timing and level of workmanship anticipated or implied at the date of this Agreement. Notwithstanding OPG's participation in the development of the GBR, OPG has no liability with respect to such designs, means, methods, sequences, timing and level of workmanship, and such participation will not have the effect of transferring any obligation under this Agreement from the Contractor to OPG or otherwise have the effect of amending this Agreement. The Parties acknowledge that such means, methods, sequences,

timing and level of workmanship are the sole responsibility of the Contractor, and the Contractor is free to make changes at any time. To the degree that any difference in the behaviour of the geotechnical subsurface conditions is attributable to a change or deficiency in the designs, means, methods, sequences, timing and level of workmanship, then the Contractor will not be entitled to make any claim for the impacts resulting therefrom.

5.5 Differing Subsurface Conditions

(a) Upon identification of geotechnical subsurface conditions which differ materially from those indicated in the GBR, the Contractor will promptly and in any event no more that 5 days after identification and before the conditions are disturbed, give Notice to OPG of such difference ("Initial Notice"). Such Notice will be followed up within 5 days with a Project Change Notice which will address the matters referred to in Section 5.1(b).

(b) OPG will investigate the subsurface conditions promptly after receiving the Initial Notice. If OPG determines that:

(1) the conditions are found to differ materially from the GBR;

(2) the material difference in the conditions is not attributable to a change or deficiency in the Contractor's designs, means, methods, sequences, timing and/or level of workmanship;

(3) the conditions directly and materially impact performance of the Work; and

(4) such impact has the effect of materially increasing or decreasing the cost or time of performing the Work,

then OPG may issue a Project Change Directive indicating the extent, if any, of a change in the Contract Price or the Contract Schedule that OPG attributes to such differing conditions, calculated in accordance with Section 7.7. If OPG declines to issue a Project Change Directive, or the Contractor disagrees with the proposed changes to the Contract Schedule or Contract Price, the resulting Dispute will be resolved in accordance with Section 5.7.

(c) Notwithstanding Sections 5.5(a) and 5.5(b) and in lieu of the procedure described in Sections 5.5(a) and 5.5(b), the following procedure shall apply in full satisfaction of any change to the Contract Price and Contract Schedule relating to rock support resulting from differing subsurface conditions (the "Rock Support Adjustment"):

(1) on a continuous basis during the performance of the Work, the Contractor will record the rock conditions (as defined in the GBR) encountered in the performance of the Work and measure the tunnel lengths thereof and OPG will review and verify such determinations. If the parties cannot agree, the positions of both parties shall be recorded. The resolution of any

disagreements will be held in abeyance until the step described in section (4) below has been completed, unless the parties mutually agree that the issue is sufficiently material that the issue should be referred to dispute resolution in which event the matter be resolved in accordance with Section 11;

(2) within two months after the TBM Completion Date, the parties shall determine the total length of the TBM-bored tunnel;

(3) following the determination in (2) above, OPG shall complete the table in Appendix 1.1(j) entitled "Rock Support Table" using the data recorded in item (1) (and in the event of disagreement, using the data assuming OPG's position); and

(4) OPG shall promptly thereafter issue a one-time Project Change Directive setting out the net change to the Contract Price and Contract Schedule determined by completing the Rock Support Table as set out in (3) above.

If OPG declines to issue a Project Change Directive in connection with the Rock Support Adjustment or the Contractor disagrees with the proposed changes to the Contract Price and Contract Schedule (including, for greater certainty, because of a disagreement on the rock conditions or the tunnel lengths thereof), the resulting dispute will be determined in accordance with Section 5.7.

(d) No request for relief for differing subsurface conditions will be allowed and no change to the Contract Price or Contract Schedule will be made in respect of replacing, repairing, remedying or otherwise fixing rock support that was installed in the performance of the Work but is later determined to be inadequate or in need of replacement, repairing, remedying, or fixing.

(e) No request by the Contractor for relief for differing subsurface conditions will be allowed in respect of Work under the St. Davids Gorge to the extent that the width of the gorge is within the width defined in the GBR.

(f) The Contractor acknowledges that the existence of geotechnical subsurface conditions which differ from those indicated in the GBR shall in no way:

(1) affect the Contractor's obligation to pay liquidated damages pursuant to Section 8.3 if the Guaranteed Flow Amount is not achieved; nor

(2) entitle the Contractor to claim that it would have received the bonus payment described in Section 8.4 had the geotechnical subsurface conditions not differed from those indicated in the GBR.

(g) Except as set out in Section 5.5(c) above, no request by the Contractor for relief for differing subsurface conditions will be allowed unless the Contractor has given the Initial Notice and the Project Change Notice required in Section 5.5(a).

5.6 Execution of Amendments

OPG will not be deemed to have agreed to, or be required to pay for, any changes to the Work, Contract Price or the Contract Schedule, until the Parties have executed an Amendment evidencing the Project Change Directive. Once the changes resulting from a Project Change Directive have been agreed to or resolved in accordance with Section 5.7, the Parties will execute an Amendment covering the applicable changes to the Work, Contract Price and Contract Schedule.

5.7 Resolution of Claims

(a) **Filing Notice of Claim.** If the Parties are unable to agree as to the extent, if any, of a change in the Contract Price or the Contract Schedule that should be made as a result of changes in the Work under Sections 5.1, 5.2, 5.3 or 5.5, either Party may deliver a Notice in the form attached as Appendix 5.7(a) of its intent to the other Party to resolve the Dispute under this Section 5.7. The Party delivering any such Notice will deliver it promptly, and in any event not later than five Business Days, after the circumstances giving rise to the Dispute first arose. If a Party fails to deliver such Notice in a timely manner, the other Party may, in its sole and absolute discretion, dismiss the Dispute. In such a case it will be deemed that there is no Dispute and the position of the Party dismissing the Dispute will prevail.

(b) **Claim Documentation.** The Party that delivers a Notice under Section 5.7(a) will submit to the other Party all reasonable documentary evidence and a concise statement of the rationale of the Party's position within 5 Business Days after delivery of such Notice.

(c) **Decision.** The Party receiving a Notice under Section 5.7(a) will review the documents and rationale received under Section 5.7(b) and will render a decision, including a concise statement setting out the reasons for its decision, no more than five Business Days after the receipt of the documents and rationale received under Section 5.7(b). This decision will be final and binding on the Parties unless the Party giving Notice under Section 5.7(a) gives to the other Party, within 5 Business Days of receiving the decision, a Notice of its intention to have the decision resolved under the dispute resolution process under Section 11 and such process is commenced within 5 Business Days after giving the notice of intent.

SECTION 6. CHANGES TO CONTRACT SCHEDULE AND DELAYS

6.1 Changes to Contract Schedule

The Contract Schedule may only be changed by an Amendment made in accordance with Section 5. No other purported change to the Contract Schedule will be valid. Except as set out in this Agreement, nothing in this Agreement obliges OPG to agree to any change to the Contract Schedule.

6.2 Time Extensions

(a) **Excusable Delays.** Neither Party will be responsible for any delay in fulfilling any obligation under this Agreement to the extent the delay has a material impact on the ability of the Contractor to meet the Contract Schedule and is caused by:

(1) OPG or another member of the OPG Group being responsible for causing the underlying circumstances giving rise to a stop work order or similar notice under Section 2.4(i); or

(2) tidal wave, lightning, earthquake, cyclone, legal strike or lockout on the Site, war, riot or act of public enemies, including terrorists.

(b) **Exceptions to Excusable Delays.** Section 6.2(a) does not apply to the extent a delay is caused by the fault or negligence of the Party seeking relief because of the delay. Section 6.2(a) does not apply if the Party seeking relief on account of the delay fails, within three Business Days after the commencement of any such delay, to give a Notice in the form attached as Appendix 6.2(b) to the other Party describing the event under Section 6.2(a) giving rise to the delay and the anticipated period of the delay. Failure by the Contractor to give such Notice within such three Business Day period is sufficient reason for denial by OPG of any extension of time.

(c) **Delays caused by OPG.** OPG will be responsible for any delay caused as a result of OPG:

(1) failing to obtain the Approvals required pursuant to Sections 3.1(e) and 3.1(f);

(2) failing to acquire sufficient interest in the lands required pursuant to Section 3.1(i);

(3) failing to furnish to the Contractor the items and information required pursuant to Sections 3.1(c) and 3.1(j);

(4) failing to discharge its obligations pursuant to Section 3.1(d);

(5) requesting the Contractor to uncover a part of the Project where no Defective part of the Work was found as described in Section 9.4(c); and

(6) not having paid the amounts required under Section 7.3(b) within 30 days of the date OPG is required to make payment under Section 7.3(b) and the Contractor has suspended the performance of the Work in accordance with Section 2.7(e).

If the delay resulting from events referred to in this Section 6.2(c) has resulted or will result in the Contractor being unable to meet the Contract Schedule, the Parties will execute an Amendment made in accordance with Section 5 covering

the applicable changes to the Contract Schedule. The Contractor will act prudently in all respects to mitigate the impact of the delay on the Contract Schedule.

(d) **Subcontractors and Suppliers.** Delays attributable to or as a result of delays caused by or within the control of Subcontractors or suppliers shall be deemed to be delays within the control of the Contractor and the Contractor shall not be granted any extension of time.

(e) **Compensation.** Subject to Section 6.2(b), the Contractor will be entitled to compensation by way of an increase in the Contract Price, calculated in accordance with Section 7.7, for material delays impacting the Work resulting from events referred to in Sections 6.2(a)(1) and 6.2(c) where the delay has the effect of materially increasing the cost of performing the Work. The Contract Price may not be increased, however, by an amount that is more than is reasonably attributable to the event that caused the material delay. The Contractor will not be entitled to any additional compensation in respect of any delay referred to in Section 6.2(a)(2).

(f) **Actions During Delay.** During any period of delay resulting from events referred to in Section 6.2(a), the Party that delivered the Notice under Section 6.2(b) will:

(1) act prudently in all respects to mitigate the impact of the delay on the Contract Schedule; and

(2) keep the other Party informed in a timely manner of the status of the event under Section 6.2(a) giving rise to the delay and of the actions being taken to mitigate the impact of such delay.

(g) **Steps After Delay Ends.** Within three Business Days after cessation of the period of delay resulting from events referred to in Section 6.2(a), the Party that delivered the Notice under Section 6.2(b) will deliver an updated Notice in the form attached as Appendix 6.2(b) to the other Party specifying the alleged duration of the excused delay and its impact, if any, on the Contract Schedule. The Party receiving such Notice will review such Notice and provide for an equitable change, if any, to the Contract Schedule in an Amendment made in accordance with Section 5. The Contract Price may also be changed to the extent permitted by Section 6.2(e). The dates in the Contract Schedule may not be extended by more than the delay reasonably attributable to the event causing the delay. If the Parties are unable to agree to a change in the Contract Schedule, either Party may file a claim under Section 5.7(a).

SECTION 7. PAYMENT OF CONTRACT PRICE AND CHANGES

7.1 Schedule of Values

Within 60 days after the Start Date, the Contractor will provide to OPG for its approval, acting reasonably, a schedule of values breaking down the Contract Price into manageable elements for

measurement and payment, reflecting the subtotals set out in Appendix 1.1(j) under the heading "Breakdown of Contract Price". Once approved by OPG, such schedule will be deemed the **"Schedule of Values"** and will become a Final Submittal in accordance with Section 2.8(g).

7.2 Application for Payment

OPG will make progress payments to the Contractor for each item in the Schedule of Values in accordance with the measurement for payment schedule set out in Appendix 7.2 and in accordance with this Section 7. The Contractor will submit only one draft Application for Payment to OPG's Representative monthly for acceptance in respect of Work performed to the end of the previous month. After receiving OPG's Representative's acceptance, the Contractor will electronically deliver to OPG (at apmailroom@opg.com) a complete Application for Payment. The Contractor will so deliver each Application for Payment in .pdf or .tif format. As part of each Application for Payment, the Contractor will submit to OPG:

(a) an invoice containing:

(1) the total amount owing by OPG (showing separately all amounts of Ontario Retail Sales Tax included in the Contract Price and all amounts due as goods and services tax levied under the *Excise Tax Act* (Canada) and expressly stating any amounts invoiced in a currency other than Canadian dollars);

(2) the OPG purchase order number;

(3) the Contractor's full name and address;

(4) the name of a contact individual at the Contractor, with a telephone number;

(5) electronic transfer instructions;

(6) the Contractor's invoice number (which must be unique for each invoice);

(7) the invoice date (which must be the date the invoice is delivered);

(8) the Contractor's registration number for the purposes of Part IX of the *Excise Tax Act* (Canada);

(b) a statutory declaration in the form set out in Appendix 1.1(d) signed by a director or officer of the Contractor declaring that:

(1) all payments due to Subcontractors, all wages and benefit payments due to any of the Contractor's Personnel, and all contributions, premiums, allowances and remittances due to any Governmental Authority, pension fund, benefit plan, or union fund in accordance with a collective agreement or Applicable Laws, have been paid on or before the date of the

Application for Payment in a timely manner, subject to any withholdings or holdbacks required by Applicable Laws; and

(2) title to the applicable part of the Tunnel Facility Project will pass to OPG in accordance with Section 7.4 no later than the date of OPG's payment; and

(3) there are no known unnotified claims for extra time or extra compensation of any nature or kind whatsoever as of the date of the statutory declaration.

(c) a certificate in the form set out in Appendix 1.1(d) signed by an officer of the Contractor certifying,

(1) that the coverages that the Contractor is obliged to maintain under Section 4.2 remain in full force,

(2) that the Contractor has paid in a timely manner all amounts payable under the *Workplace Safety and Insurance Act, 1997* (Ontario),

(3) that the Contractor remains in compliance with all its other obligations under the *Workplace Safety and Insurance Act, 1997* (Ontario), and

(4) that the Contractor has provided OPG with the Workplace Safety and Insurance Board registration number for each member of the Contractor's Personnel performing Work at the Site for the period covered by the certificate;

(d) a certificate in the form set out in Appendix 1.1(d) signed by an officer of the Contractor respecting outstanding claims; and

(e) a certificate of compliance from the Workplace Safety and Insurance Board as to the Contractor's status and that of all Subcontractors that will be performing Work at the Site.

7.3 Progress Payments

(a) **OPG Reviews Each Application for Payment.** OPG will, within 10 Business Days after receipt of each Application for Payment relating to the Schedule of Values, either provide a written Notice in the form of document attached as Appendix 7.3(a) approving the Application for Payment or return the Application for Payment to the Contractor indicating in writing OPG's reasons for rejection.

(b) **Payment Terms.** Only Applications for Payment that are approved by OPG for payment before the 25th day of the month will be processed for payment on the 25th day of the following month. Subject to Sections 7.3(c), 7.3(f) and 7.5(e) and OPG's right to set off under this Agreement and pursuant to Applicable Laws, OPG will pay the Contractor the amount of the approved Application for Payment on the 25th day of the following month. Payments due but unpaid shall bear

interest at the rate equivalent to the prevailing Bank of Canada Prime Lending Rate plus 2%. Interest shall commence accruing on the 31st day after payment is due.

(c) ***Construction Lien Act* (Ontario) Holdbacks.** Notwithstanding any term in this Agreement, OPG will retain 10% of the amount of each approved Application for Payment, or such greater amount as may be required, to satisfy OPG's obligation under the *Construction Lien Act* (Ontario). OPG will only pay to the Contractor the total accumulated 10% holdback when final payment is made under Section 7.12, to the extent that such amount has not otherwise been paid to another Person under this Agreement. Under no circumstances, however, will OPG be obliged to release any such holdback, in whole or in part, that OPG retains in accordance with the *Construction Lien Act* (Ontario) on any date that is earlier than permitted under that statute.

(d) [INTENTIONALLY DELETED]

(e) **No Deemed Acceptance.** No payment made by OPG under this Agreement and no use or occupancy of the Project, in whole or in part, by OPG will constitute acceptance of any part of the Work that is not in accordance with this Agreement.

(f) **Refusal of Payment.** Notwithstanding any term in this Agreement, OPG may refuse to make any payment, in whole or in part, or set off from any payment, otherwise payable to the Contractor under this Agreement, or because of subsequently discovered evidence or the results of subsequent inspections or tests, nullify any previous payment, an amount to be determined by OPG on account of:

(1) Work required to be performed prior to a progress payment, including previous progress payments, that has not been entirely performed;

(2) Work or the Tunnel Facility Project being Defective, in whole or in part;

(3) OPG having corrected or replaced a Defective part of the Work or Tunnel Facility Project in accordance with this Agreement;

(4) Losses suffered or incurred by any member of the OPG Group or claims, demands, actions, suits or proceedings for Losses having been made against a member of the OPG Group by any Person in respect of which the Contractor is required to indemnify under this Agreement;

(5) a Lien having been filed in respect of the Work or Goods (except to the extent that the Contractor has delivered to OPG a specific security instrument, satisfactory to OPG, to secure the discharge of such Lien) and any Losses incurred by OPG in respect of such Lien;

(6) the Contract Price having been reduced;

(7) any other terms of this Agreement or rights under Applicable Law entitling OPG to a set off against the amount for which Application for Payment was made; or

(8) Contractor's failure to deliver the substitute bond to OPG prior to the 30th day after the maintenance bond is cancelled for any reason or the surety issuing such bond is declared bankrupt, becomes insolvent, ceases to carry on any active business in Ontario or otherwise ceases to meet the requirements of this Agreement, as more particularly described in Section 4.1(c).

7.4 Title Warranty

(a) **Warranty.** The Contractor represents and warrants to OPG that title to all Work (including documents, designs, drawings, specifications, plans, reports, information and other deliverables and data) and Goods (excluding the TBM) covered by any Application for Payment, whether used or incorporated in the Project or not and wherever situate, will pass to OPG no later than the time of payment, free and clear of all Liens. OPG's retention of any amount under Sections 7.3(c), 7.3(f) or 7.5(e) will in no way affect the Contractor's representation and warranty in this Section 7.4(a), and for the purposes of this Section 7.4(a), OPG will be deemed to have paid each approved Application for Payment in full upon any payment required under Section 7.3(b) having been made.

(b) **Maintenance of Records.** The Contractor will compile and maintain at the Site, in accordance with the Final Submittals and Applicable Laws, detailed, itemized records of all items covered by each Application for Payment, including all Work (including documents, designs, drawings, specifications, plans, reports, information and other deliverables and data) and Goods. On request by OPG, the Contractor will promptly provide OPG access to such records for review and copying. The Contractor will maintain these records for the period expiring on the latest of:

(1) seven years following expiration or termination of this Agreement;

(2) the period of time as may be specified in this Agreement, including the Contractor's Proposal Documents or the Final Submittals;

(3) the period of time as may be required by Applicable Laws; and

(4) such other period as OPG may set out in a Notice to the Contractor.

7.5 Taxes

(a) **Goods and Services Tax.** The Contractor represents and warrants to OPG that, for any goods and service tax invoiced to OPG, the Contractor will be duly registered for the purposes of Part IX of the *Excise Tax Act* (Canada) and that the

Contractor will provide OPG with its registration number once available. The Contractor will deduct all Canadian goods and services tax levied under the *Excise Tax Act* (Canada) recovered or recoverable by the Contractor on the payment of expenses before submitting any Application for Payment to OPG covering any such expenses.

(b) **Provincial Sales Tax**.

(1) All amounts payable by OPG to the Contractor pursuant to this Agreement include any Ontario Retail Sales Tax payable pursuant to Applicable Law by the Contractor in respect of the Work but do not include any Ontario Retail Sales Tax payable pursuant to Applicable Law by OPG.

(2) OPG represents, warrants, and covenants to the Contractor that any electrical generating equipment that is acquired for incorporation into the Work is exempt from Ontario Retail Sales Tax pursuant to Section 7(1)(40) of the *Retail Sales Tax Act* (Ontario) and, accordingly, no Ontario Retail Sales Tax is payable pursuant to Applicable Law by the Contractor in respect of any such Goods or equipment that is acquired for incorporation into the Work. In addition, OPG has applied for and received retail sales tax ruling letters from the Ontario Ministry of Finance that set out certain Goods and equipment that when acquired by the Contractor for incorporation into the Work are exempt from Ontario Retail Sales Tax (all such ruling letters are attached hereto as Appendix Appendix 7.3(b)). The Contractor represents, warrants, and covenants to OPG that to the extent that these rulings indicate that the Contractor may acquire the particular Goods and equipment covered by the rulings exempt from the Ontario Retail Sales Tax Act by providing the supplier of the particular Goods or equipment with a properly completed Ontario Retail Sales Tax Purchase Exemption Certificate, the Contractor has calculated the Contract Price on the basis that the Contractor will acquire such Goods and equipment exempt from Ontario Retail Sales Tax and the Contractor will provide such supplier(s) with a properly completed Ontario Retail Sales Tax Purchase Exemption Certificate(s). If the Ontario Ministry of Finance at any time revokes any of the rulings, determines that any Goods or equipment acquired by the Contractor exempt from Ontario Retail Sales Tax did not qualify as electrical generating equipment acquired for incorporation into the Work, or determines that any of the rulings are not binding, OPG will indemnify and hold harmless the Contractor for any Ontario Retail Sales Tax, penalties, interest, and other costs payable by the Contractor as a consequence.

(3) With respect to the TBM, OPG represents, warrants and covenants to the Contractor that pursuant to the *Retail Sales Tax Act* (Ontario) and the regulations promulgated thereunder (collectively, the "RSTA"), regardless of the fact that legal title to the TBM will be transferred by the Contractor to OPG pursuant to this Agreement, the Contractor will be considered to

be the "purchaser" of the TBM for RSTA purposes and, accordingly, (a) the Contractor is required to pay Ontario Retail Sales Tax on its costs of acquiring and commissioning the TBM, (b) the Contractor is not required to charge and collect Ontario Retail Sales Tax from OPG in respect of that portion of the Contract Price allocated to the TBM, and (c) the Contractor is not required to pay Ontario Retail Sales Tax when legal title to the TBM is transferred back to the Contractor from OPG as contemplated by this Agreement. Accordingly, the Contractor has determined the Contract Price and, more specifically, that portion of the Contract Price allocated to the TBM, on the basis that the Contractor will be required to pay Ontario Retail Sales Tax on its costs of acquiring and commissioning the TBM. If at any time it is determined that OPG is or was the "purchaser" of the TBM for RSTA purposes and OPG is assessed for failure to pay Ontario Retail Sales Tax in respect of that portion of the Contract Price allocated to the TBM, OPG shall pay the assessment, the Contractor shall apply for a refund of the Ontario Retail Sales Tax that it paid in respect of its acquisition and commissioning of the TBM, and the Contractor shall pay any such refund (and interest thereon) received to OPG as a reduction to the Contract Price. If at any time it is determined that OPG is or was the "purchaser" of the TBM for Ontario Retail Sales Tax purposes and the Contractor is assessed for failure to charge and collect Ontario Retail Sales Tax from OPG, OPG shall indemnify and hold harmless the Contractor for any Ontario Retail Sales Tax , penalties, interest and other costs incurred or payable by the Contractor as a consequence of or in respect of any such assessment. OPG shall indemnify and hold harmless the Contractor for any Ontario Retail Sales Tax, penalties, interests and other costs incurred or payable by the Contractor as a consequence of any of these representations, warranties and covenants by OPG regarding the TBM and Ontario Retail Sales Tax being inaccurate or in error.

(4) If the Contractor is a non-resident of Ontario, the Contractor will comply with Section 39 of the RSTA and provide OPG with a duplicate copy of an applicable letter of compliance issued by the Ministry of Finance (Ontario) certifying that the Contractor has satisfied this requirement. In the event that OPG is not provided with a duplicate copy of an applicable letter of compliance, the Contractor acknowledges that OPG has an obligation to withhold and remit to the Minister of Finance (Ontario) 4% of all amounts payable to the Contractor.

(5) The indemnities contained in Section 7.5 of this Agreement shall not merge and shall survive termination or expiration of this Agreement indefinitely.

(c) **The Contractor's Income Taxes and Withholdings**. OPG will have no liability for:

(1) any of the Contractor's income or capital (including large corporations) Taxes imposed by any Governmental Authority respecting this Agreement; or

(2) any withholding, collection, payment, remitting or reporting of any Taxes paid or payable by the Contractor in respect of the Contractor's Personnel.

(d) **Refund of Taxes.** All remissions or refunds of any Taxes (other than income or capital (including large corporations taxes)), paid or payable by any Governmental Authority in respect of the Work, in whole or in part, are the exclusive property of OPG. All amounts received by the Contractor or a Subcontractor by way of a remission or refund of any Taxes will constitute trust monies to which OPG is exclusively entitled. The Contractor will promptly forward all such amounts to OPG. The Parties will co-operate with each other and take all actions required or desirable to apply for any applicable remission or refund of Taxes. Upon request by OPG, the Contractor will execute, or cause any Subcontractor to execute, all required or desirable documentation to allow OPG to act in the name of the Contractor or a Subcontractor, as the case may be, to apply for and receive any such remission or refund. OPG may be entitled to a rebate under the *Retail Sales Tax Act* (Ontario), for retail sales tax paid in connection with this Agreement. The Contractor will show, in the manner directed by OPG, on each Application for Payment, either the actual Ontario retail sales tax paid by the Contractor by category or the portion of the Contract Price eligible under Applicable Law for the rebate.

(e) **Withholding for Non-residents.** Notwithstanding any term in this Agreement, OPG may withhold any amount that is required to be withheld by any Applicable Laws respecting Taxes. OPG will have no obligation to gross up or otherwise increase payments made to the Contractor or any Subcontractor because OPG withheld any amount in respect of Taxes. Where OPG so withholds any amount, OPG will remit such amount to the applicable Governmental Authority. If OPG is entitled to set off an amount owing by OPG under this Agreement against an amount owing to OPG under this Agreement and OPG is also required to withhold an amount under any Applicable Laws respecting Taxes, then OPG will set off an amount owing by OPG against an equal amount owing to OPG. For example, if OPG owes the Contractor $100 and of that amount OPG is required to withhold $15, and the Contractor owes OPG $95, then:

(1) OPG would withhold and remit to the Canada Revenue Agency $15; and

(2) the Contractor would pay OPG $10.

These payments would thus entirely extinguish both OPG's obligation to the Contractor and the Contractor's obligation to OPG.

(f) **Importer of Record.** If any portion of the Goods is to be manufactured or fabricated outside Canada, the Contractor will ensure that either the Contractor or

its agent will be the importer of record for customs purposes. OPG will reimburse the Contractor for Canadian goods and services tax paid to obtain customs clearance upon written request with sufficient supporting information provided the Contractor is a non-resident and not registered for Part IX of the *Excise Tax Act* (Canada).

7.6 Contract Price Fixed

Subject to changes in the Contract Price made in accordance with Section 7.7(a), the Contract Price is fixed and constitutes the total compensation payable to the Contractor for performing and entirely finishing the Work. In particular, the Contract Price includes all Work (including all costs respecting the provision of labour and benefits, and the associated administration and approval processes, construction equipment and tools, and including the daily travel and subsistence allowance payable for construction labour and the associated administration and approval processes for processing the employee requests under the applicable terms of the applicable construction collective agreements), freight (delivered duty paid, as that term is defined in the Incoterms 2000), Taxes (except for Canadian goods and services tax levied under the *Excise Tax Act* (Canada)), currency exchange risk and costs, insurance required to be provided by the Contractor and all other costs and expenses of every kind respecting the Work under this Agreement. The Contract Price does not include, however, Canadian goods and services tax levied under the *Excise Tax Act* (Canada).

7.7 Changes in Contract Price

(a) **Changing Contract Price.** The Contract Price may only be changed by an Amendment made in accordance with Section 5. No other purported change to the Contract Price will be valid.

(b) **Pricing Changes to Contract Price.** If a Project Change Directive will have the effect of changing the Contract Price, the Parties will change the Contract Price by an Amendment made in accordance with Section 5 by application of:

(1) a mutually agreed lump sum based on Section 7.8; or

(2) to the extent that Section 7.7(b)(1) is not applicable, cost reimbursement based on Section 7.8.

7.8 Cost Reimbursement for Changes in the Work

(a) **Costs to Include in Calculating Value in Change in the Work.** Where the Parties calculate the amount of the costs applicable to any change in the Work under this Section 7.8, the Parties will calculate all the applicable amounts under Sections 7.8(a) and 7.8(c) without duplication, but will not include any amounts for items under Section 7.8(b). Notwithstanding any term in this Section 7.8, no amount calculated under Sections 7.8(a) or 7.8(c) will exceed the applicable amounts then prevailing in the locality of the performance of the applicable Work. The terms of this Section 7.8 apply equally whether the amount of the Work is being increased or decreased due to the change in the Work.

(1) **Payroll Costs of Labour.** In calculating the amount of the costs applicable to any change in the Work, the Parties will calculate the payroll costs, including shift and overtime premiums, for hourly paid union labour in the direct employ of the Contractor that would be involved in providing the increase and/or decrease in Work. Such payroll amounts will be determined under the applicable terms of the applicable collective agreements. Such payroll costs include all contributions, premiums, allowances and remittances due to any Governmental Authority, travel and subsistence costs, pension fund, benefit plan, or union fund in accordance with a collective agreement and all Canada Pension Plan contributions, employment insurance premiums and Workplace Safety and Insurance Board premiums. Notwithstanding any term in this Section 7.8, under no circumstance will OPG pay, or otherwise be liable for, any tax equalization payment respecting any Person performing any of the Work.

(2) **Work of Subcontractors.** In calculating the amount of the costs applicable to any change in the Work, the Parties will calculate the actual purchase cost to the Contractor, net of discounts, rebates and other refunds, of the increase and/or decrease in the applicable Work performed by a Subcontractor.

(3) **Professional Services.** To the extent that the changes in the Work require specific Professional Services, the rates payable therefore shall be subject to review and approval of OPG prior to undertaking any change in the Work.

(4) **Purchased Goods.** Subject to Section 7.8(b)(2), in calculating the amount of the costs applicable to any change in the Work, the Parties will calculate the actual purchase cost to the Contractor, net of discounts, rebates and other refunds and returns from the sale of surplus Goods, of the increase and/or decrease in the applicable Goods, delivered to the Site.

(5) **Rented Construction Equipment.** Subject to Section 7.8(b)(2), in calculating the amount of the costs applicable to any change in the Work, the Parties will calculate the actual rental cost to the Contractor, net of discounts, rebates and other refunds, of the increases and/or decreases in the applicable rented construction equipment, delivered to the Site. The rental costs may not exceed the lesser of the Contractor's rental rates or the rates set out in the latest edition of the Ontario Provincial Standards, OPSS 127 Schedule of Rental Rates for Construction Equipment. All rental rates will be subject to approval by OPG and will exclude the cost of the operator. For utilization in excess of 8 hr/day or 176 hr/mo, or for standby charges, or for transportation to and from the Site, reduced rates shall apply and shall be as agreed by OPG.

(6) **Owned Construction Equipment.** Subject to Section 7.8(b)(2), in calculating the amount of the costs applicable to any change in the Work,

the Parties will calculate the cost to the Contractor of the increases and/or decreases in the applicable construction equipment owned by the Contractor or one of its affiliates, delivered to the Site. The costs may not exceed the lesser of the Contractor's rates or the rates set out in the latest edition of the Ontario Provincial Standards, OPSS 127 Schedule of Rental Rates for Construction Equipment. All such charge rates shall be subject to approval by OPG and shall exclude cost of operator. For utilization in excess of 8 hr/day or 176 hr/mo, or for standby charges, or for transportation to and from the Site, reduced rates shall apply and shall be as agreed by OPG.

(7) **Taxes.** In calculating the amount of the costs applicable to any change in the Work, the Parties will calculate the actual cost of additional or reduced Taxes, excluding income and capital (including large corporations) taxes and goods and services tax levied under the *Excise Tax Act* (Canada).

(8) **Unit Rates.** To the extent that the changes in the Work require changes in costs in respect of those elements of the Work identified under the heading "Unit Rates" in Appendix 1.1(j), in calculating such changes in costs, the Parties will use the unit rates set out in Appendix 1.1(j) for such elements of the Work. For such elements of the Work the adjusted costs calculated by using such unit rates shall be the only changes in the cost applicable to such elements of the Work and any other costs shall be excluded.

(b) **Costs to Exclude in Calculating Value in Change in the Work.** Notwithstanding any term in Section 7.8(a), where the Parties calculate the amount of the costs applicable to any change in the Work, the Parties will exclude the costs of each of the amounts set out in this Section 7.8(b).

(1) **Payroll Costs of Supervisors and Management.** In calculating the amount of the costs applicable to any change in the Work, the Parties will exclude all payroll costs, additives and other costs respecting individuals not included under Section 7.8(a)(1), including supervisors, managers, superintendents, engineers and other design Professionals directly employed by the Contractor (except to the extent directly required to make the change in the Work), architects, estimators, accountants, lawyers, auditors, purchasing and contracting agents, field engineers, expediters, timekeepers, clerks, officers, directors and partners, whether on or off the Site. The costs of all such individuals are considered to be administrative costs covered under Section 7.8(c).

(2) **Overhead and Profit Fee.** In calculating the amount of the costs applicable to any change in the Work, any overhead or profit fee of any Subcontractor of any tier. The Contractor will be responsible for paying any such overhead or profit fees from any overhead and profit fee paid to the Contractor under Section 7.8(c).

(3) **Specified Construction Equipment.** In calculating the amount of the costs applicable to any change in the Work, the Parties will exclude all construction equipment and tools having a replacement cost, or with a base rental price, of less than $2,500, exclusive of all Taxes.

(4) **Specialized Tunneling Equipment.** In calculating the amount of the costs applicable to any change in the Work, ownership or rental costs, including but not limited to excess utilization or standby costs for specialized tunneling equipment, including but not limited to the TBM, trailing gear, tunnel mucking equipment, and grouting equipment. Such cost will be deemed to have been adequately provided for and included elsewhere in the contract lump sums.

(5) **Office Costs.** In calculating the amount of the costs applicable to any change in the Work, the Parties will exclude all costs respecting the Contractor's offices, whether on or off the Site.

(6) **Capital Costs.** In calculating the amount of the costs applicable to any change in the Work, the Parties will exclude:

(A) any debt carrying charges, including principal payments, interest or other carrying charges; and

(B) all capital costs, including interest, on the Contractor's capital employed for the Work and charges against the Contractor for late payments, if any.

(7) **Negligence.** In calculating the amount of the costs applicable to any change in the Work, the Parties will exclude all costs incurred as a result of negligence of the Contractor, any Subcontractor, any member of the Contractor's Personnel or any of the Contractor's or any of a Subcontractor's shareholders, directors, officers, partners, members, representatives, agents, advisors or any other Person for whom the Contractor or any Subcontractor is responsible at law, including any costs of any claims, demands, actions, suits or proceedings for Losses made by any Person and the costs respecting the correction or replacement of the Defective part of the Work, the disposal of Goods incorrectly purchased or the correction of any damages.

(8) **Other Costs.** In calculating the amount of the costs applicable to any change in the Work, the Parties will exclude all other costs not expressly set out in Sections 7.8(a) or 7.8(c), including all indemnifications by the Contractor under this Agreement, all costs of all acts that are to be provided at the expense of the Contractor under this Agreement and all costs which are recoverable by the Contractor in respect of warranties, guarantees, insurance or other security (including performance related security) in favour of the Contractor or a Subcontractor.

(c) **Overhead and Profit Fee.** Where the Parties calculate the amount of the costs applicable to any change in the Work, the Parties will include or deduct the additional fee, representing the Contractor's supervision, overhead (including salary burdens and small tools), profit and all other costs. Such fee will be calculated as follows:

(1) for additional costs incurred under Section 7.8(a)(1), the Contractor's fee will be 10% of such costs;

(2) for additional costs incurred under Sections 7.8(a)(2) and 7.8(a)(5), the Contractor's fee will be 10% of such costs;

(3) for additional costs incurred under Sections 7.8(a)(4) and 7.8(a)(6), the Contractor's fee will be 5% of such costs;

(4) for Section 7.8(a)(7), nil;

(5) where one or more tiers of Subcontractors are reimbursed for additional costs on the basis of cost of the Work plus a fee, the intent is that the Subcontractor who performs the Work, at whatever tier, will be paid a fee of 10% of the costs incurred by such Subcontractor under Section 7.8(a)(2). Any higher tier Subcontractor and the Contractor will each be paid a fee of 5% of the cost amount only paid to the next lower tier Subcontractor in accordance with the provisions of Section 7.8(b)(2);

(6) the amount of credit to be allowed by the Contractor to OPG for any change which results in a net decrease in cost as calculated under Section 7.8(a) will be the amount of the actual net decrease in cost plus a deduction in the Contractor's fee by an amount equal to 5% of such net decrease; and

(7) when both additions and credits are involved in any one change, the adjustment in the Contractor's fee shall be computed in accordance with Sections 7.8(c)(1) through 7.8(c)(6) above, and will be based on the aggregate net cost of the change calculated in accordance with Section 7.8(a).

(d) **Documentation and Readjustment.** Where any calculations are made under this Section 7.8, OPG may, at any time, require from the Contractor satisfactory evidence of any cost figures supplied by the Contractor. OPG may have any such cost figures reviewed by auditors designated by OPG, so long as OPG directs such review to be performed within two years after the Final Completion Date. The Contractor will provide such auditors prompt access to all premises and documents required for such review. The Contractor will preserve all records necessary for any such calculation until the end of such two-year period. If the Contractor fails to preserve any such records, OPG may make any reasonable assumptions in the absence of such records. All payments made by OPG involving calculations under this Section 7.8 are subject to readjustment based on

any such audit at any time before the expiry of the 26th month after the Final Completion Date.

7.9 Substantial Completion

(a) **Notice of Ready for Use.** The Contractor will deliver a Notice in the form attached as Appendix 7.9(a) to OPG (including a punch list of all items that remain unfinished and which will not impair the intended use of the Tunnel Facility Project and a schedule for entirely finishing each such item) when:

(1) "**substantial performance**" has occurred, as such term is defined in the *Construction Lien Act* (Ontario);

(2) the Work has progressed to the point where the Tunnel Facility Project is ready for use and is sufficiently complete, in accordance with this Agreement, so that the Tunnel Facility Project may be used as intended in accordance with this Agreement;

(3) the cost to entirely finish the Work that remains unfinished and to correct any known Defective parts of the Work does not exceed a total of $4 million;

(4) the Contractor has obtained and delivered to OPG the Approvals which the Contractor is required to obtain under Section 2.6(b);

(5) the Tunnel Facility Project has been commissioned and meets all of the tests set out in the Final Submittals and this Agreement;

(6) water is flowing in the tunnel, with gates fully open, unrestricted between tunnel intake and outlet structure for a continuous period of 24 hours, provided that the Contractor will not water up the tunnel unless the tunnel is free of Defects, and provided that all other material obligations under this Agreement have also been satisfied;

(7) the Contractor has delivered to OPG copies of all certified reports of the performance tests described in this Section 7.9(a); and

(8) the Contractor has delivered to OPG an affidavit of each of the Contractor's design Professionals substantially in the form attached as Appendix 7.9(a)(8).

When OPG determines, acting reasonably, that all of the terms of Sections 7.9(a)(1) to 7.9(a)(8) inclusive have been complied with then "**Substantial Completion**" has occurred.

(b) **Joint Inspection.** Within a reasonable time after receipt of the Notice under Section 7.9(a), the Parties will make a joint inspection of the Tunnel Facility Project to determine the status of the Tunnel Facility Project and each outstanding

item, including each item set out in the Notice delivered under Section 7.9(a). If OPG determines that Substantial Completion has not occurred in accordance with Section 7.9(a), OPG will deliver a Notice in the form of document attached as Appendix 7.9(b) to this effect to the Contractor, giving reasons. If OPG determines that Substantial Completion has occurred in accordance with Section 7.9(a), OPG will deliver a Notice in the form of document attached as Appendix 7.9(b) containing a certificate of Substantial Completion. This certificate will fix the date of Substantial Completion. The Parties will then sign a certificate of substantial completion as contemplated by Section 32(1)1 of the *Construction Lien Act* (Ontario). The Contractor will then promptly publish the notice in accordance with the *Construction Lien Act* (Ontario).

(c) **Punch List and Allocation of Responsibilities.** OPG will attach to the certificate of Substantial Completion a punch list of items that are to be entirely finished or are Defective and must be corrected or replaced by the Contractor before final payment will be made under Section 7.12. At the time of delivery of the certificate of Substantial Completion OPG will also deliver to the Contractor a written allocation of responsibilities between OPG and the Contractor pending final payment made under Section 7.12 respecting safety, security, operation, maintenance, insurance and warranties and guarantees respecting the remaining Work. The Contractor will deliver a Notice to OPG each week setting out an update as to the status of completion of each punch list item.

(d) **Access to Perform Remaining Obligations.** OPG may exclude the Contractor from the Site, in whole or in part, after the date of Substantial Completion. OPG will, however, allow the Contractor reasonable access to such parts of the Site as are required to permit the Contractor to finish entirely or correct all items on the punch list.

7.10 Final Inspections

When the Contractor considers that it has entirely finished or corrected all items on the punch list, the Flow Verification Test has been conducted and the final Test report has been approved by the chief of test and delivered to OPG and the Contractor (as more particularly described in Section 11 of Appendix 1.1(aa)), the Contractor may deliver a Notice to this effect to OPG. Promptly following receipt of this Notice, the Parties will make a joint inspection of the Tunnel Facility Project. OPG will then deliver a Notice in the form attached as Appendix 7.10 to the Contractor stating either that:

(a) OPG accepts the Work as being entirely finished, including because the Contractor has delivered to OPG all Approvals and other written or graphic documents, designs, drawings, specifications, plans, reports, information and other deliverables or data required to be provided by the Contractor to OPG under this Agreement and because the Contractor has satisfied all requirements of Applicable Laws; or

(b) there are items remaining to be entirely finished or that are Defective and must be corrected or replaced by the Contractor. The Contractor will promptly take such actions as are necessary to finish entirely, correct or replace all such items. Once the Contractor has finished all such actions, the Contractor will deliver another Notice to OPG in accordance with this Section 7.10.

7.11 Final Application for Payment

After OPG has accepted the Work as being entirely finished under Section 7.10(a), the Contractor may make a final Application for Payment in accordance with Section 7.2. The Contractor will submit with the final Application for Payment (except to the extent previously delivered by the Contractor and accepted by OPG as satisfactory), the following:

(a) as-built drawings, maintenance and operating instructions, security documents, certificates of insurance, certificates of inspection, all documents required to be maintained at the Site in accordance with Section 2.15(a) and all other documents required by this Agreement to be delivered to OPG on the entire finishing of the Tunnel Facility Project;

(b) the required consent of any surety, if any, to the final payment made under Section 7.12;

(c) a certificate of good standing from the Workplace Safety and Insurance Board or successor organization;

(d) releases in the form set out in Appendix 7.11, from the Contractor and each Subcontractor who performed Work in respect of the Tunnel Facility Project, respecting all Liens and other claims filed or otherwise arising in respect of the Work or Tunnel Facility Project; and

(e) statutory declarations in the form set out in Appendix 7.11**,** signed by a director or officer of the Contractor, and each Subcontractor who has performed Work at the Site, declaring that all payments due to Subcontractors, all wages and benefit payments due to any of the Contractor's Personnel, and all contributions, premiums, allowances and remittances due to any Governmental Authority, pension fund, benefit plan, or union fund in accordance with a collective agreement, have been paid in a timely manner.

If the Contractor is unable to deliver to OPG any release or statutory declaration referred to in Sections 7.11(d) and 7.11(e) from a Subcontractor, the Contractor will deliver to OPG collateral or security satisfactory to OPG to indemnify OPG against any Lien or other claim until such time that any Lien or claim would expire by operation of Applicable Laws.

7.12 Final Payment and Acceptance

On receipt of the Application for Payment under Section 7.11, OPG will review the Application for Payment within 10 Business Days after receipt and deliver a Notice in the form attached as Appendix 7.12 to the Contractor stating either that:

(a) OPG accepts the Application for Payment and OPG will make, subject to Sections 7.3(f) and 7.5(c), the final payment within 60 days after the delivery of such Application for Payment to OPG; or

(b) the Application for Payment does not yet satisfy all the obligations under this Agreement and setting out the reasons therefore. The Contractor will promptly take such actions as are necessary to satisfy its remaining obligations. Once the Contractor has satisfied all such obligations, the Contractor will deliver to OPG an amended final Application for Payment under Section 7.11.

Where OPG makes the final payment to the Contractor under this Section 7.12, such payment will not relieve the Contractor from any of its obligations or liabilities under this Agreement or otherwise. To the extent that any of the Work was not performed on a fixed fee basis, the Contractor will maintain the applicable records, including time sheets, accounts and invoices, for seven years following expiration or termination of this Agreement, or for such other period as OPG may set out in a Notice to the Contractor. On request by OPG, the Contractor will promptly provide OPG access to such records for review and copying.

7.13 Adjustment for Labour Rates

OPG and the Contractor acknowledge and agree that:

(a) as of the date of this Agreement, a new collective agreement has not been finalized with the unionized building trades who are members of the Canadian Union of Skilled Workers ("CUSW");

(b) as of the date of this Agreement, the unionized building trades who are members of the Electrical Power Systems Construction Association ("EPSCA") and the Brick and Allied Craft Union of Canada ("BACU") have negotiated hourly wage rates for the first 3 years of their collective agreements commencing May 1, 2004, such wage rates are listed in Appendix 7.13(b);

(c) in calculating the Contract Price, the Contractor has assumed the following hourly wage rate increases for trades performing Work on Site (collectively the "Assumed Rates"):

For CUSW, the Assumed Rates were calculated as follows for the periods indicated:

- $1.20 per hour increase above the 2003 CUSW hourly wage rate for the period commencing May 1, 2004, and ending April 30, 2005 (the "2004 CUSW Rate");
- $1.10 per hour increase above the 2004 CUSW Rate for the period commencing May 1, 2005, and ending April 30, 2006 (the "2005 CUSW Rate");
- $1.10 per hour increase above the 2005 CUSW Rate for the period commencing May 1, 2006 and ending April 30, 2007; and

- 3% increase above the CUSW hourly wage rate from the immediately preceding year for each year (or part year) of the Agreement commencing from and after May 1, 2007;

  For EPSCA and BACU, the Assumed Rates were calculated as follows for the periods indicated:

- increases of 3% above the EPSCA or BACU, as the case may be, hourly wage rate from the immediately preceding year for each year (or part year) of the Agreement commencing from and after May 1, 2007;

(d) on or prior to the Final Completion Date, the Contractor will provide to OPG a Notice setting out the actual hourly wage rates in effect for the relevant periods as agreed to by CUSW, EPSCA and BACU (collectively the "Actual Rates") together with any supporting documentation required by OPG. Such Notice will set out, on a trade by trade and month by month basis, the differences between the Actual Rates and the Assumed Rates for the relevant periods (the "Rate Differentials");

(e) upon receipt of such Notice, OPG will calculate, on a trade by trade and month by month basis, the product obtained by multiplying the relevant Rate Differential by the aggregate number of man hours set out in the Man-Hour Breakdown for the relevant trades for the relevant period (for each trade on a month-by-month basis, a "Trade Product"). OPG will provide a Notice to the Contractor, which Notice will set out the Trade Product for each trade on a month-by-month basis and the net amount of all Trade Products (the "Rate Adjustment Amount"). If the Rate Adjustment Amount is positive, the Contractor will include as part of the final Application for Payment an amount equal to the Rate Adjustment Amount. If the Rate Adjustment Amount is negative, the Contractor will deduct from the final Application for Payment an amount equal to the Rate Adjustment Amount. If the Rate Adjustment Amount is greater than the amount to be paid in connection with the final Application for Payment, no final payment will be made to the Contractor and the Contractor will forthwith pay to OPG an amount equal to such difference;

(f) all references to hourly wage rates in this Section refer to hourly wage rates, including payroll burden and excluding all other costs, such as travel and subsistence allowance; and

(g) the Man-Hour Breakdown shall be submitted as a Submittal within 90 days after the Start Date.

SECTION 8. PERFORMANCE INCENTIVES

8.1 Calculation of Liquidated Damages for Delay

Subject to the maximum liquidated damages set out in Section 8.5, the Contractor will pay OPG (by means of set off from the total amount due to the Contractor under this Agreement or, if

insufficient amounts are due, by payment by the Contractor) the following sums for each complete day that the day fixed for Substantial Completion under Section 7.9(b) falls after the date for Substantial Completion set out in the Contract Schedule:

(a) the sum of $250,000 per day during the period November to March inclusive; and

(b) the sum of $180,000 per day during the period April to October inclusive.

The Parties acknowledge that the precise amount of actual damages would be extremely difficult to calculate and that the amount of damages for failure to achieve Substantial Completion in accordance with the Contract Schedule as provided for in this section represents a reasonable and genuine pre-estimate of actual damages and is not a penalty.

8.2 Calculation of Bonus for Early Substantial Completion

Subject to the maximum bonus set out in Section 8.6, OPG will pay the Contractor the following sum for each complete day that the day fixed for Substantial Completion under Section 7.9(b) falls before the date for Substantial Completion set out in the Contract Schedule:

(a) the sum of $125,000 per day during the period November to March inclusive; and

(b) the sum of $90,000 per day during the period April to October inclusive.

Notwithstanding the foregoing, no amount shall be payable to the Contractor by OPG under this Section 8.2 until the calculations relating to liquidated damages under Section 8.3 and relating to bonuses under Section 8.4 are complete.

8.3 Calculation of Liquidated Damages Related to Guaranteed Flow Amount

Within 2 weeks following Substantial Completion, the Contractor will arrange for the performance of the water flow performance test in accordance with the Flow Verification Test set out in Appendix 1.1(aa). OPG shall have the right to be represented at such test and shall have access to all data resulting from such test.

Subject to the maximum liquidated damages set out in Section 8.5, within 30 days of the date of the water flow performance test, the Contractor will pay OPG (by means of set off from the total amount due to the Contractor under this Agreement or, if insufficient amounts are due, by payment by the Contractor) the following sum for the difference in water flow calculated as follows:

PTWFA = Performance Test Water Flow Amount (performed and adjusted in accordance with Flow Verification Test, expressed in m^3/s)

GFA = Guaranteed Flow Amount (expressed in m^3/s)

GFA - PTWFA = A

0.02 = Assumed Flow Amount +/- 2% Test Uncertainty

(a) If "A" is positive and equal to or less than (PTWFA x 0.02), or if "A" is zero, no liquidated damages are due under this Section 8.3;

(b) If "A" is negative, the Contract may be entitled to a bonus as calculated in Section 8.4;

(c) For the portion of "A" greater than (PTWFA x 0.02), the amount of such portion shall be multiplied by the following sums within the specified ranges:

(1) \$350,000 for each 1 m^3/s of incremental flow from 600 to 650 m^3/s, inclusive

(2) \$390,000 for each 1 m^3/s of incremental flow from 550 to 600 m^3/s, inclusive

(3) \$430,000 for each 1 m^3/s of incremental flow from 500 to 550 m^3/s, inclusive

(4) \$600,000 for each 1 m^3/s of incremental flow from 400 to 500 m^3/s, inclusive

(5) \$900,000 for each 1 m^3/s of incremental flow from 350 to 400 m^3/s, inclusive

(6) \$1,800,000 for each 1 m^3/s of incremental flow less than 350 m^3/s.

The Parties acknowledge that the precise amount of actual damages would be extremely difficult to calculate and that the amount of damages for failure to achieve GFA as provided for in this section represents a reasonable and genuine pre-estimate of actual damages and is not a penalty.

The amount of liquidated damages payable under this Section 8.3 shall be the sum of the amounts calculated under the applicable Section 8.3(c)(1) to 8.3(c)(6), inclusively, above.

Example: If the Guaranteed Flow Amount is 560 m^3/s and the Performance Test Water Flow Amount is 500 m^3/s, then the liquidated damages payable would be based on 60 m^3/s - (500 m^3/s x 0.02) = 50 m^3/s. The calculation would be ((40 x \$430,000) + (10 x \$390,000)) = \$21,100,000 (liquidated damages).

8.4 Calculation of Bonuses Related to Guaranteed Flow Amount

Subject to the maximum bonus set out in Section 8.6, within 30 days of the date of the water flow performance test, OPG will pay the Contractor the following sum for the difference in water flow calculated as follows (using the value for "A" calculated in Section 8.3):

(a) If "A" is negative and the absolute value of "A" is equal to or less than (PTWFA x 0.02), no bonus is due under this Section 8.4.

(b) If "A" is negative and the absolute value of "A" is greater than (PTWFA x 0.02), for the portion of "A" that is greater than (PTWFA x 0.02), the amount of such portion shall be multiplied by the following sums below within the specified ranges:

(1) \$175,000 for each 1 m^3/s of incremental flow from 600 to 650 m^3/s, inclusive

(2) \$195,000 for each 1 m^3/s of incremental flow from 550 to 600 m^3/s, inclusive

(3) \$215,000 for each 1 m^3/s of incremental flow from 500 to 550 m^3/s, inclusive

(4) \$300,000 for each 1 m^3/s of incremental flow from 400 to 500 m^3/s, inclusive

(5) \$450,000 for each 1 m^3/s of incremental flow from 350 to 400 m^3/s, inclusive

(6) \$900,000 for each 1 m^3/s of incremental flow less than 350 m^3/s.

The total bonus payable under this Section 8.4 shall be the sum of the amounts calculated under the applicable Section 8.4(b)(1) to 8.4(b)(6), inclusively, above.

Example: If the Guaranteed Flow Amount is 520 m^3/s and the Performance Test Water Flow Amount is 570 m^3/s then the bonus payable would be based on 50 m^3/s - (570 m^3/s * 0.02) = 38.6 m^3/s. The calculation would ((30 m^3/s * \$215,000) + (8.6 m^3/s * \$195,000)) = \$8,127,000 (Bonus).

8.5 Maximum Liquidated Damages

The total amount of liquidated damages calculated under Sections 8.1 and 8.3 will not exceed 20% of the Contract Price.

8.6 Maximum Bonus Payment

The total amount of the bonus payment calculated under Section 8.2 and 8.4 will not exceed 20% of the Contract Price.

SECTION 9. ACCEPTANCE OF TUNNEL FACILITY PROJECT AND CORRECTION OF DEFECTS

9.1 Warranty

(a) **Basic Warranty.** The Contractor warrants and guarantees to OPG that:

(1) notwithstanding anything else in this Agreement, the Work will in all respects be fit for the purposes intended by this Agreement, including the

Owner's Mandatory Requirements, Contractor's Proposal Documents and the Final Submittals; and

(2) all Work will be performed in accordance with this Agreement.

(b) **Exclusions.** The Contractor's warranties and guarantees in Section 9.1(a) do not apply to the extent that any breach of the warranty or guarantee is due to:

(1) maintenance or operation by OPG contrary to any maintenance or operating instructions delivered by the Contractor to OPG; or

(2) the negligence of OPG or any Person providing services to OPG, other than the Contractor or a Subcontractor.

(c) **No Deemed Acceptance.** The Contractor's obligations under Section 9.1(a) are absolute. These warranties and guarantees will not be affected in any way by any certificate, acceptance, approval, payment or any other act, matter or thing done or omitted under this Agreement. For greater certainty, none of the following actions will constitute any acceptance of the Work or Tunnel Facility Project by OPG in whole or in part or will constitute a waiver or release of any of the Contractor's obligations under this Agreement:

(1) any review, comment, acceptance, rejections or failure to review, comment, accept or reject by OPG of a Submittal or other document under this Agreement;

(2) any inspection, test or approval by OPG or any third party;

(3) any payment under this Agreement;

(4) any certificate of Substantial Completion issued under Section 7.9(b);

(5) any use or occupancy of the Tunnel Facility Project in whole or in part by OPG; or

(6) any correction or replacement of a Defective part of the Work or Tunnel Facility Project by, or at the request of, the Contractor, OPG or OPG's Representative.

(d) **Risk of Loss.** The Work and Tunnel Facility Project will remain at the sole risk of the Contractor against loss or damage up to and including the Final Completion Date (but excluding damage that was caused by OPG and occurred after Substantial Completion to a part of the Work or Tunnel Facility Project for which OPG was responsible at the time the damage occurred).

(e) **Indemnity.** The Contractor will indemnify and hold harmless each member of the OPG Group, from and against:

(1) all Losses suffered or incurred by a member of the OPG Group arising in respect of the Work, to the extent that any such Losses are attributable to bodily injury, sickness, disease or death, or to damage to or destruction of tangible property, including any resulting loss of use; and

(2) all claims, demands, actions, suits or proceedings for Losses made against any member of the OPG Group by any Person,

but only, in each case, to the extent such Losses are caused by:

(i) a breach of this Agreement (including in respect of any breach of Applicable Laws) by the Contractor; or

(ii) by any act or omission of any Person performing any of the Work.

The obligations of the Contractor under this Section 9.1(e) will not be affected in any way by any certificate, acceptance, approval, payment or any other act, matter or thing done or omitted under this Agreement, including any act by OPG or OPG's Representative referred to in Sections 9.1(c)(1) to 9.1(c)(6) inclusive.

9.2 Access to Tunnel Facility Project

The Contractor will provide access to the Tunnel Facility Project, the Site and the premises of the Contractor and Subcontractors, at all reasonable times and from time to time, to OPG's Representative, and at the request of OPG's Representative, to OPG's Designated Delegates and any other Person, for the purposes of Site visits, compliance with access rights, emergency maintenance and repairs, viewing, performing surveillance on, inspecting, testing and/or accepting the Work and/or Tunnel Facility Project, in whole or in part, including to monitor compliance with the Owner's Mandatory Requirements, the Contractor's Proposal Documents, the Final Submittals and any applicable quality assurance program. In particular, the Contractor will deliver a Notice to OPG's Representative providing OPG with Notice of at least two Business Days before OPG is required to inspect any Goods at any hold point in any inspection plan. At the request of OPG's Representative, the Contractor will promptly provide to OPG's Representative a copy of all the documents (unpriced, if the Contractor desires) respecting any subcontract subject to viewing, performing surveillance, inspecting, testing and/or accepting. No such viewing, performing surveillance, inspecting, testing and/or accepting by OPG will relieve the Contractor of any of its obligations or liabilities under this Agreement. The Contractor will advise each applicable representative of OPG of the Contractor's or Subcontractor's applicable site safety procedures and policies. The Contractor will provide each such representative with proper and safe transportation and conditions for such access.

9.3 Inspections, Tests and Approvals

The Contractor will with promptness and in an orderly sequence so as not to cause any delay to the Work, arrange for and obtain all inspections, tests and approvals required for the acceptance of Goods that are to be incorporated or used in the Tunnel Facility Project. The Contractor will ensure that each inspection, test or approval that is required to be carried out, in whole or in part, by a Professional, is so carried out by a Professional. The Contractor will pay all costs

respecting such inspections, tests and approvals. If this Agreement, the applicable quality assurance program or any Applicable Laws or Approvals require any part of the Work or the Tunnel Facility Project to be inspected, tested or approved, in whole or in part, the Contractor will arrange for and obtain all such inspections, tests and approvals. The Contractor will pay all costs in connection with such inspections, tests and approvals. The Contractor will deliver to OPG all certificates, reports and other documents respecting any inspections, tests and approvals made in accordance with this Section 9.3, the Contractor's Proposal Documents or the Final Submittals. The Contractor will give OPG reasonable Notice of the date, time and location for all inspections, tests or approvals carried out under this Section 9.3 so that OPG can attend. If Notice is not given, OPG may require the inspection, test or approval to be redone at the Contractor's cost. If any such approval is to be issued in the name of OPG or that will affect the operation of the Project following the Final Completion Date, the Contractor will submit the draft approval to OPG's Representative for acceptance, before the Contractor obtains this approval. The Contractor will only obtain any such approval following receipt of the written acceptance of OPG's Representative of the draft approval. In addition to any other inspection, test or approval set out in this Agreement, OPG may require, at its cost (but for certainty without payment of any amount to the Contractor), any other inspection, test or approval of any part of the Work or the Tunnel Facility Project, in whole or in part, either on or off the Site, upon Notice to the Contractor.

9.4 Uncovering Project

(a) **Covered Without OPG's Consent.** If, without the prior written consent of OPG, the Contractor covers any part of the Project (or the construction work of any Person) that is required under this Agreement or Applicable Laws or Approval to be inspected, tested or approved, the Contractor will, at its cost, uncover and recover such part of the Project or construction work. If, however, the Contractor has given OPG timely Notice of the Contractor's intention to cover such part of the Project or the construction work and OPG has not acted with reasonable promptness in response to such Notice, OPG will be responsible for the cost, calculated in accordance with Section 7.7(b), of uncovering and recovering such part of the Project or the construction work.

(b) **Covered Contrary to OPG's Request.** If the Contractor covers any part of the Project (or the construction work of any Person) contrary to the request of OPG, the Contractor will, at its cost, if requested by OPG, uncover and recover such part of the Tunnel Facility Project or construction work.

(c) **OPG's Request to Uncover.** If, for any reason not set out in Sections 9.4(a) or 9.4(b), OPG wishes to have part of the Project uncovered to be inspected, tested or approved by any Person designated by OPG, the Contractor will, at OPG's request, uncover the requested part of the Project for inspection, testing, approval and performing all necessary Work. If it is determined that any part of the Work uncovered under this Section 9.4(c) is Defective, the Contractor will:

(1) pay all costs for uncovering and recovering the part of the Work requested by OPG to be uncovered;

(2) pay all of OPG's reasonable costs of inspection, testing and approval; and

(3) correct or replace the Defective part of the Work in accordance with this Section 9.

If, however, it is determined that none of the Work uncovered under this Section 9.4(c) is Defective, OPG will pay all of the Contractor's reasonable costs for uncovering and recovering the part of the Project requested by OPG to be uncovered, which costs will be calculated in accordance with Section 7.7(b).

9.5 Notice of Defective Tunnel Facility Project

OPG will, within a reasonable period of time after having actual knowledge of a Defective part of the Work, deliver Notice to the Contractor of the Defective part, but OPG's failure to do so will not impose any liability on OPG and the Contractor will be estopped from making any claim against OPG for failure to do so. In addition, OPG's failure to do so will not:

(a) have the effect of transferring any obligation under this Agreement from the Contractor to OPG or otherwise have the effect of amending this Agreement; or

(b) will not affect or change in any way the Contractor's:

(1) obligation to entirely finish the Work in accordance with this Agreement, or

(2) responsibility for repairing, replacing or re-providing any Defective part of the Work or Tunnel Facility Project.

9.6 OPG May Stop Construction

OPG may at any time and from time to time, by delivering a Notice to the Contractor, direct the Contractor to stop the performance of the Work, in whole or in part, including, if

(a) the Work or the Tunnel Facility Project is Defective, in whole or in part;

(b) the Contractor fails to supply suitable Goods, in whole or in part;

(c) the Contractor fails to perform the Work, in whole or in part, in a manner that ensures that the entirely finished Tunnel Facility Project will conform to this Agreement; or

(d) the Contractor has breached any term of this Agreement, including due to any act or omission of a Subcontractor that breaches a term of this Agreement.

The Contractor may resume the stopped Work to which OPG's direction applies only once the Contractor has remedied the issue that was the cause for OPG to deliver such Notice. OPG is not obliged to deliver a Notice to the Contractor under this Section 9.6 for any reason whatsoever.

Subject to Sections 2.4(i) and 13.1, the Contractor will not be entitled to any change to the Contract Price or the Contract Schedule for any Work stopped pursuant to this Section 9.6.

9.7 Correction or Removal of Defective Part of Tunnel Facility Project - Before Substantial Completion

(a) **Work Required.** Before Substantial Completion, OPG may accept or reject any Defective parts of the Work or the Tunnel Facility Project, whether or not such part has been incorporated into the Project, on delivery of Notice to this effect to the Contractor. The Contractor will promptly correct all Defective parts of the Work and the Tunnel Facility Project either upon discovery or upon rejection by OPG under this Section 9.7. If reasonably requested by OPG, the Contractor will remove any and all Defective parts of the Tunnel Facility Project from the Site, whether or not such parts have been incorporated into the Project, and replace such parts with parts that are not Defective and that comply with this Agreement.

(b) **Cost to Correct or Remove.** The Contractor will pay all costs respecting the correction of a Defective part of the Work or the Tunnel Facility Project ("**Correction Costs**"), including:

(1) all incidental costs of the corrective services, including, as may be required for disassembly, removal, re-installation, re-erection, re-assembly, transportation, insurance and any applicable Taxes;

(2) all of OPG's fees and charges of engineers, architects, accountants, lawyers (on a solicitor and his own client basis) and other professionals, all court, arbitration and other dispute mediation or resolution costs and charges, whether incurred through settlement or otherwise, together with interest calculated in accordance with Section 1.1(mm); and

(3) all costs and charges respecting correction or replacement of any Defective part of the Work or the Tunnel Facility Project, including any part of the Work or Tunnel Facility Project that was rendered Defective because of the Defective part of the Work or Tunnel Facility Project, including in respect of any damage or loss arising in respect of such correction or replacement or in respect of any inspections conducted to determine whether any such correction or replacement was required, including for loss of use.

9.8 Correction or Removal of Defective Part of Tunnel Facility Project - After Substantial Completion

(a) **Warranty Period.** "**Warranty Period**" means, in respect of each part of the Work and Tunnel Facility Project, the greatest of:

(1) one year following the date of Substantial Completion;

(2) the warranty period specified in any warranty from a Subcontractor for any specific part of the Work and Tunnel Facility Project;

(3) the warranty period specified in this Agreement, including the Contractor's Proposal Documents or the Final Submittals, for any specific part of the Work and Tunnel Facility Project; and

(4) the warranty period for any specific part of the Work and Tunnel Facility Project provided under any Applicable Laws,

subject to any extension made under Section 9.8(d).

(b) **Obligation to Correct.** If at any time and from time to time before the expiration of the relevant Warranty Period, the Work or the Tunnel Facility Project, in whole or in part, including any part of the Work or Tunnel Facility Project that was rendered Defective because of the Defective part of the Work or Tunnel Facility Project, becomes or is determined to be Defective or fails because of any defect, the Contractor will promptly, without cost to OPG and in accordance with OPG's instructions and at times and within the period of time reasonably specified by OPG:

(1) satisfactorily correct such Defective part of the Work and Tunnel Facility Project, or, to the extent reasonably requested by OPG, remove such Defective part of the Work or Tunnel Facility Project from the Site and replace such Defective part with parts which are not Defective and which comply with this Agreement; and

(2) satisfactorily correct or replace any other damage arising in respect of the actions taken in respect of Section 9.8(b)(1) or in respect of any inspections conducted to determine whether any actions were required in respect of Section 9.8(b)(1).

The Contractor will pay all Correction Costs as described in Section 9.7. In providing any corrective services under this Section 9.8(b), the Contractor will comply with all applicable terms of this Agreement and will endeavour to minimize interference with, and impact on, OPG's operations.

(c) **Failure to Comply.** If the Contractor fails to comply with its obligations under Section 9.8(b) or any other term in this Agreement as expeditiously as is commercially reasonable and within the time period reasonably specified by OPG, or if there is an emergency that poses a significant risk of loss or damage to the Project or any Person, OPG may take, directly or indirectly, any of the actions contemplated under Section 9.8(b) or such other actions as are reasonable in the circumstances, without affecting any other rights or remedies OPG may have against the Contractor under this Agreement. The Contractor will pay all Correction Costs as described in Section 9.7 respecting all such actions and deduct same from any monies otherwise due, owing or payable to the Contractor.

In respect of any action taken by OPG, directly or indirectly, under this Section 9.8(c), OPG may without terminating this Agreement:

(1) eject and exclude from the Site the Contractor, any Subcontractor and any of the Contractor's Personnel and prohibit the Contractor from continuing the Work;

(2) suspend the Contractor's performance of the Work under this Agreement to the extent of such actions;

(3) take possession of the Site, work in progress, Goods, Contractor's construction equipment, tools, fuel and temporary structures and facilities, including for offices, lunchrooms, canteens, sanitation, showers, change rooms, accommodations, shops, warehouses and garbage disposal, at the Site (and at no additional charge for the retention and use thereof);

(4) assume any and all subcontracts with Subcontractors;

(5) avail itself of any performance bond, guarantee, indemnity, letter of credit or other security provided by the Contractor or a Subcontractor with respect to the applicable Work;

(6) incorporate or use in the Project all Goods stored at the Site or for which OPG has paid the Contractor but which are stored elsewhere, including for greater certainty, the TBM; and/or

(7) withhold, without interest, all payments to the Contractor under any agreement between OPG and the Contractor until the Contractor's liability to OPG is determined.

The Contractor will allow all members of the OPG Group and OPG's other contractors access to the Site to enable OPG to exercise its rights under this Section 9.8(c). The Contract Schedule will not be changed for any reason relating to any actions taken by OPG, directly or indirectly, under this Section 9.8(c).

(d) **Extension of Correction Period.** Where any correction or replacement of any Defective part of the Work or Tunnel Facility Project, including any part of the Work or Tunnel Facility Project that ceases to be used in commercial operations because of the Defective part of the Work or Tunnel Facility Project, including in respect of any damage or loss arising in respect of such correction or replacement, is carried out under this Section 9.8, then the Warranty Period will:

(1) recommence at the beginning of the Warranty Period under Section 9.8(a) respecting the part of the Work or Tunnel Facility Project that was corrected or replaced, commencing on the date that such corrected or replaced part re-enters commercial operation; and

(2) respecting the part of the Work or Tunnel Facility Project that ceases to be used in commercial operations because of the Defective part of the Work or Tunnel Facility Project, be suspended as at the date that such Work or Tunnel Facility Project were taken out of commercial operation and will recommence on the date that such Work or Tunnel Facility Project re-enter commercial operation.

9.9 Acceptance of Defective Part of Tunnel Facility Project

If any part of the Work or the Tunnel Facility Project becomes or is determined to be Defective or fails because of any defect before the expiration of the relevant Warranty Period (as that period may be extended under Section 9.8(d)), OPG may deliver a Notice to the Contractor directing the Contractor not to correct or replace the Defective part of the Work or the Tunnel Facility Project in whole or in part. The Contractor will pay all of OPG's costs respecting its evaluation of, and determination respecting, such Defective part of the Work and the Tunnel Facility Project (including all of OPG's fees and charges of engineers, architects, accountants, lawyers (on a solicitor and his own client basis) and other professionals and all court, arbitration and other dispute mediation or resolution costs and charges). To the extent OPG accepts any such Defective part of the Work or the Tunnel Facility Project before OPG makes the final payment under Section 7.12, the Parties will reduce the Contract Price under an Amendment made in accordance with Section 5 to reflect an equitable reduction in the Contract Price for the Defective part of the Work or the Tunnel Facility Project. To the extent OPG accepts any such Defective part of the Work or Tunnel Facility Project after OPG makes the final payment under Section 7.12, the Contractor will pay OPG an agreed amount that reflects an equitable reduction in the Contract Price for the Defective part of the Work.

9.10 Warranty Work

The Contractor will perform in a timely manner all the warranty Work set out in this Agreement. In performing such Work at the Site, the Contractor will comply with all applicable terms of this Agreement respecting the performance of Work at the Site and will endeavour to minimize interference with, and impact on, OPG's operations.

SECTION 10. DEFAULT

10.1 Events of Default

Each of the following events and circumstances constitutes an event of default by the Contractor under this Agreement:

(a) the Contractor or any Person providing a parental indemnity to OPG in accordance with Section 4.1(e) has been dissolved or has had a resolution passed for its winding-up or liquidation, other than in respect of an amalgamation, merger or consolidation;

(b) the Contractor or any Person providing a parental indemnity to OPG in accordance with Section 4.1(e) has made a general assignment, arrangement, composition or proposal with, or for the benefit of, its creditors;

(c) the Contractor or any Person providing a parental indemnity to OPG in accordance with Section 4.1(e) ceases to be, or admits that it is no longer, able to satisfy its obligations as they become due;

(d) the Contractor or any Person providing a parental indemnity to OPG in accordance with Section 4.1(e) has instituted, or has had instituted against it, a proceeding seeking a judgment of insolvency or bankruptcy or any other relief under any bankruptcy or insolvency law or similar Applicable Laws affecting creditor's rights, or a petition is presented for its winding-up or liquidation and, in the case of any such proceeding or petition instituted or presented against it, such proceeding or petition:

(1) is instituted by or consented to by the Contractor or such Person providing a parental indemnity in accordance with Section 4.1(e);

(2) results in a judgment of insolvency or bankruptcy, the entry of an order for relief or the making of an order for its winding-up or liquidation and any such judgment or order has not been stayed pending an appeal; or

(3) if instituted against the Contractor or such Person providing a parental indemnity in accordance with Section 4.1(e) is not stayed pending an appeal and dismissed, discharged, stayed or restrained, in each case within 30 days of the institution or presentation thereof;

(e) the Contractor or any Person providing a parental indemnity in accordance with Section 4.1(e) has filed a petition, answer or consent seeking reorganization, readjustment, arrangement, composition or similar relief under any Applicable Law;

(f) the Contractor or any Person providing a parental indemnity in accordance with Section 4.1(e) has consented or becomes subject to the appointment of a receiver, liquidator or trustee or assignee in bankruptcy in respect of all or a substantial part of its assets and in the case that any such process, if instituted against the Contractor or such Person providing a parental indemnity in accordance with Section 4.1(e), as the case may be, has been instituted or presented against the Contractor or such Person providing a parental indemnity in accordance with Section 4.1(e), as the case may be, any such process has not been stayed pending an appeal and dismissed, discharged, stayed or restrained within 30 days thereafter;

(g) the Contractor or any Person providing a parental indemnity in accordance with Section 4.1(e) had a secured party take possession of all or a substantial part of its assets;

(h) the Contractor or any Person providing a parental indemnity in accordance with Section 4.1(e) has a distress, execution, attachment, or sequestration enforced or sued on or against all or a substantial part of its assets;

(i) the Contractor breaches any of its obligations (including any representations, warranties, guaranties and indemnities) under this Agreement, or under any document delivered under this Agreement, and fails to remedy the breach to the satisfaction of OPG within seven Business Days following receipt of Notice from OPG specifying the breach, or if the breach cannot be cured within such seven Business Day period, after such longer period of time as is reasonably required to cure the breach (but no longer than 60 days in any circumstances), so long as the Contractor diligently and constantly endeavours to cure the breach during such extended period provided that such cure period shall not apply to defaults described in Sections 10.1(j) to 10.1(p);

(j) the Contractor breaches or contravenes any Applicable Law in connection with this Agreement and (i) fails to provide a plan within seven Business Days following receipt of Notice from OPG specifying the breach or contravention, to remedy the breach or contravention which plan is satisfactory to OPG, or (ii) fails to comply with such plan; provided that the Contractor shall not be in default if the Contractor provides evidence to OPG (which is satisfactory to OPG) that such breach or contravention is not material;

(k) the Contractor's conflict of interest declaration appended as Appendix 2.18 is or becomes incorrect, inaccurate or incomplete; or if measures cannot be instituted to address to OPG's satisfaction a conflict which resulted from a change in circumstances as described in Section 2.18;

(l) the Contractor fails to obtain and maintain the maintenance bond, or the Performance LC(s) for this Agreement as required under Section 4.1;

(m) the Contractor fails to obtain and maintain the insurance required pursuant to Section 4.2;

(n) the Contractor, or any Subcontractor, or any Person providing a parental indemnity to OPG in accordance with Section 4.1(e), any of their shareholders, directors, officers, partners, members, representatives, agents or any of the Contractor's Personnel gives or offers to give (directly or indirectly) to any Person, a bribe, gift, gratuity, commission or other thing of note, as an inducement or reward;

(1) for doing or forbearing to do any action in relation to this Agreement; or

(2) for showing favour or disfavour to any Person in relation to this Agreement;

(o) the Contractor assigns or attempts to assign this Agreement, in whole or in part, except in a manner expressly permitted in Section 14.1; or

(p) the Contractor fails to achieve Substantial Completion within 365 days of the date for Substantial Completion in the Contract Schedule.

10.2 Notice

OPG may terminate this Agreement immediately and without any cost to OPG by delivering a Notice to the Contractor on the occurrence of any event of default set out in Section 10.1.

10.3 OPG's Recourse

If OPG is entitled to terminate this Agreement under Section 10.2, OPG may, in addition to its rights under Section 10.2 and without terminating this Agreement:

(a) eject and exclude from the Site the Contractor, any Subcontractor and any of the Contractor's Personnel and prohibit the Contractor from continuing the Work;

(b) entirely finish the Work, in whole or in part, by whatever means OPG deems appropriate under the circumstances (and the Contractor, at no additional charge to OPG, will promptly, and in any event within three Business Days, provide OPG with all such records and work in progress that are not located on the Site and that are requested by OPG in a Notice);

(c) take possession of all or part of the Site, any work in progress, drawings, designs, Goods, Contractor's construction equipment, tools, fuel and temporary structures and facilities, including for offices, lunchrooms, canteens, sanitation, showers, change rooms, accommodations, shops, warehouses and garbage disposal, at the Site (and at no additional charge for the retention and use thereof) (and the Contractor, at no additional charge to OPG, will cooperate to ensure the orderly transition of the foregoing);

(d) assume any and all subcontracts with Subcontractors;

(e) enforce any indemnity, performance bond, payment bond, maintenance bond, letter of credit, guarantee or other security provided by the Contractor, a Subcontractor or any other Person with respect to the applicable Work (although, if the terms of any such document permit earlier enforcement under any such document, OPG may enforce such rights in accordance with the terms of such other document);

(f) incorporate or use in the Tunnel Facility Project any or all Goods stored at the Site or for which OPG has paid the Contractor but which are stored elsewhere;

(g) withhold, without interest, all payments, in whole or in part, to the Contractor under any agreement between OPG and the Contractor until the Contractor's liability to OPG is determined; and

(h) terminate the license of the TBM and the TBM Accessories granted by OPG to the Contractor.

10.4 Deemed Termination

If at any time after OPG terminates this Agreement under Section 10.2 or exercises its rights under Section 10.3, or both, it is determined for any reason that an event of default had not occurred or the default was otherwise excusable, the rights and obligations of the Parties will be the same as if the termination of this Agreement by OPG had occurred under Section 13.2.

10.5 Contractor's Liability

If OPG terminates this Agreement under Section 10.2 or exercises its rights under Section 10.3, the Contractor will be liable to OPG for:

(a) all costs in excess of the Contract Price incurred by OPG to finish entirely the Work and the Tunnel Facility Project, including external and internal costs (including costs of additional engineering, management and administration);

(b) all costs of correcting Defective parts, if any, in the Work or Tunnel Facility Project, calculated in accordance with Section 9.8(c); and

(c) all other Losses suffered or incurred by OPG in respect of any event of default arising in respect of Section 10.1.

OPG may set off such amount, in whole or in part, as OPG determines is owing by the Contractor to OPG under this Section 10.5, against any amount otherwise owing by OPG to the Contractor.

10.6 Other Rights and Remedies

Any action by OPG under this Section 10 shall be without prejudice to OPG's other rights or remedies under any guarantee, indemnity, bond or security held by OPG for performance of the Work by the Contractor.

10.7 OPG's Liability

Notwithstanding any term in this Agreement, the Contractor may not make any claim against OPG for breach of this Agreement by OPG unless, the Contractor, within 10 Business Days after the Contractor discovered (as such term is defined in Section 5 of the *Limitations Act* (Ontario)) such breach by OPG of its obligations under this Agreement, gives Notice to OPG in the form attached as Appendix 10.7 describing the breach and the anticipated claim for the breach. The Contractor will be estopped from making any claim against OPG unless it provides this Notice in the time period required by this Section 10.7. Notwithstanding any term in this Agreement, OPG's maximum liability for any claim for breach of this Agreement by OPG, other than failure to pay any part of the Contract Price otherwise due to the Contractor, will not exceed the Contract Price.

10.8 Limitation of Liability

Notwithstanding any term in this Agreement (other than Section 10.9), the liability of Contractor respecting all claims arising in respect of this Agreement will not exceed the greater of:

(a) an amount equal to the Contract Price; and

(b) the amount of insurance recoverable under this Agreement.

10.9 Exceptions

The limitations of liability set out in Section 10.8 will not apply, however, to:

(a) the Contractor's obligations under Sections 2.4(f), 2.5(f), 2.15(f), 2.16(e), 8.1, 8.3, 9.1(e), 9.7, 9.8 and 10.5; and

(b) Losses suffered or incurred by a member of the OPG Group or any claims, demands, actions, suits or proceedings for Losses made against any member of the OPG Group by any Person, to the extent arising in respect of:

(1) the deliberate or willful breach of this Agreement by the Contractor; or

(2) liability for contribution or indemnity for injury or damage to third parties arising in respect of the Contractor's negligence.

Except as set out in Sections 8.1 and 8.3 (including, for greater certainty, in the event of default by the Contractor hereunder, the payments under Sections 8.1 and 8.3 that would have been payable but for the exercise by OPG of its rights on default (using for this purpose the actual date of substantial completion of the work that was to be performed by the Contractor under this Agreement)), and except where recoverable under insurance or in respect of Losses suffered or incurred by a member of the OPG Group or any claims, demands, actions, suits or proceedings for Losses made against any member of the OPG Group by any Person to the extent arising in respect of the deliberate or willful breach of this Agreement by the Contractor, neither Party will be liable to the other Party for consequential liabilities, damages, losses, costs or expenses.

SECTION 11. DISPUTE RESOLUTION

11.1 Dispute Review Board

(a) **Establishment**. Promptly following the Start Date within the time period set out in Section 11.2(d), the Parties will co-operate in the execution of the agreement attached as Appendix 11.1(a) (the "**Dispute Review Board Agreement**") establishing the Niagara Tunnel Project Dispute Review Board (the "**Dispute Review Board**"). The purpose of the Dispute Review Board is to assist in the resolution of any and all disputes arising in respect of performance of this Agreement (individually, a "**Dispute**") as contemplated below.

(b) **Amicable Resolution of Disputes**. The Parties will endeavour to resolve all Disputes by good faith negotiation. The Dispute Review Board process is not intended to substitute for the Parties' mutual ongoing commitment to resolve all Disputes in good faith as amongst themselves.

(c) **Principles**. All matters of process, scheduling and conduct of the Dispute Review Board will be determined by the needs of the Project and exigencies of the Contract Schedule. All Disputes will be heard as expeditiously as possible, and in order to achieve this, the Dispute Review Board may make all inquiries necessary.

(d) **Referral of Disputes to Dispute Review Board**. Except as expressly stated herein, if the Parties are unable to resolve any Dispute (other than a Default Dispute), the Dispute will be referred to the Dispute Review Board. In the case of a Default Dispute, such Dispute may be referred to the Dispute Review Board or to arbitration in accordance with Section 11.5.

(e) **Recommendations**. The Dispute Review Board will provide fully reasoned, written recommendations to the Parties to assist in the resolution of Disputes ("**Recommendations**"). The fully reasoned, written Recommendations of the Dispute Review Board are not binding on any party, although it is expected that the Parties will place great weight on the Recommendations and use them as a basis for settling Disputes.

(f) **Condition Precedent to any Further Proceedings**. If the Recommendations relating to a Dispute are not satisfactory to a Party (the "**Dissatisfied Party**"), the Dissatisfied Party, not later than 10 Business Days after receipt of the written Recommendations, may deliver written Notice to the other Party of the Dissatisfied Party's intention to commence an action regarding the unresolved Dispute in a court of competent jurisdiction. All unresolved Disputes will be held in abeyance until the earlier of (i) Substantial Completion; and (ii) termination of this Agreement, except to the extent that holding such Dispute in abeyance could prejudice, by operation of the provisions of the *Limitations Act, 2002* (Ontario), the right of the Dissatisfied Party to commence an action regarding the unresolved Dispute. In the event that holding a Dispute in abeyance could prejudice, by operation of the *Limitations Act, 2002* (Ontario), the right of the Dissatisfied Party to commence an action regarding the unresolved Dispute, the Dissatisfied Party may commence such action prior to the expiry of the applicable limitation period. It is a condition precedent to any court proceeding that the Recommendations of the Dispute Review Board be pleaded in, referred to and attached as a schedule to the originating process. Either Party may plead or rely on this Agreement as evidence of the Parties' consent to an order staying any and all proceedings pending formal annexation of the applicable Recommendations. If neither Party delivers written Notice to the other Party within 10 Business Days after receipt of written Recommendations from the Dispute Review Board of the Party's intention to commence an action regarding the unresolved Dispute in a court of competent jurisdiction, the Parties will be deemed to have accepted the Recommendations of the Dispute Review Board, the Recommendations will be binding on the Parties, and the Parties will be estopped from commencing court proceedings regarding the unresolved Dispute.

11.2 Constitution of the Dispute Review Board

(a) **Submission of Disclosure Statements**. Before the Parties approve any member of the Dispute Review Board, each Party will cause the proposed member to deliver to the Parties a comprehensive disclosure statement. The Parties will ensure that each disclosure statement includes a resume of experience, together with a declaration describing all past, present and anticipated or planned future relationships to the Tunnel Facility Project and with each of OPG, the Contractor and each Subcontractor. Disclosure of relationships must include all recent, professional or personal, relationships with all key individuals of OPG, the Contractor and each Subcontractor.

(b) **Initial Selection of Members**. Nomination and approval of the first two members of the Dispute Review Board will occur as follows:

(1) OPG on the one hand and the Contractor on the other hand will each nominate a proposed board member and convey Notice of its nominee's name and disclosure statement to the other (being OPG or the Contractor, as the case may be) within thirty days after the Start Date.

(2) by providing written Notice, either side may reject the other side's nominee, without expressing a reason for the rejection, twice, and thereafter, if a side wishes to reject any further nominees, that side must provide reasonable written reasons or, alternatively, that side may accept a previously rejected nominee;

(3) any nominee who is not rejected in writing by the other side within seven days of receiving Notice of the nominee's name and disclosure statement will be deemed to have been approved by the other side;

(4) if a nominee is rejected, the nominating side will make another nomination within seven days of receipt of the written Notice of rejection and the process will be repeated until two mutually acceptable nominees are approved;

(5) upon approval of two members of the Dispute Review Board, such first two members will choose a third member (who will be the chairperson) according to the following:

(A) the two members of the Dispute Review Board will prepare a single list of five possible names of candidates not previously rejected and corresponding disclosure statements which the two members will submit in writing simultaneously to the Parties;

(B) each Party can reject up to two people on this list, and each must return its list with the names of these people struck out, within seven days of receipt of the list of five names and corresponding disclosure statements. Failure of a Party to provide strike-outs

within this time shall constitute deemed acceptance of the entire list;

(C) the first two members will then compare the lists and select, in their sole and absolute discretion, any non-rejected person as the third member of the Dispute Review Board; and

(D) upon selection, the first two members will then promptly disclose their choice to the Parties.

(c) **Members Qualifications**. Only individuals experienced with the type of construction involved in respect of the Tunnel Facility Project, and with the interpretation of agreements similar to this Agreement, may be nominated to the Dispute Review Board. In selecting nominees for the Dispute Review Board, the Parties will only nominate individuals with a demonstrated ability to provide leadership for the Dispute Review Board's activities. The other mandatory criteria for selecting members of the Dispute Review Board are set out below. These are enduring criteria that apply at all times to all members and nominees of the Dispute Review Board:

(1) **No Current Financial Interests**. Neither Party will nominate any individual, or permit any member of the Dispute Review Board to remain a member, if that individual or member has a financial interest in OPG, the Contractor or any Subcontractor, or otherwise has any financial interest in the Tunnel Facility Project or this Agreement.

(2) **No Prior Financial Interest**. Neither Party will nominate any individual, or permit any member of the Dispute Review Board to remain a member, who, except for fee-based consulting services on other projects unrelated to the Work and the Tunnel Facility Project, was previously employed by, or had financial ties to, OPG, the Contractor, or any Subcontractor.

(3) **No Close Relationships**. Neither Party will nominate any individual, or permit any member of the Dispute Review Board to remain a member, who has a then current or recent, close, professional or personal, relationship with any key individual of OPG, the Contractor, or any Subcontractor.

(4) **No Previous Involvement in Work**. Neither Party will nominate any individual, or permit any member of the Dispute Review Board to remain a member, who has had a substantial, relevant prior involvement in the Tunnel Facility Project of a nature which could reasonably be expected to compromise the individual's or the member's, as the case may be, ability to participate impartially in the activities of the Dispute Review Board.

(5) **No Employment**. Neither Party will employ, or offer or commit to employ or otherwise engage, a Dispute Review Board member during the member's tenure.

(d) **Agreement with Members**. Each of the Parties and all three members of the Dispute Review Board will execute the Dispute Review Board Agreement in the form set out in Appendix 11.1(a) within four weeks after the selection and approval of the third member of the Dispute Review Board.

(e) **Replacement Members**. The Parties may agree to terminate the tenure of any member of the Dispute Review Board at any time in writing. Neither OPG nor the Contractor may unilaterally terminate the tenure of any Dispute Review Board member. The Dispute Review Board Agreement will survive the termination, resignation, death or incapacity of any member. If the tenure of any Dispute Review Board member is terminated or if any such member otherwise ceases to participate on the Dispute Review Board, the two remaining members of the Dispute Review Board will use the process set out in Section 11.2(b)(5) to select a new third member, and the new third member will sign a new Dispute Review Board Agreement with the other two members and with the Parties. If two or three members are terminated, the procedure in Sections 11.2(b) and 11.2(c) will apply until those positions are filled.

11.3 Operation

(a) **Beginning and Completion**. The Dispute Review Board will remain empanelled and active throughout the duration of the Tunnel Facility Project, irrespective of the fact its actual composition may change from time to time.

(b) **Individual Communication**. No individual member of the Dispute Review Board will have any private communication with either Party.

(c) **General Procedure**. Dispute Review Board operating procedures will be formulated by the Dispute Review Board as a task under the Dispute Review Board Agreement. It is anticipated that during its first meeting at the Site, the Dispute Review Board will establish procedures for the conduct of its routine meetings, Site visits, and hearings of Disputes. The Parties direct the Dispute Review Board to adapt such procedures as required, in its unfettered discretion, to best achieve the objects of the Dispute Review Board. The Parties acknowledge that the Dispute Review Board may initiate new procedures or modify existing procedures as it deems appropriate or necessary to best achieve the object of the Dispute Review Board. The Parties undertake and agree to comply with all such procedures.

(d) **Agreement, Reports and Information**. The Parties will provide a conformed set of plans and specifications to each Dispute Review Board member. The members will thereafter remain informed of construction activity and other developments by means of timely transmittal of relevant information prepared by OPG and the Contractor in the normal course of construction, including through periodic progress reports and minutes of progress meetings.

(e) **Progress Meetings**. In addition to its other duties, the Dispute Review Board will meet at regular intervals, no less frequently than quarterly, and at times of significant construction events. The frequency and scheduling of these meetings will be as agreed among the Parties and the Dispute Review Board, depending upon the progress of the Work. In the case of failure to agree, the Dispute Review Board will schedule the meetings. Each meeting will consist of an informal roundtable discussion followed by an optional field observation of the Tunnel Facility Project. The informal round table discussion will be attended by key personnel from OPG and the Contractor. The agenda for each meeting will include no fewer than the following items:

(1) approval of minutes of previous meeting (to be kept by OPG, and circulated for approval within seven days of each meeting, or less if necessary);

(2) Work performed since the last meeting;

(3) current status of the Contract Schedule and schedule for future Work;

(4) anticipated or potential problems and proposed solutions;

(5) perspectives on potential Disputes, claims and other controversies;

(6) status of past Disputes, claims and other controversies;

(7) new business; and

(8) set date, time and place of next meeting and Site visit.

11.4 Review of Disputes

(a) **General**. The Parties will cooperate to ensure that the Dispute Review Board is able to consider Disputes promptly.

(b) **Prerequisites to Review**. Provided that it has not been expressly excluded from referral herein, a Dispute (other than a Default Dispute, which Dispute may be referred to the Dispute Review Board or to arbitration in accordance with Section 11.5) will be referred to the Dispute Review Board when:

(1) either Party believes that good faith bilateral negotiations have not and are not likely to succeed or have reached an impasse; or

(2) if this Agreement provides for a prior decision by OPG's Representative or a professional, and such decision has been issued and is unacceptable to a Party.

(c) **Disputes**. Provided that it has not been expressly excluded from referral herein, either Party may refer a Dispute to the Dispute Review Board. Requests for

Dispute Review Board resolution must be submitted in writing to the chairperson of the Dispute Review Board and must state the Dispute, with particularity, arising in respect of this Agreement, including a sworn statement that negotiations have been attempted and exhausted or otherwise failed (the "**Dispute Request**"). The Party referring the Dispute to the Dispute Review Board will simultaneously submit a copy of the Dispute Request in compliance with this Section 11.4(c) to the other Party. After conferring with both Parties, the Dispute Review Board will establish a hearing procedure that is as summary, efficient, and inexpensive as possible in the circumstances and in accordance with the principles set out above.

(d) **Substantial and Complex Disputes.** If and only if the Dispute cannot be resolved summarily by exercise of the Dispute Review Board's inquisitorial powers, and (i) the Dispute Review Board considers it to be necessary, or (ii) the Parties make a joint request, the Dispute will be heard as follows:

(1) Concise written statements will be prepared by both Parties, together with a binder of relevant supporting documents, indexed, paginated in one continuous sequence throughout the binder, each document separated from each other document by sequentially numbered index tabs corresponding to the index.

(2) The Party initiating the Dispute will serve its statement (the "**Applicant's Statement**") on the other Party and file three copies with the chairperson of the Dispute Review Board within the time set by the Dispute Review Board. The Applicant will set out a proposed method and schedule for the hearing in its Applicant's Statement.

(3) The respondent's statement (the "**Respondent's Statement**"), prepared in identical form, will be similarly served and filed within the time set by the Dispute Review Board. The respondent will set out a proposed method and schedule for the hearing in the Respondent's Statement.

(4) The Dispute Review Board may, by written notice to the Parties, require either or both of the Parties to support their respective statements with documents, affidavits, declarations, tests, samples, photographs, videos, reports or other material, in the Dispute Review Board's sole and absolute discretion, and at any time and from time to time.

(5) The Dispute Review Board will acknowledge in writing to the Parties that the Dispute is perfected in accordance with this section when all of (1), (2), (3) and (4) above are complied with and shall, at the same time, advise the Parties as to the method and schedule for the hearing having regard to the Parties' positions as recorded in their statements.

(e) **Board to Visit Site**. In the case of a Dispute referred to the Dispute Review Board, either Party to the Dispute or the Dispute Review Board itself may request that a Site visit be undertaken before, or as part of, any hearing.

(f) **Hearing**. The place of the hearing will be at the Site at a time and on a date stipulated by the Dispute Review Board in consultation with the Parties. If circumstances require, the Dispute Review Board may, with the prior consent of the Parties, adjourn all or a portion of the hearing of the Dispute to any other location or time.

(1) **Proceedings in Confidence**. The proceedings of the Dispute Review Board hearing will be conducted and maintained as far as possible in absolute privacy, privilege and confidence.

(2) **Representation**. Each Party has the right, but not the obligation, to be represented by counsel at any hearing or any portion of any hearing, at its own expense.

(3) **No Transcripts Required**. No transcript is required to be kept of any testimony before the Dispute Review Board, but, if such testimony is taken and transcribed, a copy must be provided to the other Party once received.

(4) **Hearing Procedure**. The order of proof, the fact and extent of oral evidence (whether under oath or not), examinations and cross-examinations (whether under oath or not), the quality of proof, the burden of proof, argument both written and oral, and all matters of form, procedure, and process relating to the hearing before the Dispute Review Board are within the absolute discretion of the Dispute Review Board.

(g) **Inquiry by Board**. The Dispute Review Board is expressly authorised by the Parties to take all accounts, make all inquiries, give all directions and do all things necessary to reach their Recommendations. The Parties agree to satisfy, in good faith, and as soon as practicably possible, any inquiries made by the Dispute Review Board, including where appropriate, the production of any documents, affidavits, declarations, tests, samples, photographs, videos, reports or other material, which inquires are made in their sole and absolute discretion, at any time and from time to time.

(h) **Deliberations**. The chairperson of the Dispute Review Board will declare the hearing closed at the close of argument and thereafter the Dispute Review Board will have, in aggregate, no more than two weeks for deliberation and delivery of its Recommendations.

(i) **Recommendations**. The Dispute Review Board's Recommendation for the resolution of the Dispute will be transmitted to both Parties simultaneously at the end of the period of deliberation. In a difficult or complex case, this time period may be extended at any time and from time to time by agreement of the Parties.

The Dispute Review Board will use best efforts to reach a unanimous Recommendation on every Dispute, however, if unanimity is not reached, individual Recommendations are permissible.

(j) **Clarification and Reconsideration**: If either Party feels that the Recommendations require clarification or reconsideration, that party may so request, in writing, specifying with all possible particularity that Party's reasons, and the Dispute Review Board may or may not, in its sole and absolute discretion, elect to clarify, re-deliberate or re-open the hearing for the purpose set out in the Party's request, and if the hearing is re-opened, the requirements set out in this section apply once again.

11.5 Arbitration

If a Dispute arises as to whether an event of default has occurred under Section 10.1 of the Agreement (a "**Default Dispute**"), either Party to the Default Dispute may elect to have such Dispute resolved by arbitration under the Arbitration Act, 1991 (Ontario) (the "Arbitration Act"). This election shall be made either prior to or within two Business Days after the delivery of a Dispute Request under Section 11.4(c) of this Agreement by delivery to the Other Party of a written Notice to Arbitrate. If either Party elects to have a Default Dispute resolved by arbitration, the Parties shall have no further recourse to the Dispute Review Board in respect of this Default Dispute, and the Dispute Review Board shall have no jurisdiction to consider this Default Dispute. The sole issue to be determined by the arbitrator in the arbitration shall be whether an event of default under Section 10.1 has occurred. The arbitrator shall have no jurisdiction to award any remedy arising from such determination. The following provisions shall apply to the arbitration:

(a) the arbitration shall be determined by a single arbitrator who is independent of any Party and who shall be a lawyer experienced in and knowledgeable about construction contracts;

(b) in the event that the Parties cannot agree to the appointment of an arbitrator within 5 Business Days prior to the commencement of the arbitration, either Party may apply to the Superior Court of Justice of Ontario for the appointment of an arbitrator with the qualifications set out above;

(c) all matters relating to the arbitration shall be kept confidential to the full extent permitted by law until the date of the release of the decision of the arbitrator, and no individual shall be appointed as an arbitrator unless he or she agrees in writing to be bound by this dispute resolution provision;

(d) the application of Section 7(2) of the Arbitration Act is expressly excluded;

(e) each Party shall provide to the other Party within 15 days prior to the commencement of the arbitration copies of the relevant, non-privileged documents in the Party's possession, power or control;

(f) each Party to the arbitration shall be permitted to conduct an examination of a representative of the other Party, which examination shall last for no longer than one day;

(g) the hearing shall take place within 60 days after the commencement of the arbitration;

(h) the arbitrator shall render his or her decision within 15 days after the conclusion of the hearing;

(i) in all other respects, the arbitration process shall be determined by agreement of the Parties or by the arbitrator;

(j) the arbitrator will apply the laws of the province of Ontario and Canada to decide the Default Dispute; and

(k) the place of arbitration will be Toronto, Ontario and the arbitration will be conducted in the English language.

Subject to Section 44 of the Arbitration Act, the decision of the arbitrator in an arbitration under this section will be final and binding on the Parties and the Parties will have no right of appeal on any ground, including, for greater certainty, any appeal on a question of law, a question of fact, or a question of mixed fact and law. The arbitrator's decision with respect to the Default Dispute shall be pleaded, referred to and scheduled to the originating process in any subsequent proceedings brought in a court of competent jurisdiction for a remedy resulting from that decision.

SECTION 12. ESCROW INFORMATION

12.1 Delivery of Escrow Information

The Contractor shall submit to OPG, within three (3) Business Days after the signing of this Agreement, in a sealed container, one copy of all documentary information respecting the Contractor's preparation of the Contract Price (collectively, the "**Escrow Information**"). Notwithstanding any term in this Agreement, nothing in the Escrow Information will amend, restate or terminate this Agreement in whole or in part.

12.2 Contractor's Representation

The Contractor represents and warrants to OPG that the Escrow Information constitutes all the documents and other information used by the Contractor in preparing and negotiating the Contract Price. The Parties may use any of the Escrow Information to assist in the settlement of Disputes. No other information of the Contractor used by the Contractor in preparing and negotiating the Contract Price will be considered in resolving such Disputes.

12.3 Initial Review by OPG

Shortly after delivery pursuant to Section 12.1, the Escrow Information will be unsealed, examined, organized, and inventoried by representatives of OPG, together with members of the Contractor's staff who are knowledgeable in how the Contractor's proposal was prepared.

The examination under this Section 12.3 will be for the purposes of ensuring that the Escrow Information is authentic, legible, and complete. It will not include review of, and will not constitute approval of, proposed construction methods, estimating assumptions, or interpretations of this Agreement. If the Contractor fails to include in the Escrow Information any documentary information that the Contractor was required to include pursuant to Section 12.1, then such missing documentary information will be determined by OPG, acting reasonably. The examination under this Section 12.3 will not alter any conditions or terms of this Agreement.

12.4 Ownership

The Escrow Information is the property of the Contractor. The Escrow Information is nevertheless subject only to joint review by the Parties and the Dispute Review Board as provided in this Agreement. OPG stipulates and expressly acknowledges that the Escrow Information constitutes trade secrets. Neither Party will review the Escrow Information unless the other Party is present during such review.

12.5 Purpose

Both parties hereby consent that the Escrow Information may be used in the negotiation of adjustments for changes to the Work and in the settlement of Disputes.

12.6 Storage

The Escrow Information will be placed in escrow, following initial review by OPG pursuant to Section 12.3, for the life of this Agreement, with a third party and held at a secured location with access only provided as permitted by Section 12.7.

12.7 Examination After Signing

The Escrow Information may be examined by OPG, the Contractor and the Dispute Review Board, at any time deemed necessary after the signing of this Agreement to assist in the settlement of Disputes. Neither Party will review the Escrow Information unless the other Party is present during such review.

Examination of the Escrow Information is subject to the following conditions:

(a) As trade secrets, the Escrow Information is proprietary and confidential.

(b) All documents related to the issue being reviewed shall be inspected.

(c) OPG and the Contractor shall each designate, in writing to the other party a minimum of ten calendar days prior to examination, representatives who are authorized to examine the Escrow Information.

(d) Members of the Dispute Review Board may examine the Escrow Information as deemed necessary by the Dispute Review Board.

(e) Access to the Escrow Information will take place only with the knowledge of the Contractor's representatives and the opportunity to be present at the time of examination.

(f) No other Person shall have access to the Escrow Information.

SECTION 13. SUSPENSION OF WORK AND TERMINATION

13.1 Suspension of Work

OPG may at any time, and from time to time, for any reason without affecting the validity of this Agreement, suspend the performance of the Work in whole or in part for such period of time as OPG may notify the Contractor. Except to the extent any such suspension arises in respect of any default by the Contractor or any negligent or willful act or omission of the Contractor or a Subcontractor, OPG will pay the Contractor the reasonable extra direct damages suffered by the Contractor arising from the suspension. Except for such extra direct damages, notwithstanding any term in this Agreement, in no circumstances whatsoever will OPG be liable to the Contractor for consequential liabilities, damages, losses, costs or expenses suffered or incurred by the Contractor in any such suspension. Severance costs respecting the termination of any of the Contractor's Personnel do not constitute direct damages. Before OPG pays the Contractor for such extra direct damages, the Contractor will provide to OPG such reasonable evidence of such damages as OPG may request. In addition, before making any payment, OPG may conduct an audit of such damages and the Contractor will provide OPG with all information reasonably requested by OPG in respect of such audit. Immediately following a Notice of resumption delivered by OPG to the Contractor, the Contractor will resume performing the Work in accordance with the schedule established by OPG.

13.2 Termination

OPG may from time to time, without cause and without affecting the validity of this Agreement, immediately terminate any unprovided Work, in whole or in part, by delivering a Notice to this effect to the Contractor. Upon receipt of such Notice, the Contractor will cease performing the designated portion of the Work which is the subject of termination, but will continue to perform all Work not subject to termination. Except to the extent any such termination arises in respect of any event of default by the Contractor, OPG will pay the Contractor:

(a) the amounts set out in this Agreement for all parts of the Work that have been entirely finished and delivered in accordance with the terms of this Agreement, and for which OPG has not made any payment;

(b) the amount of the Contractor's costs determined in accordance with Section 7.7(b) incurred in providing the work in progress, not including the Work referred to in Section 13.2(a); and

(c) the reasonable extra direct damages suffered by the Contractor arising from the termination (such as the reasonable out-of-pocket costs of demobilization).

Except for such amounts referred to in Sections 13.2(a) and 13.2(b) and direct damages referred to in Section 13.2(c), notwithstanding any term in this Agreement, in no circumstances whatsoever will OPG be liable to the Contractor for consequential liabilities, damages, losses, costs or expenses, damages, loss of profit, economic loss, interest or any other damages or loss suffered or incurred by the Contractor in any such termination. Before OPG pays the Contractor for such amounts referred to in Sections 13.2(a) and 13.2(b) and direct damages referred to in Section 13.2(c), the Contractor will provide to OPG such reasonable evidence of such amounts and damages as OPG may request. In addition, before making any payment, OPG may conduct an audit of such amounts and damages and the Contractor will provide OPG with all information reasonably requested by OPG in respect of such audit. On payment for such amounts and damages, title to all the remainder of the Work (including documents, designs, drawings, specifications, plans, reports, information and other deliverables and data) that had not to date vested in OPG, will vest automatically in OPG.

SECTION 14. GENERAL

14.1 Assignment and Benefit

The Contractor may not assign this Agreement, in whole or in part, without the prior written consent of OPG except to a wholly-owned subsidiary of the Contractor provided that the Contractor is not released from its obligations under this Agreement and provided further that the Contractor provides prior Notice to OPG. In the event of an assignment by the Contractor of this Agreement, any reference to the Contractor under this Agreement shall include the assignee. This Agreement enures to the benefit of and binds the Parties and their respective successors and permitted assigns. OPG may from time to time transfer, assign, sell, lease or otherwise dispose of certain assets relating to one or more electricity generating stations or other business units of OPG (each station or other unit being a "**Business Unit**"). Notwithstanding any term in this Agreement, OPG may, without the consent of the Contractor, assign this Agreement, in whole or in part, and sublicence, assign or transfer OPG's rights respecting the Retained Intellectual Property, as that term is defined in Section 2.16(c), in whole or in part, to any owner, operator, lessee or any other successor in interest of a Business Unit (an "**Assignee**"). OPG may disclose to an Assignee or a proposed Assignee any information and documentation respecting this Agreement. The Assignee may use the Retained Intellectual Property, in accordance with the rights sublicensed, assigned or transferred by OPG. In addition, OPG may divide OPG's rights under this Agreement with any Assignee in such a manner as to permit both OPG and the Assignee to realize the full rights that OPG is entitled to under this Agreement. Effective immediately upon any such assignment or transfer by OPG and assumption, in whole or in part, by an Assignee of any of OPG's obligations respecting such assignment or transfer, OPG will be automatically released and forever discharged from the obligations to the extent that they are assumed. The Contractor will from time to time and promptly upon request, sign and deliver all

further documents and take all further action reasonably necessary or appropriate to give effect to the terms and intent of this Section 4.1.

14.2 Amendments

OPG's Representative, or an officer senior to OPG's Representative, are the only individuals authorized to execute any Amendment on behalf of OPG. Aside from those individuals, no other Person has any authority to make any agreement, undertaking, representation, warranty, guarantee, release or waiver on behalf of OPG in respect of this Agreement. Except as expressly provided in this Agreement, no amendment (including an Amendment), restatement or termination of this Agreement in whole or in part is binding unless it is in writing and signed by each Party. Accordingly, this Agreement will not be amended by any Application for Payment, invoice or other document (even where such Application for Payment, invoice or other document purports, directly or indirectly, to be paramount to any term of this Agreement), unless such Application for Payment, invoice or other document is signed by both Parties.

14.3 Discretion Granted

Wherever OPG is granted sole and absolute discretion or the power to refuse a change in this Agreement, the exercise of such discretion or power will not be subject to the dispute resolution process under Section 11 or any other claim by the Contractor.

14.4 Notice

Except as otherwise provided in this Agreement, such as in Section 10.2, every Notice required or permitted under this Agreement must be in writing and may be delivered in person, by courier or by fax to the applicable Party, as follows:

If to OPG, Ontario Power Generation Inc.
700 University Avenue, H
Toronto, Ontario, M5G 1X6

Attention: Emad Elsayed
Fax: 416-592-6552

if to the Contractor, Strabag AG
Donau-City-Str. 9
1220 Wien (Vienna)
Austria

Attention: Ernst Gschnitzer

Fax: +43 1 22422 1227

with a copy to:
Hatch Associates
2800 Speakman Drive
Mississauga, Ontario, L5K 2R7

Attention: Harry Charalambu
Fax: 416-905-855-2607

or to any other address, fax number or individual that a Party designates by Notice. Any Notice under this Agreement, if delivered personally or by courier will be deemed to have been given when actually received, if delivered by fax before 3:00 p.m. on a Business Day will be deemed to

have been delivered on that Business Day and if delivered by fax after 3:00 p.m. on a Business Day or on a day which is not a Business Day will be deemed to be delivered on the next Business Day.

14.5 Currency

Unless otherwise specified, all amounts to be paid or calculated under this Agreement are to be paid or calculated in Canadian dollars.

14.6 Set Off

OPG may set off any amount owing to OPG from the Contractor from any amount otherwise due, owing, or payable by OPG to the Contractor.

14.7 Waivers

No waiver of any term of this Agreement is binding unless it is in writing and signed by all the Parties entitled to grant the waiver. No failure to exercise, and no delay in exercising, any right or remedy, under this Agreement will be deemed a waiver of that right or remedy. No waiver of any breach of any term of this Agreement will be deemed to be a waiver of any subsequent breach of that term.

14.8 Cumulative Remedies

OPG's rights and remedies under this Agreement and under any security held by OPG for the Contractor's performance under this Agreement are cumulative and are in addition to and not in substitution for any other rights and remedies available at law or in equity or otherwise. No single or partial exercise by a Party of any right or remedy precludes or otherwise affects the exercise of any other right or remedy to which that Party may be entitled.

14.9 Survival of Obligations

All representations, warranties, guarantees and indemnities made in, required by or given under this Agreement, as well as all continuing obligations under this Agreement, will survive final payment made under Section 7.12, Substantial Completion and acceptance of the Tunnel Facility Project and termination or expiry of this Agreement.

14.10 Relationship of Parties

Nothing in this Agreement will be construed as constituting either Party as the agent, partner, joint venturer or other representative of the other Party. The relationship between the Parties is that of a purchaser and an independent contractor. The Contractor's Personnel are solely the employees of the Contractor and Subcontractors (and not OPG's) for all purposes under this Agreement, including for all purposes under any Applicable Laws. Accordingly, none of the Contractor's Personnel or Subcontractors is entitled to any benefits respecting any pension or other benefit plan, program or policy of OPG. The Contractor will pay all Taxes respecting each of the Contractor's Personnel and each of the Subcontractors and OPG will have no responsibility for any such Taxes.

14.11 No Third Party Beneficiary

This Agreement is solely for the benefit of the Parties and, to the extent expressly and specifically made beneficiaries of this Agreement. In particular, OPG holds the rights of all third party beneficiaries under Sections 2.4(f)(4), 2.4(j), 2.5(f), 2.14(e), 2.14(j), 2.15(f), 2.16(e), 2.17(d) and 9.1(e) in trust for the benefit of such third party beneficiaries. Otherwise, no term of this Agreement will be deemed to confer upon other third parties any claim, remedy, reimbursement or other right. The Contractor represents and warrants to OPG that the Contractor is entering into this Agreement solely on its own behalf and not as agent for any other Person.

14.12 Acknowledgement as to Negotiation of this Agreement

Each Party acknowledges that all Parties have participated in the drafting of this Agreement. Accordingly, no term of this Agreement will be interpreted less favourably to any Party because that Party or its counsel was primarily responsible for the drafting of that term.

14.13 Choice of Language

The Parties confirm that it is their wish that this Agreement, as well as any other documents respecting this Agreement, including Notices, schedules and authorizations, have been and will be drawn up in the English language only. Les parties aux présentes confirment leur volonté que cette convention, de même que tous les documents, y compris tous avis, cédules et autorisations s'y rattachant, soient rédigés en langue anglaise seulement.

14.14 Counterparts

This Agreement and any Amendment, restatement or termination of this Agreement in whole or in part may be signed and delivered in any number of counterparts, each of which when signed and delivered is an original but all of which taken together constitute one and the same instrument. This Agreement and any Amendment, restatement or termination of this Agreement in whole or in part may be delivered by fax.

14.15 Freedom of Information

The Contractor expressly acknowledges that OPG is subject to the provisions of the *Freedom of Information and Protection of Privacy Act*, R.S.O. 1990, C.F.31, and any confidentiality covenants of OPG set out in this Agreement are granted expressly subject to any and all disclosure requirements that may exist or may in the future arise under the *Freedom of Information and Protection of Privacy Act*, as may be amended or replaced by time to time.

The Parties have duly executed this Agreement.

ONTARIO POWER GENERATION INC.

By: Emad Elsayed

Name: EMAD ELSAYED
Title Vice President – Niagara Tunnel Project

August 18, 2005

ONTARIO POWER GENERATION INC.

By: Jim Hankinson

Name: Jim Hankinson
Title President & CEO

STRABAG AG

By: Ernst Oschnitzer

Name: ERNST OSCHNITZER
Title AREA DIRECTOR

Appendix 1.1(b)

Appendix 1.1(b) - Amendment Form

AMENDMENT AGREEMENT NUMBER [1]

This Agreement is made as of **[•]**, 200• between

> **ONTARIO POWER GENERATION INC.**, a corporation existing under the laws of Ontario ("**OPG**"),
>
> and
>
> **STRABAG AG**, a corporation existing under the laws of Austria (the "**Contractor**").

RECITALS

A. OPG and the Contractor entered into a design/build agreement dated as of **[■]**, 2005 (the "**Original Agreement**").

B. OPG and the Contractor have agreed to amend the Original Agreement to **[insert brief description of amendment, 1-2 lines]**.

C. For value received, the Parties agree as follows.

Interpretation

Any defined term used in this Agreement that is not defined in this Agreement has the meaning given to that term in the Original Agreement. In this Agreement, the following terms have the respective meanings set out below.

- **[Insert any definitions required in this Agreement.]**

Change to Section [•] (Title of Section)

Section **[•]** of the Original Agreement is deleted in its entirety and replaced with the following. OR Section **[•]** of the Original Agreement is deleted in its entirety. OR The following Section is added as a new Section **[•]** to the Original Agreement.

Change to Section [•] (Title of Section)

Section **[•]** of the Original Agreement is deleted in its entirety and replaced with the following. OR Section **[•]** of the Original Agreement is deleted in its entirety. OR The following Section is added as a new Section **[•]** to the Original Agreement.

Original Agreement Remains in Full Force

Except for changes to the Original Agreement set out in this Agreement and any previous Amendment, the Original Agreement remains in full force, unamended, including the provisions

relating to Contract Price and Contract Schedule. **[Note: Insert any changes to Contract Price or Contract Schedule if relevant.]**

The Parties have duly executed this Agreement.

ONTARIO POWER GENERATION INC.

By: _____

Name:

Title:

STRABAG AG

By: _____

Name:

Title:

Appendix 1.1(d)

Appendix 1.1(d) - Payment Related Documents

Certificate - Application for Payment

TO: Ontario Power Generation Inc. ("OPG")

RE: Design/Build Agreement (the "Agreement") between OPG and Strabag AG (the "Contractor"), dated as of [date] for the Niagara Tunnel Facility Project

I, **[name]**, am the **[title]** of the Contractor and am authorized to deliver this Certificate on behalf of the Contractor. I hereby certify, for and on behalf of the Contractor, that:

(a) the coverages that the Contractor is obliged to maintain under Section 4.2 of the Agreement remain in full force;

(b) the Contractor has paid in a timely manner all amounts payable under the *Workplace Safety and Insurance Act, 1997* (Ontario);

(c) the Contractor remains in compliance with all its other obligations under the *Workplace Safety and Insurance Act, 1997* (Ontario);

(d) the Contractor has provided OPG with the Workplace Safety and Insurance Board registration number for each member of the Contractor's Personnel performing Work at the Site for the period covered by the certificate; and

(e) [there are no known outstanding claims under the Agreement, except for those claims which have already been communicated to OPG in a timely manner in the form of Notice required by the Agreement and which are listed in the Appendix to this Certificate, including an estimate of the value of each such claim;] or

[there are outstanding claims which have not been communicated to OPG in the form of Notice required by this Agreement and each of these claims is described in the attached form of Notice required by this Agreement and is delivered to OPG in a timely manner, and there are no other known outstanding claims under the Agreement, except for those claims which have already been communicated to OPG in a timely manner in the form of Notice required by this Agreement and which are listed in the Appendix to this Certificate, including an estimate of the value of each such claim.]

Defined terms used in this Certificate that are not defined in this Certificate have the meanings given to those terms in the Agreement.

DATED: **[date]**, 200**[●].**

STRABAG AG

By: _____

Name:

Title:

Statutory Declaration - Application for Payment

C A N A D A	)	IN THE MATTER OF THE DESIGN/BUILD
	)	AGREEMENT BETWEEN ONTARIO
	)	POWER GENERATION INC. AND
	)	STRABAG AG (the "Contractor")
PROVINCE OF ONTARIO	)	DATED AS OF **[DATE]** FOR
	)	THE NIAGARA TUNNEL FACILITY
	)	PROJECT (the "Agreement")

I, **[•]**, of the **[City]** of **[•]**, Ontario, do solemnly declare that:

I am the **[title]** of Contractor and as such have personal knowledge of the facts set out in this solemn Declaration.

Defined terms used in this solemn Declaration but not defined in this solemn Declaration have the meanings given to those terms in the Agreement.

All payments due to Subcontractors; all wages and benefit payments due to any of the Contractor's Personnel; and all contributions, premiums, allowances and remittances due to any Governmental Authority, pension fund, benefit plan or union fund in accordance with a collective agreement or Applicable Laws, have been paid in a timely manner on or before the date of the Application for Payment to which this solemn Declaration relates, subject to any withholdings or holdbacks required by Applicable Laws.

Title to the applicable part of the Project will pass to OPG in accordance with Section 7.4 of the Agreement no later than the date of OPG's payment to which this solemn Declaration relates.

(a) [there are no known outstanding claims under the Agreement, except for those claims which have already been communicated to OPG in a timely manner in the form of Notice required by the Agreement and which are listed in the Appendix to this solemn Declaration, including an estimate of the value of each such claim;] or

(b) [there are outstanding claims which have not been communicated to OPG in the form of Notice required by this Agreement and each of these claims is described in the attached form of Notice required by this Agreement and is delivered to OPG in a timely manner, and there are no other known outstanding claims under the Agreement, except for those claims which have already been communicated to OPG in a timely manner in the form of Notice required by this Agreement and which are listed in the Appendix to this solemn Declaration, including an estimate of the value of each such claim.]

I make this solemn Declaration conscientiously believing it to be true and knowing it is of the same force as if made under oath.

DECLARED before me at the City of ■, in the County/Region of ■, this day of **[●]**, 200**[●]**.

A Commissioner, etc.

Name

Appendix 1.1(h)

Appendix 1.1(h) - Concept Drawings

1. CONCEPT DRAWINGS

Number	Title
NAW130-D0E-29230-0015, Rev 05	Diversion Tunnel General Arrangement
NAW130-D0E-29310-0007, Rev 05	Intake Works Intake Channel and Accelerating Wall Arrangement and Details
NAW130-D0E-29310-0008, Rev 03	Intake Works Modifications to INCW Control Structure
NAW130-D0E-29310-0009, Rev 04	Intake Works Intake Structure Arrangement and Details
NAW130-D0E-29710-0023, Rev 02	Outlet Works Outlet Structure and Canal Arrangement, Plan and Sections
NAW130-D0E-29710-0024, Rev 02	Outlet Works Closure Gate Hoist Structure Architectural Arrangement
NAW130-D0E-29270-0001, Rev 02	Diversion Tunnel Dewatering Station Arrangement, Plan, Sections and Details
NAW130-D0E-80000-0012, Rev 05	Construction Facilities Outlet Area West Plan
NAW130-D0E-80000-0013, Rev 04	Construction Facilities Outlet Area East Plan
NAW130-D0E-80000-0014, Rev 04	Construction Facilities Intake Area Plan and Section
NAW130-D0E-80000-0015, Rev 01	Construction Facilities Intake Area and INCW Part Project Area Site Plans
NAW130-D0E-84500-0001, Rev 02	Construction Facilities Designated Truck Routes

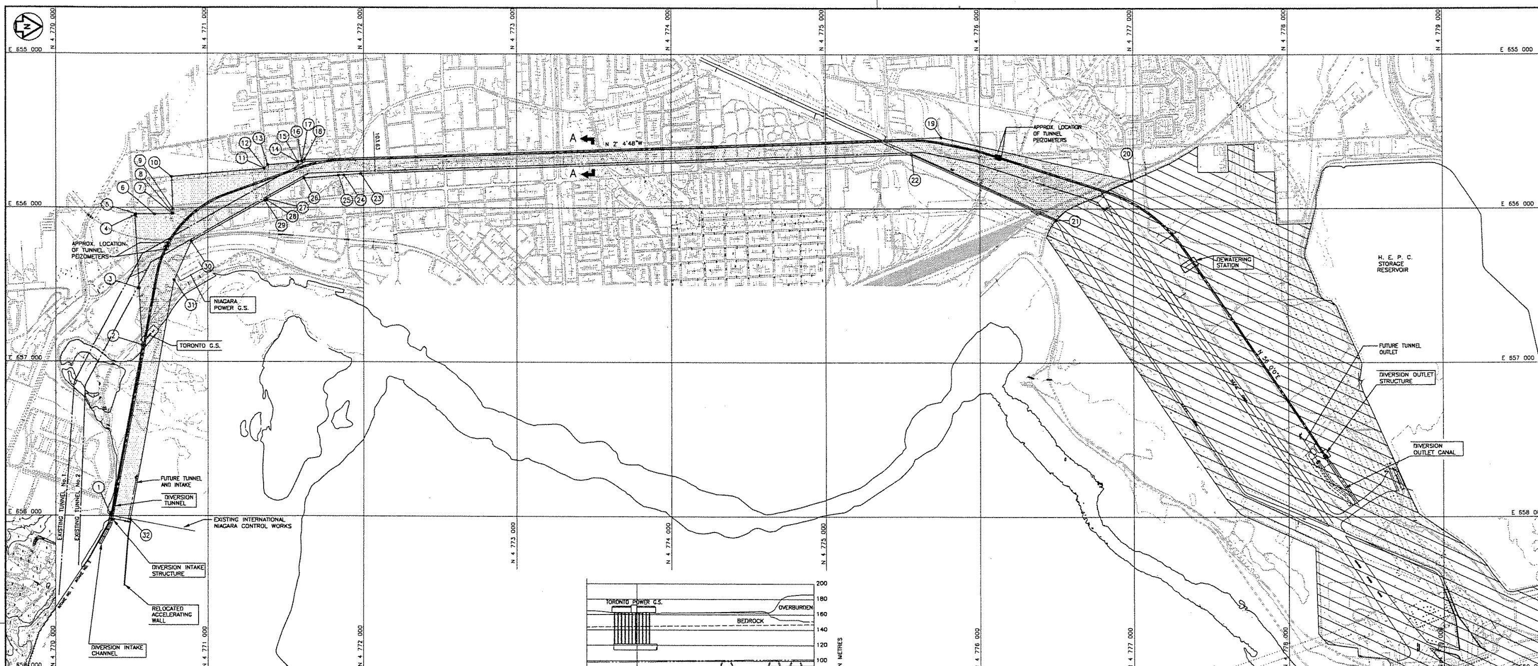
2. REFERENCE DRAWINGS

These reference drawings are in MIL format. They can be attached to an AutoCAD 2000 drawing as an image.

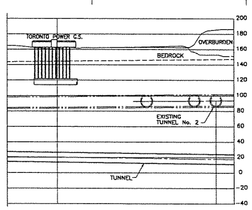
Number	Title
NF28-297-F Rev 08/15/89	Sir Adam Beck PGS and Surrounding Area Site Plan including Domestic Water System
NF28-d-2159	Chippawa-Grass Island Submersible Gates System and Cross Frame
NF28-e-2700	Intake Excavation Plan
NF28-d-2737	Intake Area Downstream Gravity Wall Concrete Details
NF28-e-2925 Rev 07/05/56	Chippawa-Grass Island Pool Control Structure General Arrangement of Typical Pier and Rollway
NF28-d-6000 Rev 02/02/55	Chippawa-Grass Island Pool Control Structure Dewatering Equipment Rollway General Arrangement
NF28-d-6001 Rev 12/07/54	Chippawa-Grass Island Pool Control Structure Dewatering Equipment Rollway Unit Assembly
NF28-d-6050 Rev 06/13/56	Chippawa-Grass Island Pool Control Structure Excavation Plan
NF28-d-6060	Chippawa-Grass Island Pool Control Structure Pier No. 1 Concrete Details Sheet 1 of 7
NF28-d-6061	Chippawa-Grass Island Pool Control Structure Pier No. 1 Concrete Details Sheet 2 of 7

Number	Title
NF28-d-6062	Chippawa-Grass Island Pool Control Structure Pier No. 1 Concrete Details Sheet 3 of 7
NF28-d-6063	Chippawa-Grass Island Pool Control Structure Pier No. 1 Concrete Details Sheet 4 of 7
NF28-d-6064	Chippawa-Grass Island Pool Control Structure Pier No. 1 Concrete Details Sheet 5 of 7
NF28-d-6065	Chippawa-Grass Island Pool Control Structure Pier No. 1 Concrete Details Sheet 6 of 7
NF28-d-6066	Chippawa-Grass Island Pool Control Structure Pier No. 1 Concrete Details Sheet 7 of 7
NF28-d-6070 Rev 12/07/77	Chippawa-Grass Island Pool Control Structure Piers 2 to 14 Concrete Details Sheet 1 of 7
NF28-d-6074 Rev 07/06/56	Chippawa-Grass Island Pool Control Structure Piers 2 to 14 Concrete Details Sheet 5 of 7
NF28-d-6076 Rev 07/06/56	Chippawa-Grass Island Pool Control Structure Piers 2 to 14 Concrete Details Sheet 7 of 7

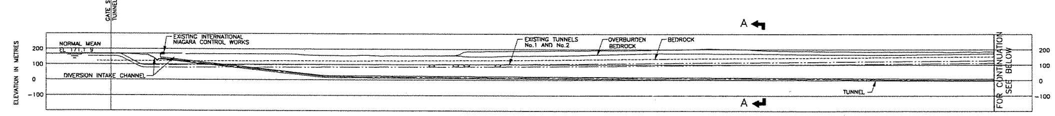
Number	Title
NF28-d-6090 Rev 11/26/54	Chippawa-Grass Island Pool Control Structure Dewatering Equipment Rollway Generator Assembly - Emergency Gate
NF28-d-6100 Rev 02/09/55	Chippawa-Grass Island Pool Control Structure Piers 2 to 14 Construction Joints Sheet 1 of 4
NF28-e-6269 Rev 4	Upstream Accelerating and Downstream Training Walls and Weirs General Arrangement
NF28-f-6275 Rev D	Upstream Accelerating Wall Location &Typical Section Details
NF28-f-6276 Rev D	Upstream Accelerating Wall Typical Sections and Details
NF28-d-3397	Pumped Storage Canal Dewatering Structure Reinforcing Details
NF28-d-3399	Pumped Storage Canal Dewatering Structure Reinforcing Details
6-B-214	Niagara River Critical Navigation Depths In Grass Island Pool



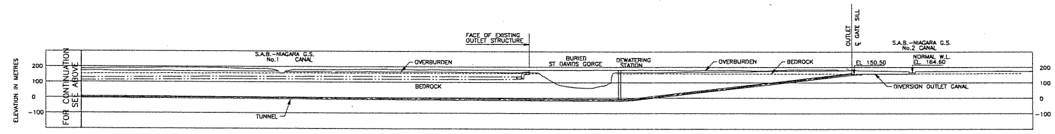
PLAN
SCALE 1 : 10000



PART PROFILE OF TUNNEL
SCALE HORT. 1 : 5000
VERT. 1 : 2000



PART PROFILE
SCALE HORT. 1 : 10000
VERT. 1 : 10000



PART PROFILE
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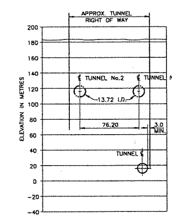
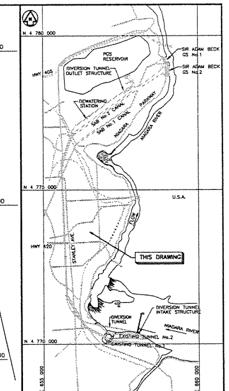


SECTION A–A
SCALE 1 : 2000

RIGHT OF WAY COORDINATES		
I.D.	NORTHING	EASTING
1	4 770 363.690	657 999.253
2	4 770 569.747	656 892.033
3	4 770 550.220	656 524.318
4	4 770 524.949	656 048.417
5	4 770 531.580	656 041.525
6	4 770 651.610	656 043.288
7	4 770 767.697	656 038.345
8	4 770 773.964	656 037.715
9	4 770 772.599	656 007.251
10	4 770 763.830	655 799.809
11	4 771 362.802	655 747.552
12	4 771 362.616	655 745.608
13	4 771 384.944	655 722.652
14	4 771 578.573	655 705.850
15	4 771 578.177	655 701.505
16	4 771 600.752	655 699.446
17	4 771 602.306	655 698.564
18	4 771 620.013	655 688.510
19	4 775 749.616	655 538.521
20	4 776 988.567	655 819.333
21	4 776 496.540	656 073.982
22	4 775 559.060	655 649.129
23	4 771 982.267	655 779.039
24	4 771 874.377	655 788.473
25	4 771 838.638	655 790.317
26	4 771 617.107	655 809.320
27	4 771 378.366	655 944.881
28	4 771 378.999	655 951.583
29	4 771 364.346	655 952.842
30	4 770 892.451	656 220.794
31	4 770 780.027	656 470.440
32	4 770 491.096	658 022.964



KEY PLAN
SCALE 1 : 50000

NOTES:

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT CONCEPT DRAWINGS AND DOCUMENTS FOR THIS PROJECT AND ONTARIO POWER GENERATION DRAWINGS FOR THE EXISTING WORKS. DETAILS OF EXISTING CANALS AND SERVICES ARE NOT SHOWN, WHERE APPROPRIATE, FOR CLARITY.
2. ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS IN METRES UNLESS OTHERWISE NOTED. ELEVATIONS ARE BASED ON NAD83 SYSTEM.
3. THE GRID CO-ORDINATE SYSTEM IS BASED ON NAD83 SYSTEM. SURVEY BASED ON SECOND AND THIRD ORDER CONTROL.
4. ARRANGEMENT SHOWN AND ALL OTHER DIMENSIONS, ELEVATIONS AND SLOPES ARE FOR REFERENCE ONLY, OR TO CONVEY THE CONCEPT OF THE WORK.
5. ARRANGEMENT AND DIMENSIONS ARE SHOWN FOR A D=12650mm (NOMINAL) INSIDE DIAMETER TUNNEL.
6. ALL DIMENSIONS, ELEVATIONS AND SLOPES INDICATED WITH * SHALL BE MAINTAINED.
7. ALL DIMENSIONS AND ELEVATIONS INDICATED WITH ** SHALL BE ADJUSTED, BASED ON THE FINAL TUNNEL INSIDE DIAMETER (D).

LEGEND:

EXISTING STRUCTURES

APPROX. TUNNEL RIGHT OF WAY

APPROX. LIMITS OPG LAND AT OUTLET AREA

CONCEPT DRAWING

mf roll number	ver no	date	particulars	dwn chkd	appd
	05	AUG 03 2005	ISSUED FOR INCLUSION IN AGREEMENT		
	04	APR 14 2005	ISSUED FOR AMENDMENT 4		
	03	MAR 18 2005	ISSUED FOR AMENDMENT 3		
	02	MAR 7 2005	ISSUED FOR AMENDMENT 2		
	01	DEC 17 2004	ISSUED FOR PROPOSAL		
	00	NOV 17 2004	ISSUED FOR REVIEW		

NIAGARA TUNNEL FACILITY PROJECT

DIVERSION TUNNEL GENERAL ARRANGEMENT

ONTARIO POWER GENERATION — Electricity Production - Hydroelectric Technical Services

Hatch Mott MacDonald–Acres

dwn | designed by | cad use
chkd
date yr/month/day 04/11/02 | design approved | plot scale 1:1 M
dist. code
scale 1:10000 | authorized | CAD file type DWG

dwg no NAW130–D0E–29230–0015 | ver 05

1:2000 0 50 100 150 200 m
1:5000 0 100 200 300 400 500 m
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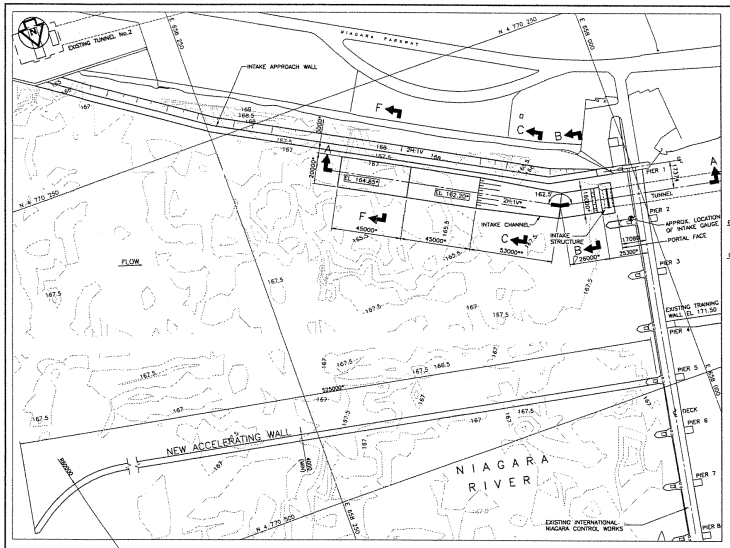
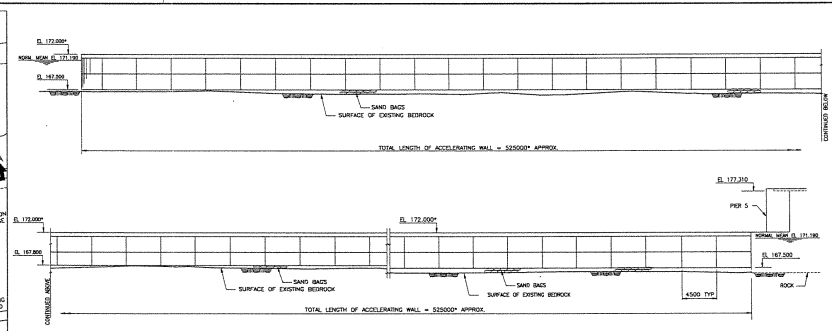
A0 (841 x 1189) standard drawing number NAW130–D0E–29230–0015

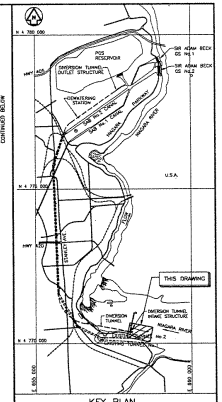
EE/jd



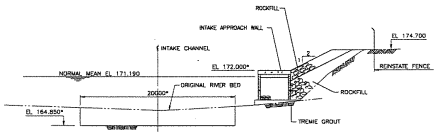
PLAN
SCALE 1:1000



ELEVATION OF ACCELERATING WALL
SCALE 1:200



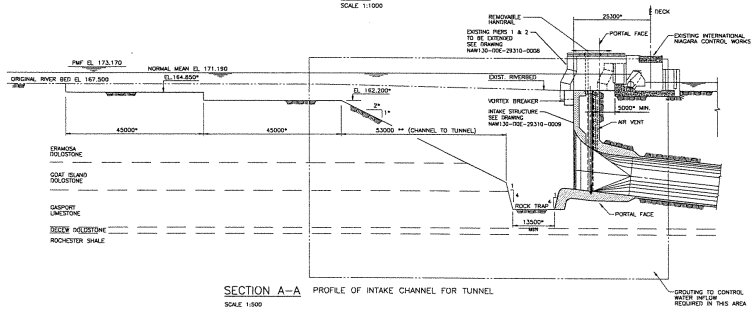
KEY PLAN
SCALE 1 : 50000



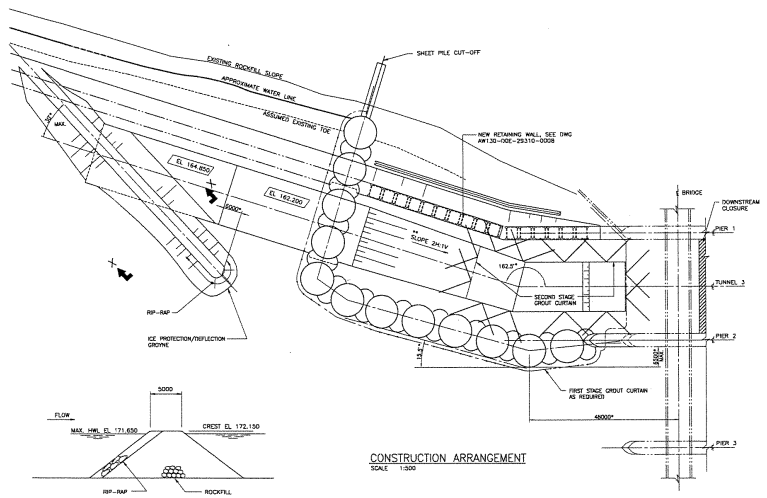
SECTION F–F
SCALE 1:200

NOTES:

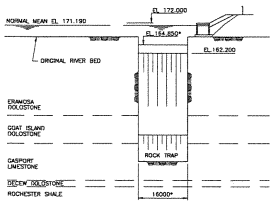
1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT CONCEPT DRAWINGS AND DOCUMENTS FOR THIS PROJECT AND ONTARIO POWER GENERATION DRAWINGS FOR THE EXISTING WORKS. DETAILS OF EXISTING CANALS AND SERVICES ARE NOT SHOWN, WHERE APPROPRIATE, FOR CLARITY.
2. FOR GENERAL NOTES, SEE DRAWING NAW130-D0E-29310-0013



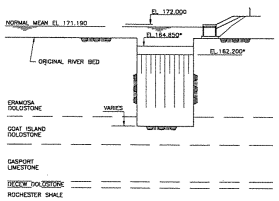
SECTION A–A PROFILE OF INTAKE CHANNEL FOR TUNNEL
SCALE 1:500



CONSTRUCTION ARRANGEMENT
SCALE 1:500



SECTION B–B
SCALE 1:500



SECTION C–C
SCALE 1:500

SECTION X–X
SCALE 1:250

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1:250	0	5	10	15	20	25	m
1:500	0	10	20	30	40	50	m
1:1000	0	20	40	60	80	100	m

CONCEPT DRAWING

rev	date	particulars	prepd	appd
05	AUG 01 2005	ISSUED FOR INCLUSION IN AGREEMENT		
04	APR 14 2005	ISSUED FOR AMENDMENT 4		
03	MAR 18 2005	ISSUED FOR AMENDMENT 3		
02	MAR 7 2005	ISSUED FOR AMENDMENT 2		
01	DEC 17 2004	ISSUED FOR PROPOSAL		
00	NOV 17 2004	ISSUED FOR REVIEW		

NIAGARA TUNNEL FACILITY PROJECT
INTAKE WORKS
INTAKE CHANNEL AND
ACCELERATING WALL
ARRANGEMENT AND DETAILS

ONTARIOPOWER GENERATION — Electricity Production – Hydroelectric Technical Services

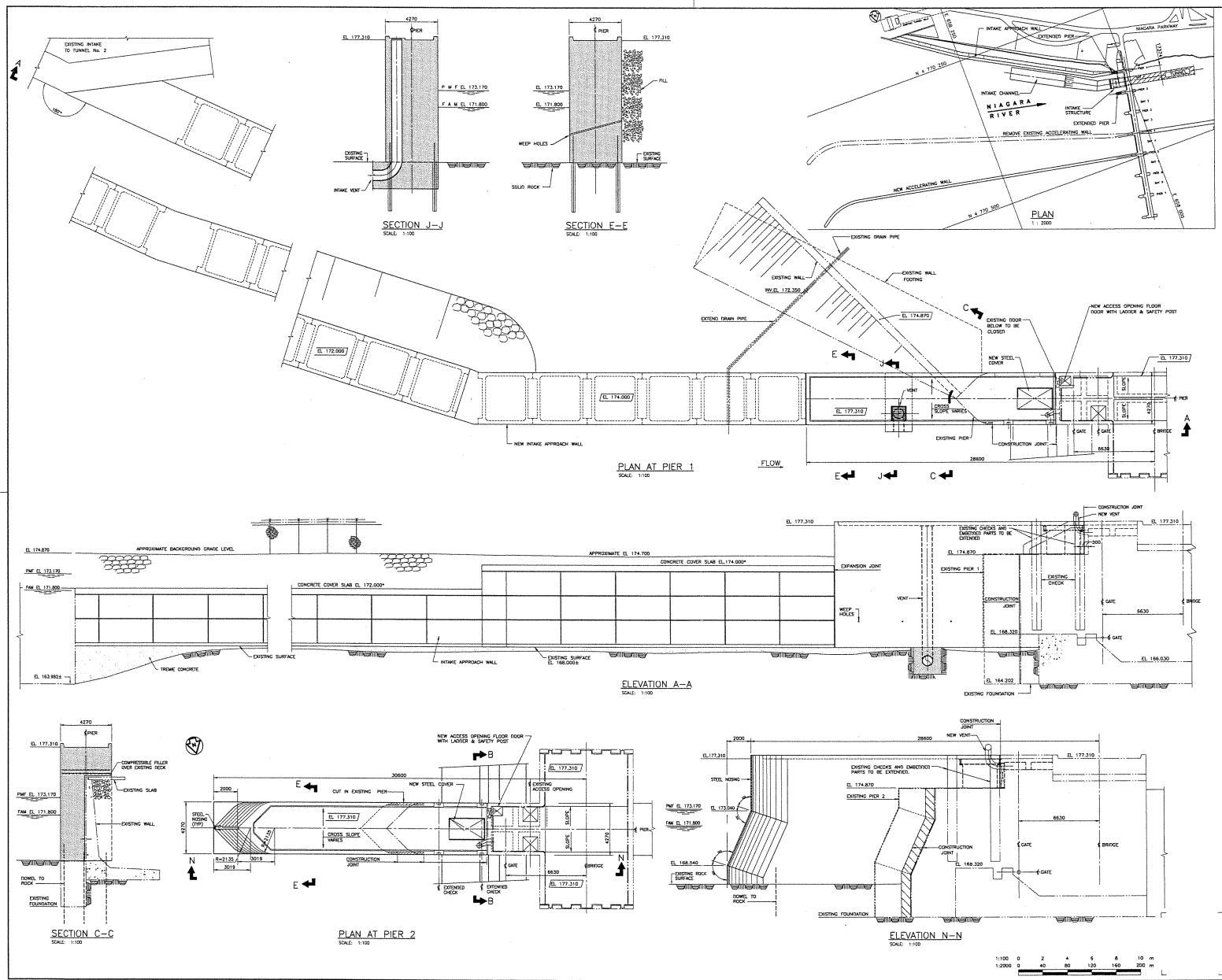
Hatch Mott MacDonald–Acres

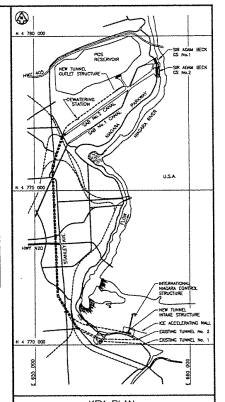
date yr/month/day 04/11/02 — designed by — design approved — scale 1:1 M — dat. code

scale AS SHOWN — authorized — CAD file type DWG

dwg no NAW130–D0E–29310–0007 — rev 05

A0 (841 x 1189) standard drawing number NAW130–D0E–29310–0007





NOTES:

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT CONCEPT DRAWINGS AND DOCUMENTS FOR THIS PROJECT AND ONTARIO POWER GENERATION DRAWINGS FOR THE EXISTING WORKS. DETAILS OF EXISTING CANALS AND SERVICES ARE NOT SHOWN, WHERE APPROPRIATE, FOR CLARITY.
2. FOR GENERAL NOTES, SEE DRAWING NAW130-00E-29230-0015

CONCEPT DRAWING

rev no/ revision	rev no	date	particulars	drawn	code
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	02	MAR. 7 / 2002	ISSUED FOR AMENDMENT 2		
	01	DEC. 4 / 2001	ISSUED FOR PROPOSAL		
	00	NOV. 1 / 2001	ISSUED FOR REVIEW		

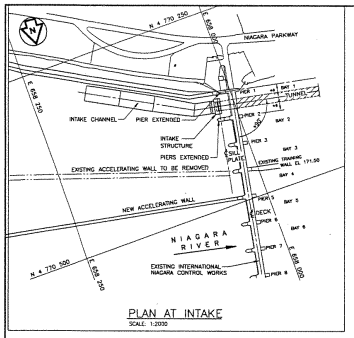
NIAGARA TUNNEL FACILITY PROJECT
INTAKE WORKS
MODIFICATIONS TO INCW
CONTROL STRUCTURE

ONTARIO POWER GENERATION — Electricity Production – Hydroelectric Technical Services

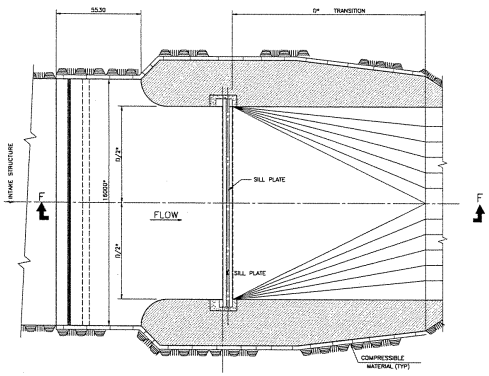
Hatch Mott MacDonald–Acres

drawn		designed by	
date	yr/month/day	design approved	
	04/11/02		
scale	AS SHOWN	authorized	
size			
drawing no	NAW130–00E–29310–0008	rev	03
CAD file type	DWG		
dwg. scale	1:1M		
dwg. code			

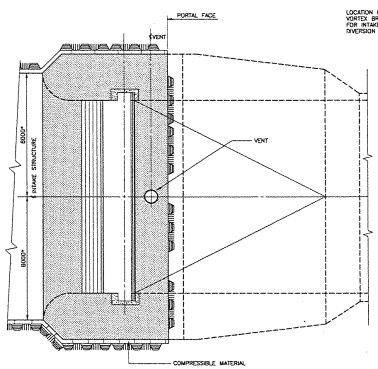
A0 (841 x 1189) standard drawing number NAW130–00E–29310–0008



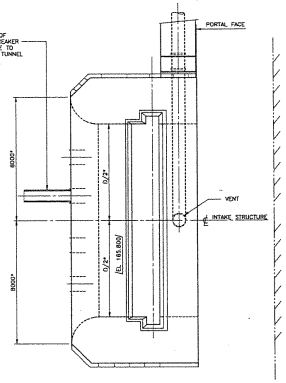
PLAN AT INTAKE
SCALE: 1:2000



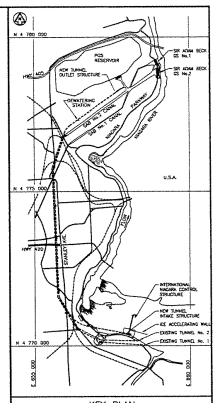
PLAN C–C
SCALE: 1:100



PLAN B–B
SCALE: 1:100



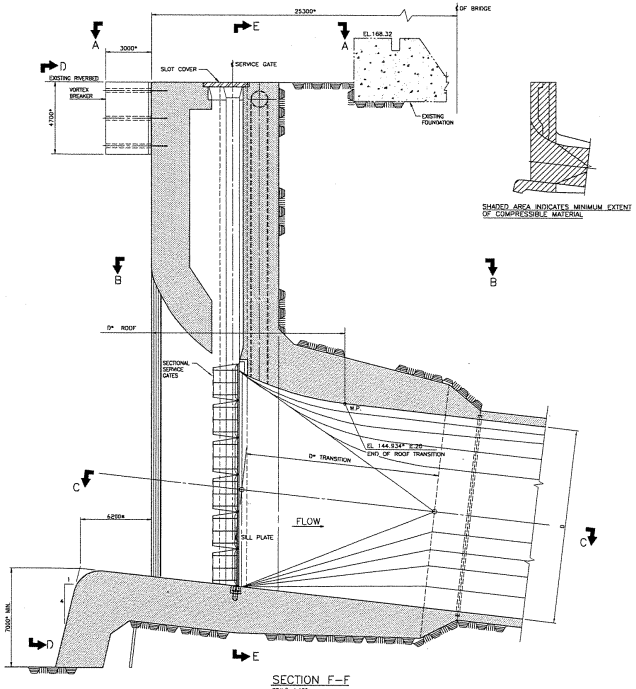
PLAN A–A
SCALE: 1:100



KEY PLAN
SCALE 1 : 50000

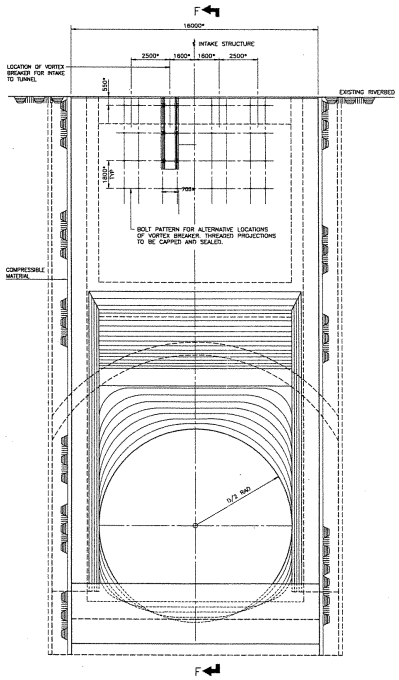
NOTES:

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT CONCEPT DRAWINGS AND DOCUMENTS FOR THIS PROJECT AND ONTARIO POWER GENERATION DRAWINGS FOR THE EXISTING WORKS. DETAILS OF EXISTING CANALS AND SERVICES ARE NOT SHOWN, WHERE APPROPRIATE, FOR CLARITY.
2. FOR GENERAL NOTES, SEE DRAWING NAW130–D0E–29330–0015

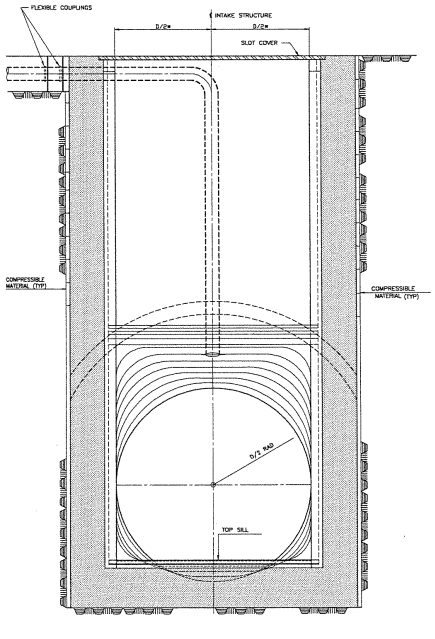


SHADED AREA INDICATES MINIMUM EXTENT OF COMPRESSIBLE MATERIAL

SECTION F–F
SCALE: 1:100



ELEVATION D–D
SCALE: 1:100



SECTION E–E
SCALE: 1:100

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CONCEPT DRAWING

rev no/mo/yr	rev no.	date	particulars	by	chkd
	04	AUG 23 2005	ISSUED FOR INCLUSION IN AGREEMENT		
	03	APR 11 2005	ISSUED FOR AMENDMENT 4		
	02	MAR 1 2005	ISSUED FOR AMENDMENT 2		
	01	DEC 17 2004	ISSUED FOR PROPOSAL		
	00	NOV 17 2004	ISSUED FOR REVIEW		

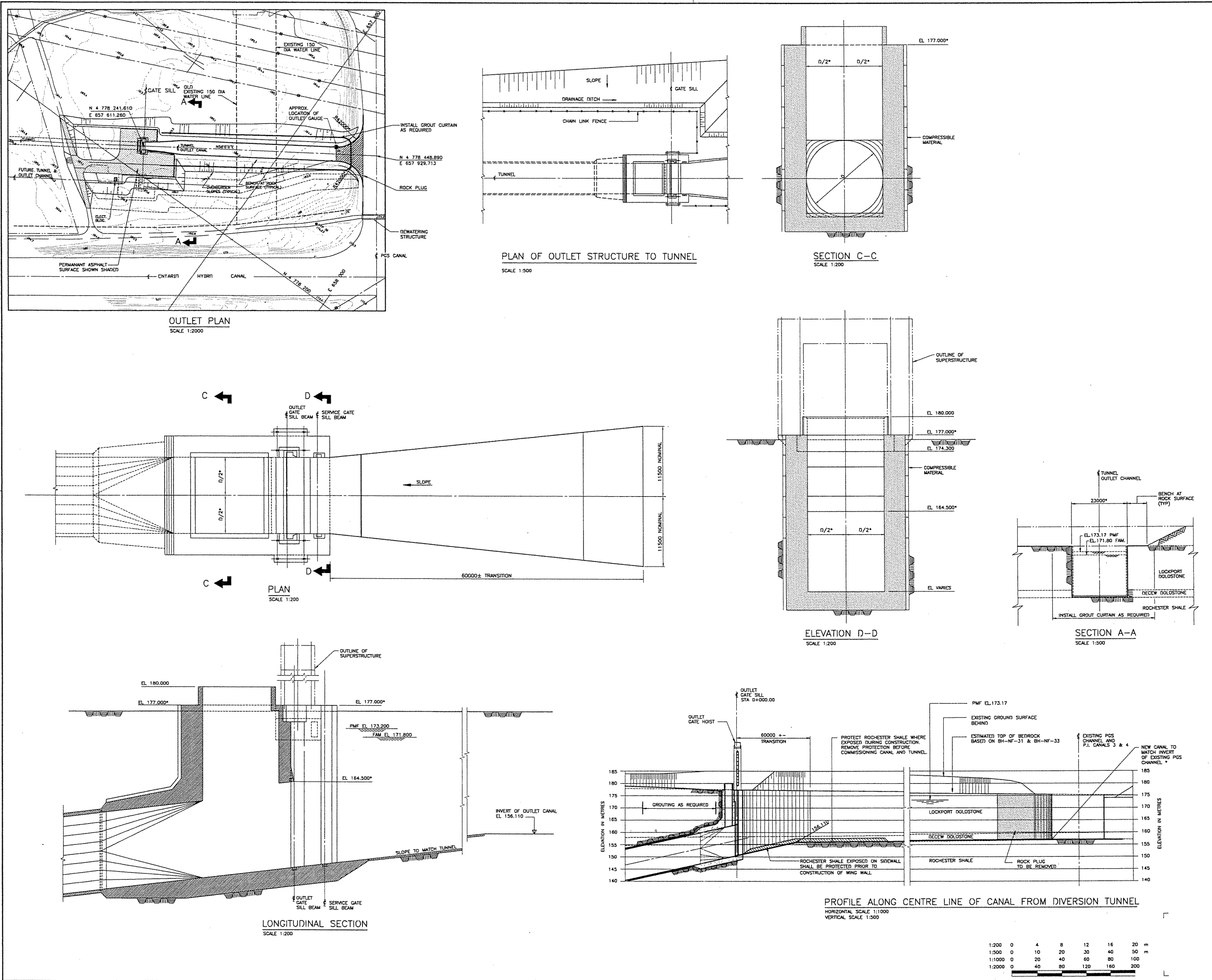
NIAGARA TUNNEL FACILITY PROJECT
INTAKE WORKS
INTAKE STRUCTURE
ARRANGEMENT AND DETAILS

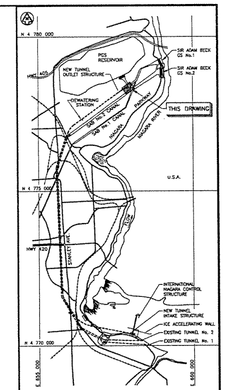
ONTARIO POWER GENERATION — Electricity Production – Hydroelectric Technical Services

Hatch Mott MacDonald–Acres

drn		designed by	
chkd			
date yr/month/day 04/11/05		design approved	
scale AS SHOWN		authorized	
size			
scale 1:1M			
dwg no NAW130–D0E–29310–0009		rev 04	

AO (841 x 1189)
standard drawing number NAW130–D0E–29310–0009





KEY PLAN
SCALE 1 : 50000

NOTES:

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT CONCEPT DRAWINGS AND DOCUMENTS FOR THIS PROJECT AND ONTARIO POWER GENERATION DRAWINGS FOR THE EXISTING WORKS. DETAILS OF EXISTING CANALS AND SERVICES ARE NOT SHOWN, WHERE APPROPRIATE, FOR CLARITY.
2. FOR GENERAL NOTES, SEE DRAWING NAW130-D0E-29230-0015

ref not number	ver no	date	particulars		
	02	AUG 03 2005	ISSUED FOR INCLUSION IN AGREEMENT		
	01	DEC 17 2004	ISSUED FOR PROPOSAL		
	00	NOV 17 2004	ISSUED FOR REVIEW		

NIAGARA TUNNEL FACILITY PROJECT

OUTLET WORKS

OUTLET STRUCTURE AND CANAL ARRANGEMENT, PLAN AND SECTIONS

ONTARIO POWER GENERATION — Electricity Production - Hydroelectric Technical Services

Hatch Mott MacDonald–Acres

date yr/month/day: 04/11/05
plot scale: 1:1M
scale: AS SHOWN
CAD file type: DWG
dwg no: NAW130-D0E-29710-0023
ver: 02

A0 (841 x 1189)

standard drawing number
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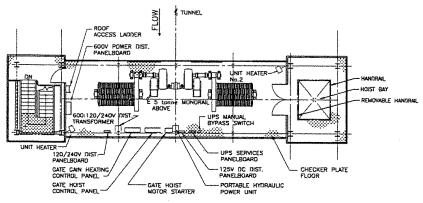
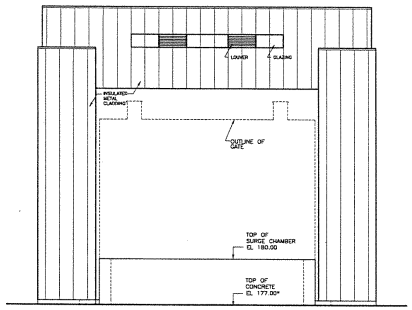
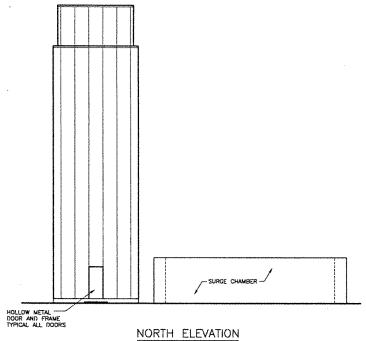


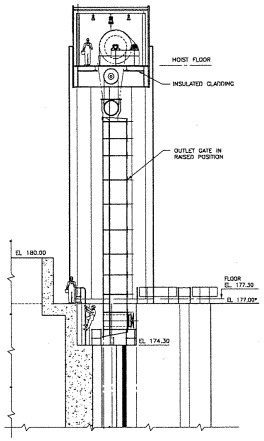
PLAN AT HOIST FLOOR
SCALE 1:100



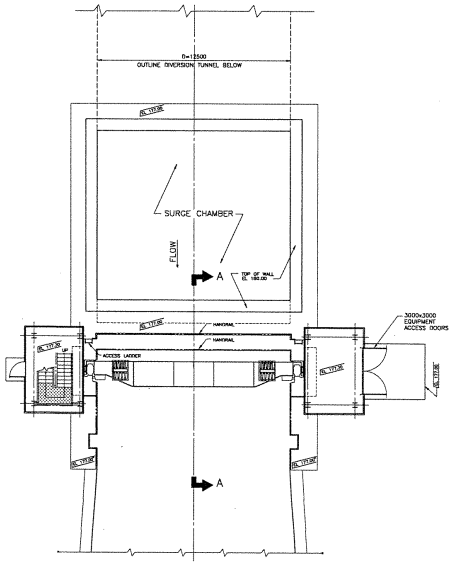
WEST ELEVATION
SCALE 1:100



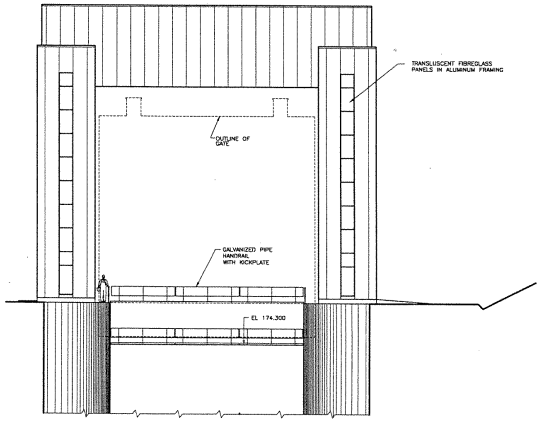
NORTH ELEVATION
SCALE 1:100



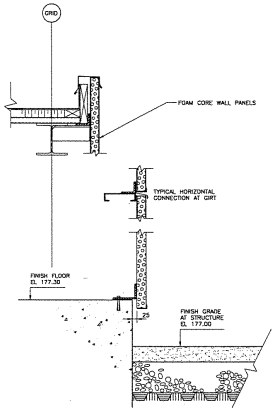
SECTION A–A
SCALE 1:100



PLAN AT FLOOR EL 177.30
SCALE 1:100



EAST ELEVATION
SCALE 1:100



TYPICAL WALL SECTION
SCALE 1:10

1:10 0 200 400 600 800 1000 mm
1:100 0 2 4 6 8 10 m

NOTES:

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT CONCEPT DRAWINGS AND DOCUMENTS FOR THIS PROJECT AND ONTARIO POWER GENERATION DRAWINGS FOR THE EXISTING WORKS. DETAILS OF EXISTING CANALS AND SERVICES ARE NOT SHOWN, WHERE APPROPRIATE, FOR CLARITY.
2. FOR GENERAL NOTES, SEE DRAWING NAW130-D0E-29230-0015

CONCEPT DRAWING

rev no	rev date	particulars	drawn	checked	code
02	AUG 04 2005	ISSUED FOR INCLUSION IN AGREEMENT			
01	DEC 17 2004	ISSUED FOR PROPOSAL			
00	NOV 17 2004	ISSUED FOR REVIEW			

NIAGARA TUNNEL FACILITY PROJECT
OUTLET WORKS
CLOSURE GATE HOIST STRUCTURE
ARCHITECTURAL ARRANGEMENT

ONTARIO POWER GENERATION — Electricity Production – Hydroelectric Technical Services

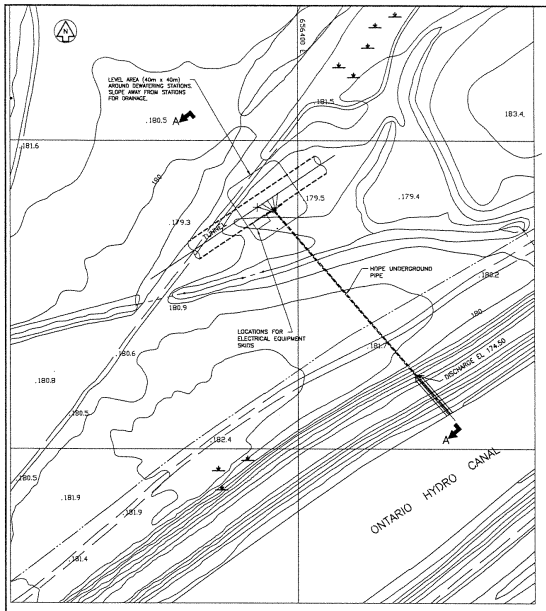
Hatch Mott MacDonald–Acres

drawn		designed by	
checked			
date yr/month/day 04/11/02		design approved	
scale AS SHOWN		authorized	
		CAD file type DWG	
		plot scale 1:1 M	
		CAD. code	

drawing no NAW130–D0E–29710–0024 | rev 02

A0 (841 x 1189) standard drawing number NAW130–D0E–29710–0024

EE/dl



PLOT PLAN
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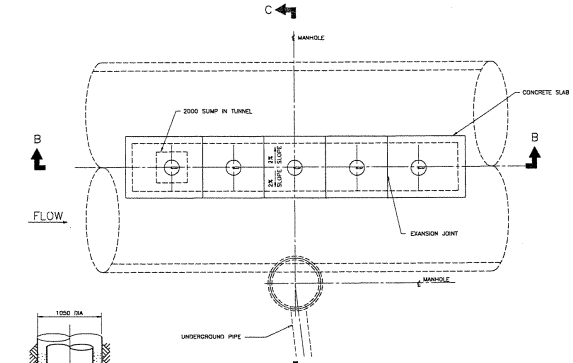

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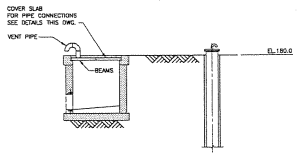

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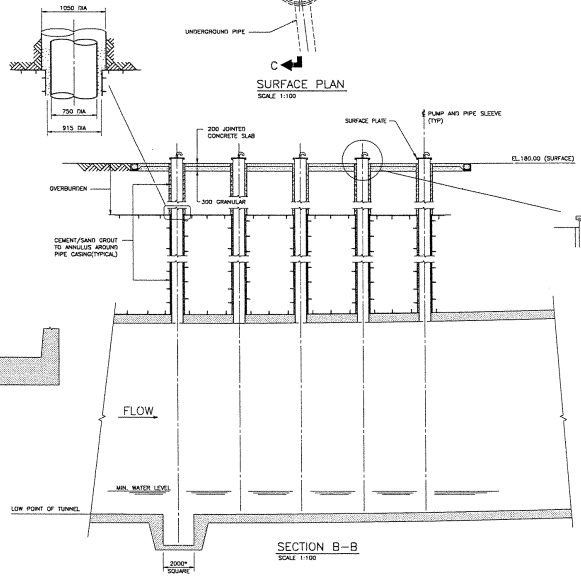

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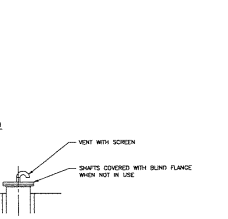

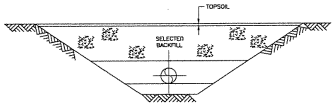

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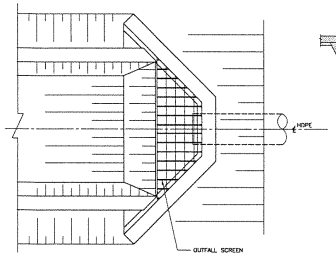
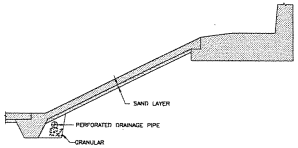
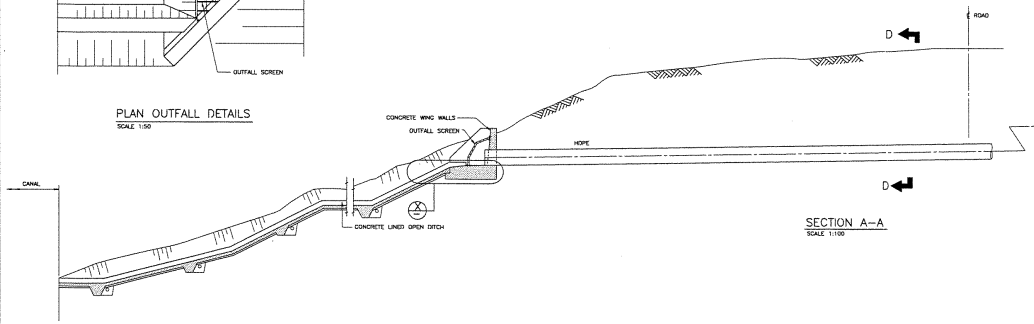


PLAN OUTFALL DETAILS
SCALE 1:50



DETAIL X
SCALE 1:50



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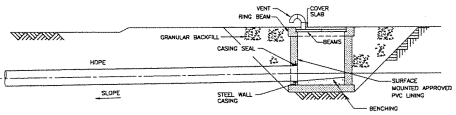

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NOTES:

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT CONCEPT DRAWINGS AND DOCUMENTS FOR THIS PROJECT AND ONTARIO POWER GENERATION DRAWINGS FOR THE EXISTING WORKS. DETAILS OF EXISTING CANALS AND SERVICES ARE NOT SHOWN, WHERE APPROPRIATE, FOR CLARITY.
2. FOR GENERAL NOTES, SEE DRAWING NAW130–00E–29230–0015
3. INSTALL CONTUIT ON OUTSIDE OF CASING FOR CABLING FROM INSTRUMENTATION THAT IS TO BE INSTALLED IN TUNNEL LINER.
4. SUPPLY AND INSTALLATION OF PUMPS AND DISCHARGE PIPES, BY OTHERS.

CONCEPT DRAWING

rev number	rev no	date	particulars	prep.	chkd	appd
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	01	DEC. 11 2001	ISSUED FOR PROPOSAL			
	00	NOV. 19 2001	ISSUED FOR REVIEW			

NIAGARA TUNNEL FACILITY PROJECT
DIVERSION TUNNEL
DEWATERING STATION
ARRANGEMENT, PLAN,
SECTIONS AND DETAILS

ONTARIO POWER GENERATION — Electricity Production - Hydroelectric Technical Services

Hatch Mott MacDonald–Acres

drawn		designed by	
date yr/month/day 04/11/02		design approved	
scale AS SHOWN		authorized	
size		plot scale 1:1M	
CAD file type DWG			
Dwg no NAW130–00E–29270–0001		rev 02	

AO (841 x 1189)

standard drawing number NAW130–00E–29270–0001

Aug 02 2002 - 1:12pm
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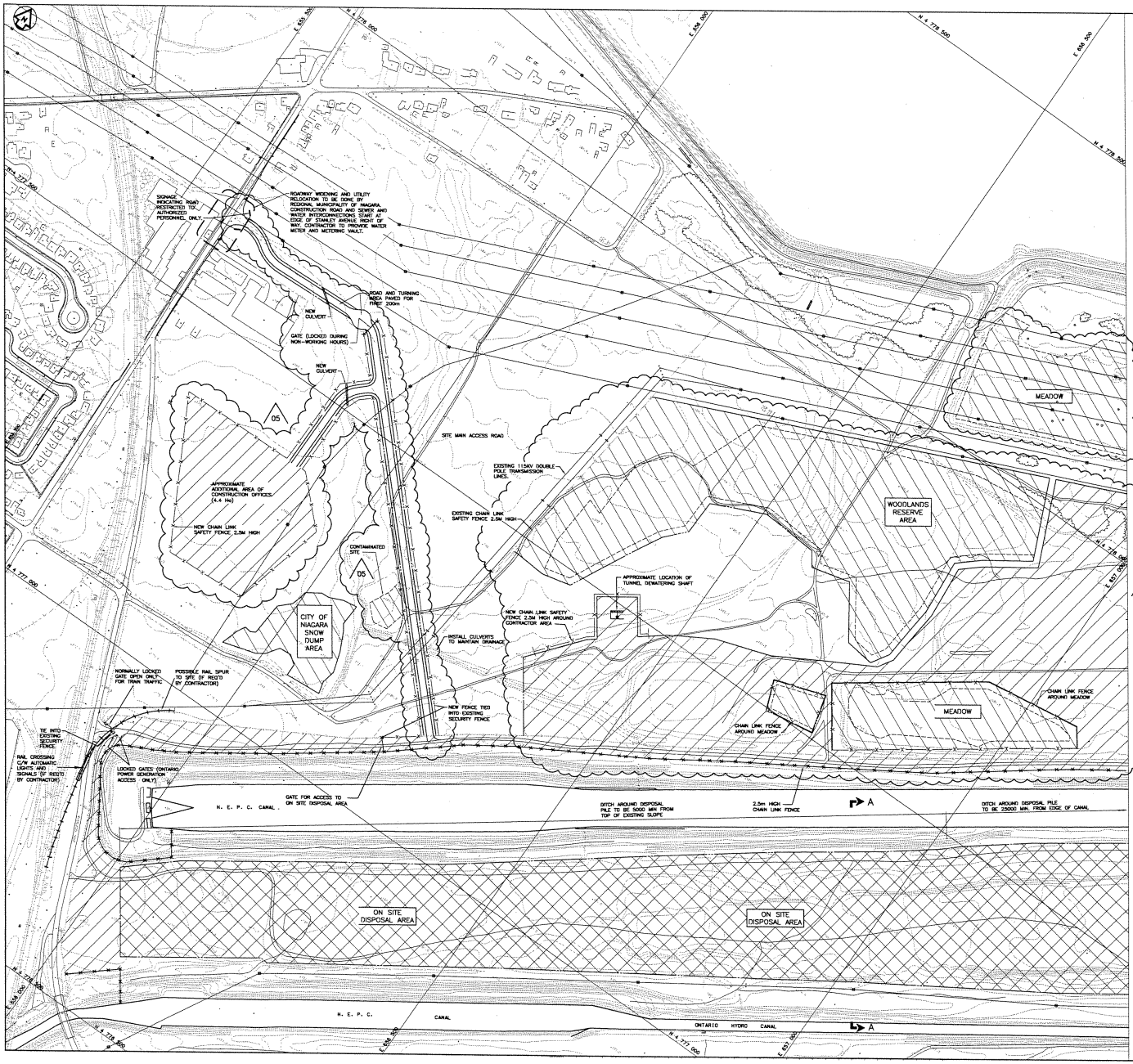
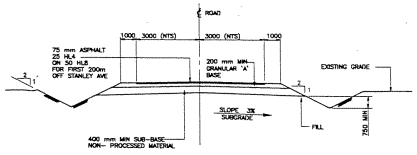
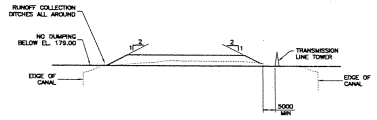




TYPICAL CONSTRUCTION ROAD SECTION

SCALE 1 : 100



SECTION A–A

SCALE 1 : 2000

NOTES:

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT CONCEPT DRAWINGS AND DOCUMENTS FOR THIS PROJECT AND ONTARIO POWER GENERATION DRAWINGS FOR THE EXISTING WORKS. DETAILS OF EXISTING CANALS AND SERVICES ARE NOT SHOWN, WHERE APPROPRIATE, FOR CLARITY.
2. FOR GENERAL NOTES, SEE DRAWING NAW130-D0E-29230-0015
3. FENCE TO BE GROUNDED UNDERNEATH TRANSMISSION LINES.
4. THE OUTLET AREA SITE INCLUDES THE AREA DELINEATED BY "AREA AVAILABLE FOR CONTRACTOR", THE "ON SITE DISPOSAL AREA" AND THE "SITE MAIN ACCESS ROAD"
5. EXISTING OPG FENCES THAT ACT AS BOUNDARIES TO THE AREA AVAILBLE TO THE CONTRACTOR, SHALL BE UNDER THE CONTROL OF THE CONTRACTOR.

LEGEND:

- 05 GPS SURVEY
- AREA AVAILABLE FOR CONTRACTORS
- AREA NOT AVAILABLE FOR CONTRACTOR ACCESS
- DISPOSAL AREA

CONCEPT DRAWING

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05	AUG. 05 2005	ISSUED FOR INCLUSION IN AGREEMENT			
04	APR. 14 2005	ISSUED FOR AMENDMENT 4			
03	MAR. 18 2005	ISSUED FOR AMENDMENT 3			
02	MAR. 7 2005	ISSUED FOR AMENDMENT 2			
01	DEC. 17 2004	ISSUED FOR PROPOSAL			
00	NOV. 17 2004	ISSUED FOR REVIEW			
ref. cal number	rev. no.	date	particulars	drw. chkd	appd

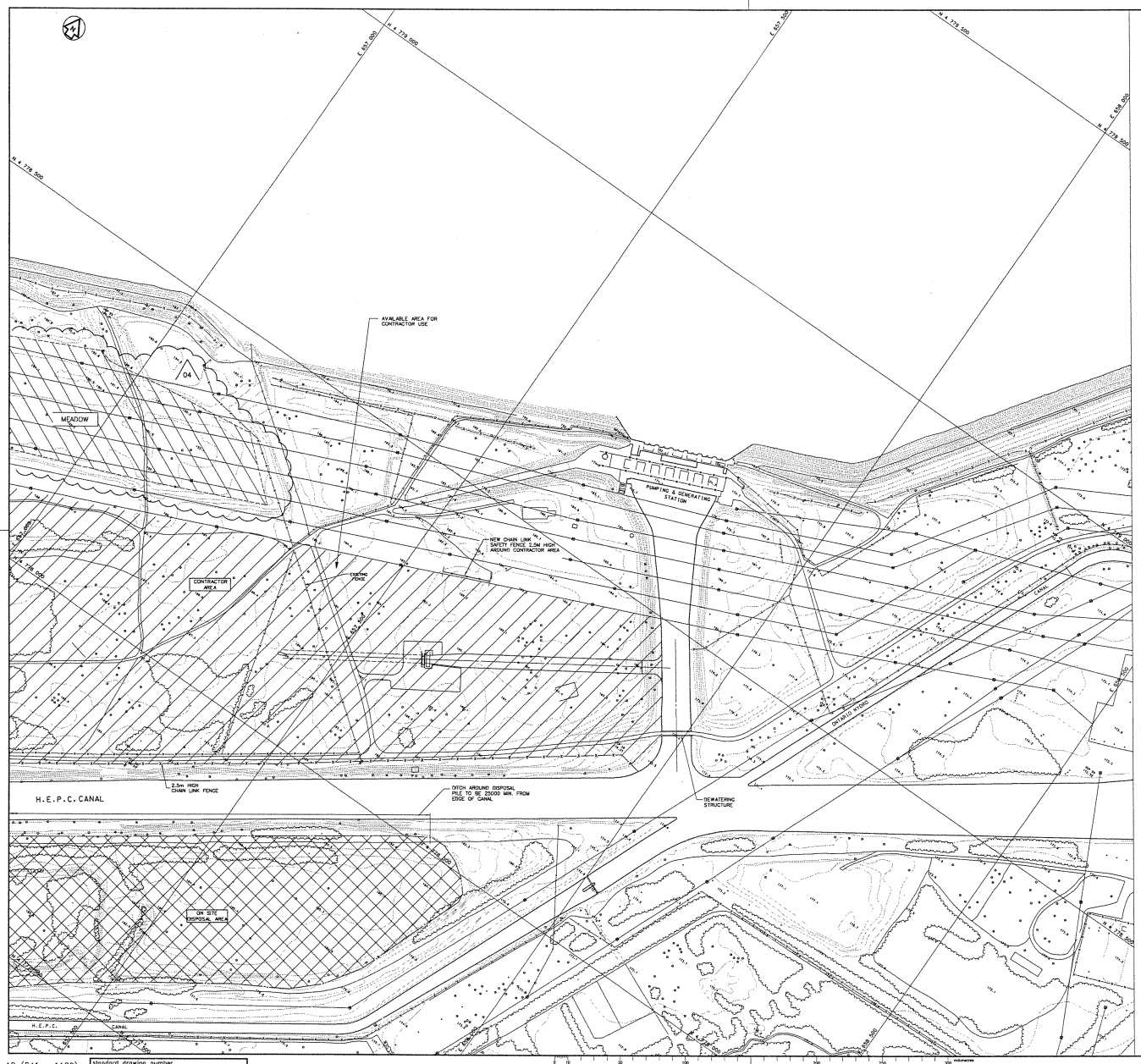
NIAGARA TUNNEL FACILITY PROJECT
CONSTRUCTION FACILITIES
OUTLET AREA
WEST PLAN

ONTARIO POWER GENERATION — Electricity Production – Hydroelectric Technical Services

Hatch Mott MacDonald–Acres

drw	designed by		
chkd			
date yr/month/day 04/11/05	design approved	dwg scale 1:1 M	
		dwg. code	
scale 1:2000	authorized	CAD file type DWG	
dwg no. NAW130-D0E-80000-0012			rev 05

1159811\Civil\NAW130-D0E-80000-0012.dwg, Layout1, 12/08/2005 11:03:17 AM, Park110733, PostScript Level 2 [EPS].pc3, 1:2.98



NOTES:

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT CONCEPT DRAWINGS AND DOCUMENTS FOR THIS PROJECT AND ONTARIO POWER GENERATION DRAWINGS FOR THE EXISTING WORKS. DETAILS OF EXISTING CANALS AND SERVICES ARE NOT SHOWN, WHERE APPROPRIATE, FOR CLARITY.
2. FOR GENERAL NOTES, SEE DRAWING NAW130-D0E-29230-0015
3. FENCE TO BE GROUNDED UNDERNEATH TRANSMISSION LINES.
4. THE OUTLET AREA SITE INCLUDES THE AREA DELINEATED BY "AREA AVAILABLE FOR CONTRACTOR", THE "ON SITE DISPOSAL AREA" AND THE "SITE MAIN ACCESS ROAD"
5. EXISTING GPG FENCES THAT ACT AS BOUNDARIES TO THE AREA AVAILIBLE TO THE CONTRACTOR, SHALL BE UNDER THE CONTROL OF THE CONTRACTOR.

LEGEND:

- 04 GPS SURVEY
- AREA AVAILABLE FOR CONTRACTORS
- 04 AREA NOT AVAILABLE FOR CONTRACTOR ACCESS
- DISPOSAL AREA

CONCEPT DRAWING

not run number	rev no	date	particulars	chkd	appd
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	03	MAR 18 2005	ISSUED FOR AMENDMENT 3		
	02	MAR 7 2005	ISSUED FOR AMENDMENT 2		
	01	DEC 17 2004	ISSUED FOR PROPOSAL		
	00	NOV 17 2004	ISSUED FOR REVIEW		

NIAGARA TUNNEL FACILITY PROJECT
CONSTRUCTION FACILITIES
OUTLET AREA
EAST PLAN

ONTARIO POWER GENERATION — Electricity Production – Hydroelectric Technical Services

Hatch Mott MacDonald–Acres

drwn	designed by		
chkd			
date yr/month/day 04/11/05	design approved		cost scale 1:1 M
scale 1:2000	authorized		CAD file type DWG
dwg no NAW130-D0E-80000-0013			rev 04

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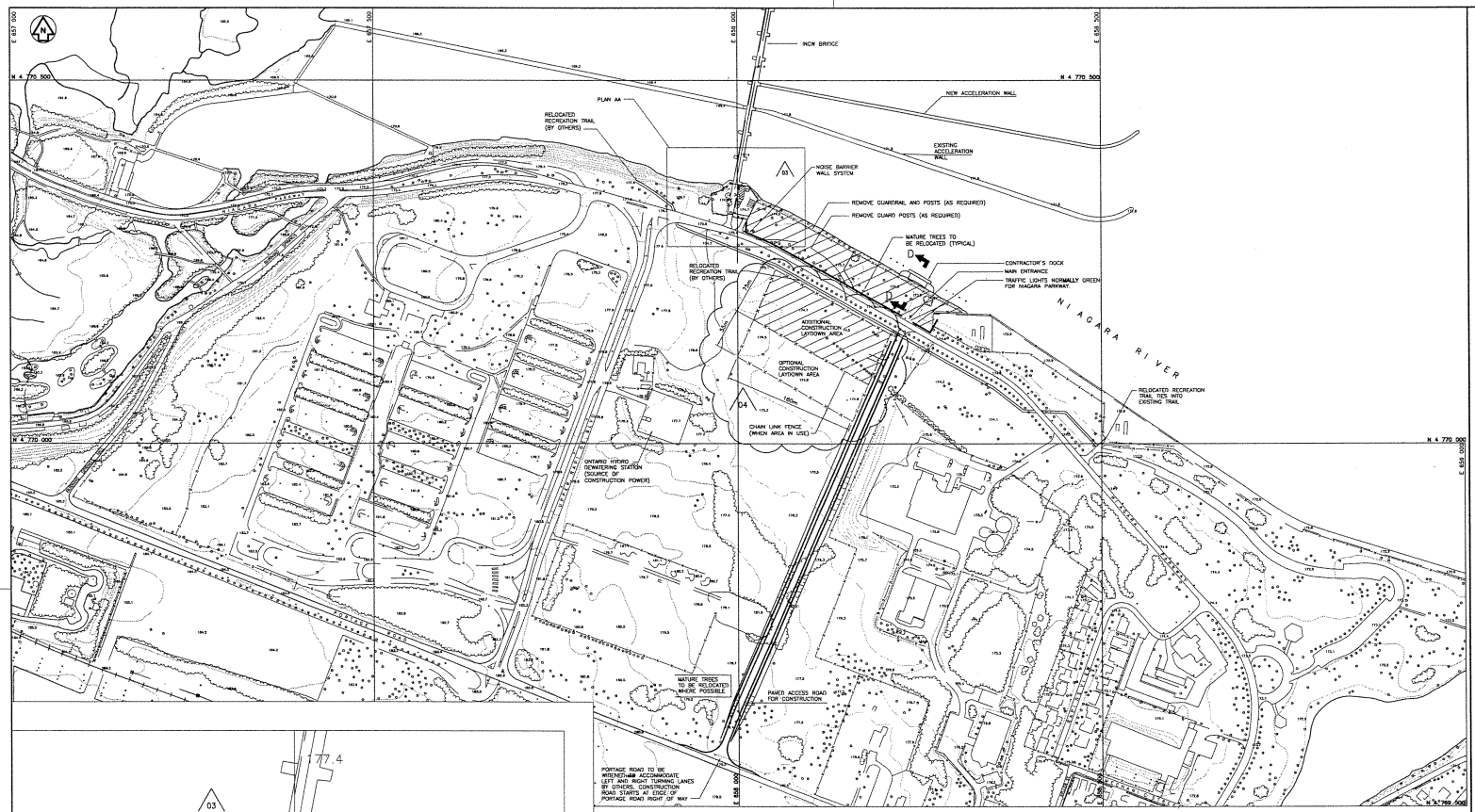
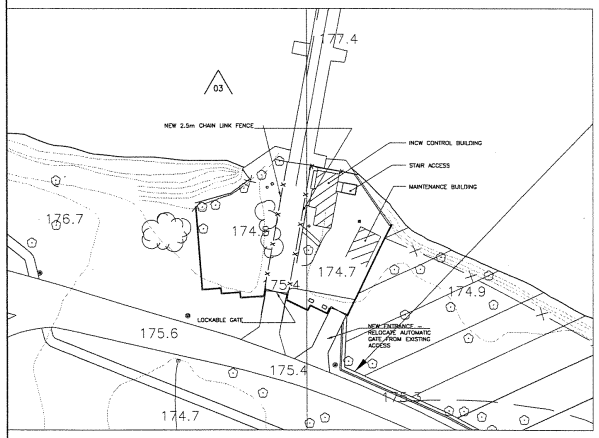
SCALE 1:2000

A0 (841 x 1189)

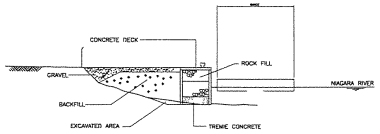
standard drawing number NAW130-D0E-80000-0013





PLAN A–A AT INCW CONTROL BUILDING

SCALE 1:500



SECTION D–D

SCALE 1:200

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NOTES:

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT CONCEPT DRAWINGS AND DOCUMENTS FOR THIS PROJECT AND ONTARIO POWER GENERATION DRAWINGS FOR THE EXISTING WORKS. DETAILS OF EXISTING CANALS AND SERVICES ARE NOT SHOWN, WHERE APPROPRIATE, FOR CLARITY.
2. FOR GENERAL NOTES, SEE DRAWING NAW130-D0E-29230-0015
3. FENCE TO BE GROUNDED UNDERNEATH TRANSMISSION LINES.
4. TREES WITHIN "AREAS AVAILABLE TO CONTRACTOR" THAT REQUIRE REMOVAL TO BE RELOCATED, IF PRACTICAL, IN CONSULTATION WITH OPG.

LEGEND:

AREA AVAILABLE FOR CONTRACTORS

CONCEPT DRAWING

rel mil number	rev no	date	particulars	chkd	appd
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	03	MAR 18 2005	ISSUED FOR AMENDMENT 3		
	02	MAR 7 2005	ISSUED FOR AMENDMENT 2		
	01	DEC 17 2004	ISSUED FOR PROPOSAL		
	00	NOV 17 2004	ISSUED FOR REVIEW		

NIAGARA TUNNEL FACILITY PROJECT

CONSTRUCTION FACILITIES

INTAKE AREA

PLAN AND SECTION

ONTARIO POWER GENERATION — Electricity Production – Hydroelectric Technical Services

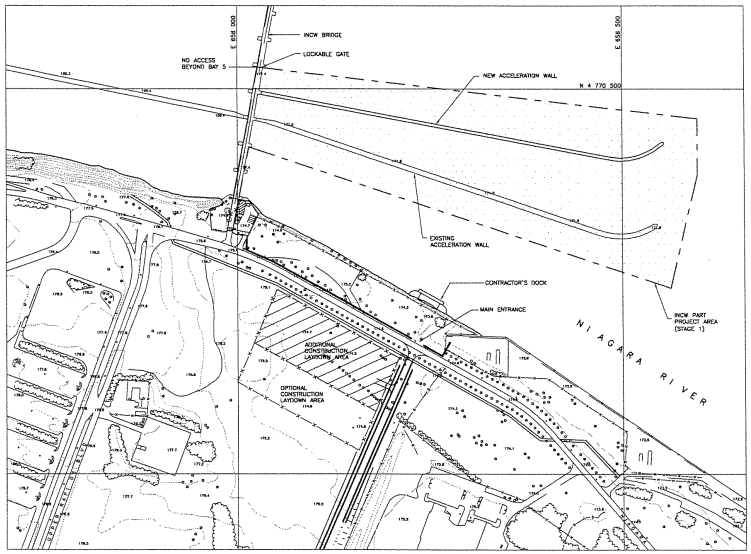
Hatch Mott MacDonald–Acres

dwn	designed by		
chkd			
date yr/month/day 04/11/05	design approved	CAD scale	plot scale 1:1 M
scale 1:2000	authorized	CAD file type DWG	
dwg no NAW130-D0E-80000-0014			rev 04

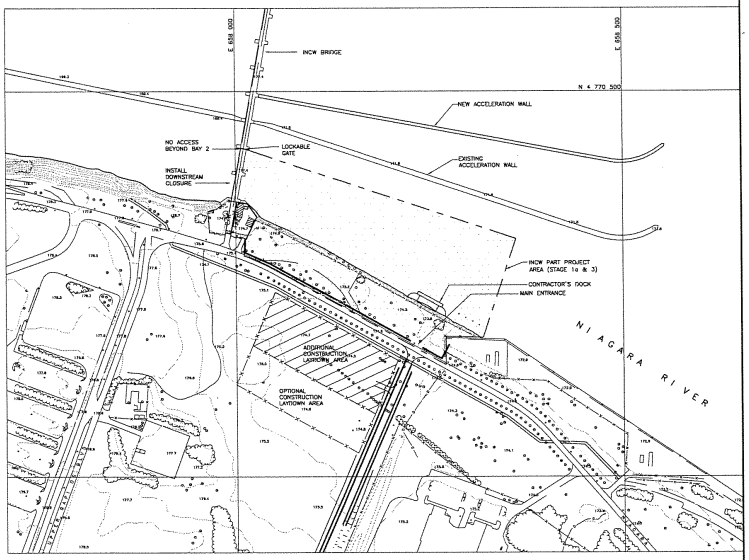
A0 (841 x 1189)

standard drawing number NAW130-D0E-80000-0014

EE/hch



INCW PART PROJECT SITE
EXISTING AND NEW ACCELERATING WALL WORK (STAGE 1)
SCALE 1 : 2000



INCW PART PROJECT AREA SITE
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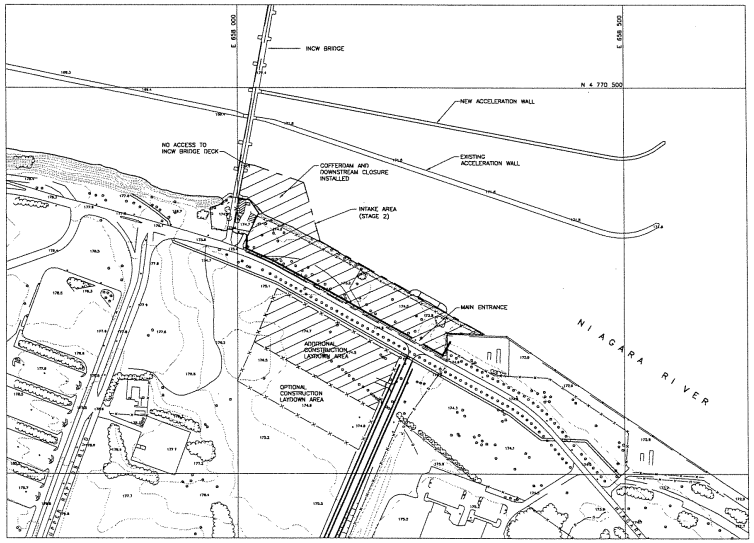
COFFERDAM DISMANTLING AND REMOVAL (STAGE 3)
SCALE 1 : 2000



INTAKE AREA SITE
INTAKE CONSTRUCTION WORK (STAGE 2)
SCALE 1 : 2000

LEGEND:

INTAKE AREA
CONTRACTOR IS "CONSTRUCTOR" FOR WORK IN THIS AREA. NO IN-WATER WORK IS ALLOWED

INCW PART PROJECT AREA
OPG ASSUMES ROLE OF "CONSTRUCTOR" FOR WORK IN THIS AREA

rev no	date	particulars	drn	chkd
01	AUG 03 2005	ISSUED FOR INCLUSION IN AGREEMENT		
00	MAR 15 2005	ISSUED FOR AMENDMENT 3		

NIAGARA TUNNEL FACILITY PROJECT
CONSTRUCTION FACILITIES
INTAKE AREA AND
INCW PART PROJECT AREA
SITE PLANS

ONTARIOPOWER GENERATION
Electricity Production - Hydroelectric
Technical Services

Hatch Mott MacDonald-Acres

dwn	designed by		
chkd			
date yr/month/day 04/11/05	design approved		plot scale 1:1 M
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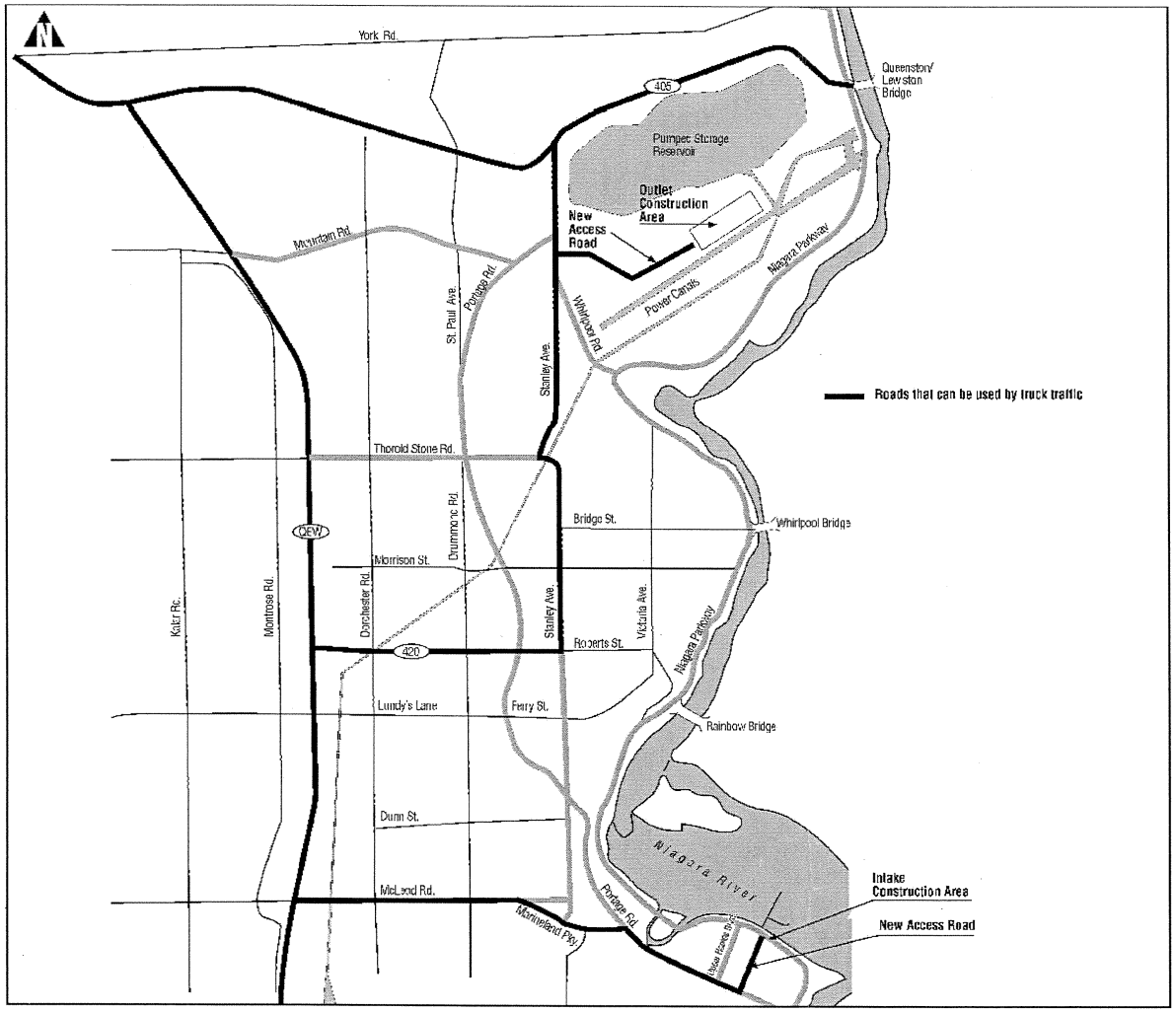
dwg no NAW130-D0E-80000-0015			rev 01

A0 (841 x 1189)

standard drawing number
NAW130-D0E-80000-0015

NOTES:

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT CONCEPT DRAWINGS AND DOCUMENTS FOR THIS PROJECT AND ONTARIO POWER GENERATION DRAWINGS FOR THE EXISTING WORKS. DETAILS OF EXISTING CANALS AND SERVICES ARE NOT SHOWN, WHERE APPROPRIATE, FOR CLARITY.
2. FOR GENERAL NOTES, SEE DRAWING NAW130-D0E-29230-0015



rev. not number	rev. no.	date	particulars	drn.	chkd.	appd.
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	01	MAR. 08 2008	ISSUED FOR AMENDMENT 3			
	00	DEC. 20 2004	ISSUED FOR PROPOSAL			

NIAGARA TUNNEL FACILITY PROJECT
CONSTRUCTION FACILITIES
DESIGNATED TRUCK ROUTES

ONTARIO POWER GENERATION — Electricity Production – Hydroelectric Technical Services

Hatch Mott MacDonald-Acres

date yr/month/day 04/12/16	designed by		
	design approved		
scale NTS	authorized		CAD file type DWG

drg. no. NAW130-D0E-84500-0001 — rev. 02

A0 (841 x 1189) — standard drawing number NAW130-D0E-84500-0001

Appendix 1.1(j)

Appendix 1.1(j) - Contract Price

BREAKDOWN OF CONTRACT PRICE

MEASUREMENT PAYMENT ITEM	DESCRIPTION OF WORK	ORST INCLUDED	TOTAL
	Insurance Premium	170,000	2,724,181
1.1	Mobilization/Demobilization	871,842	31,729,969
1.2	Maintenance Bond in the form of Appendix 4.1(f)	0	610,749
1.3	Performance LC	0	2,544,789
1.5	Design	0	5,870,313
1.6	Accelerating Wall, Intake Channel and Approach Wall	952,100	54,862,211
1.7	Diversion Outlet Canal	33,520	12,730,052
1.8	Dewatering System Shafts	145,367	3,787,251
1.9	Intake Structure	56,789	5,334,935
1.10	Intake Gates	8,389	2,325,461
1.11	Outlet Structure	60,149	7,222,558
1.12	Outlet Structure Gate and Hoist	16,729	5,957,260
1.13	Diversion Tunnel	7,489,430	406,881,138
1.14	Tunnel Boring Machine	4,738,617	78,242,470
1.15	Flow Verification Test	0	94,682
1.16	Demolition and Disposal of Dewatering Structure (optional)	11,490	1,495,595
	Proponent's Estimate of its DRB Cost (50% of overall cost)	0	221,557
	Total Contract Price	14,554,422	**622,635,171**

This Contract Price is to divert a GFA of 500 m^3/s (at the reference hydraulic head and the reference elevation of the energy grade line as defined in Appendix 1.1(aa), Flow Verification Test) of the flow of the Niagara River from an intake located under the International Niagara Control Works, to an outlet that will discharge into the existing canal system that feeds the existing Sir Adam Beck hydroelectric plants at Queenston, Ontario.

ALTERNATIVE 1 TO CONTRACT PRICE

As an alternative to the Constraint 3.1(c)(i) in Appendix 1.1(sss), Summary of Work, of the Design/Build Agreement, the Contractor offers the following credit to its Contract Price and change to the Substantial Completion Date if a single continuous closure of the PGS is permitted by OPG for Work associated with:

(a) connection of the outlet canal to the PGS canal; and

(b) for Work associated with demolition and disposal to off-site location(s) of the existing dewatering structure in the PGS canal should such Work be directed by OPG.

Credit to Contract Price: $375,000.00

Number of calendar days of single continuous closure of the PGS required to secure Credit to Contract Price: six (6) days.

Revised Substantial Completion Date proposed with single continuous closure of the PGS: October 6, 2009.

This offer of a reduction in the Contract Price and the associated schedule impacts shall remain in force for the duration of the Agreement and may be accepted by OPG at any time at its sole discretion.

ALTERNATIVE 2 TO CONTRACT PRICE

The Contract Price will be increased by the amount set out below for each previously agreed 6-hour closure period of PGS, subsequently confirmed with OPG within 2 to 5 days of agreed time of closure, that OPG fails to deliver to Contractor for Work associated with:

(a) connection of the outlet canal to the PGS canal; and

(b) for Work associated with demolition and disposal to off-site location(s) of the existing dewatering structure in the PGS canal, should such Work be directed by OPG,

provided that Proponent has complied with all requirements of the Summary of Work Constraints at 3.1(c) of Appendix 1.1(sss) of the Agreement, and with all other terms and conditions of the Agreement regarding such closure.

Increase in Contract Price per occurrence: $62,500.00.

OPTIONAL PRICE ADJUSTMENT

The following adjustment shall be made to the Contract Price in the event that OPG shall instruct the Contractor not to remove the temporary access roads constructed as part of the Work:

The Price Adjustment for the intake area access road is $0.0

The Price Adjustment for the outlet access road is $0.0

The following all inclusive unit rates will be used to evaluate changed quantities above and below the baseline quantities in the GBR:

UNIT RATES FOR DRILLING AND GROUTING

Gallery grouting

Mobilization and demobilization (to and from gallery) of plant and equipment for drilling and grouting in gallery	Each campaign	1,500.00 CAD
Drilling max. 51 mm dia., max length = 5,00m	per m	33.00 CAD
Drilling max. 51 dia., length = 5,01-10,00m	per m	39.00 CAD
Grout connection	per No.	1,430.00 CAD
Grouting cement incl. admixtures (in place)	per ton	596.00 CAD

Curtain grouting above ground (for ground water control only)

Mobilization and demobilization (to and from grouting area) of plant and equipment for drilling and grouting above ground	each campaign	2,5000.00 CAD
Drilling max. 71 mm dia., max. length = 5,00 m	per m	50.00 CAD
Drilling max. 71 mm dia., length = 5,01-10,00 m	per m	54.00 CAD
Drilling max. 71 mm dia., length = 10,01-20,00 m	per m	64.00 CAD
Drilling max. 71 mm dia., length = 20,01 - 30,00 m	per m	79.00 CAD
Grouting connection	per No.	1,430.00 CAD
Grouting cement incl. admixtures (in place)	per ton	490.00 CAD

UNIT RATE FOR SHOTCRETE

Fixed costs

Mobiliziation and demobilization of plant and equipment for applying additional shotcrete in tunnel or above ground (not applicable to shotcrete to overbreak in tunnel)	each campaign	2,500.00 CAD

Applying shotcrete

Mass shotcrete	each m3	465.00 CAD

UNIT RATE FOR DISPOSAL OF ROCK OVERBREAK

All rock classes and locations

Disposal of rock overbreak (solid rock)	each m3	55.00 CAD

UNIT RATES FOR PUMPING TREATMENT AND DISPOSAL OF WATER

Plant and installation per additional litre per second	per unit	6,000.00 CAD	<30 l/s
		4,000.00 CAD	30 to 150 l\s
		3,100.00 CAD	>150 l/s
Running cost pumping and disposal			
Tunnel Pumping and disposal of water (with treatment) during excavation and first pass lining only)	per m3	0.35 CAD	
Intake Pumping and disposal of water (with treatment)	per m3	0.15 CAD	

ROCK SUPPORT TABLE

See attached.

Rock Support Table

	A	B	C	D	E	F	G	H	I	J	K	L
1												
2	NIAGARA TUNNEL FACILITY PROJECT :											
3	Calculation of Aggregate Rock Conditions											
4												
5	BASELINED ROCK CONDITIONS (Ref: GBR Section 8.1.3.7)		Calculated Baseline Lengths of Each Rock Condition		Contract Unit Rates (Ref: Appendix 1.1(g))		Calculated Baseline		Actual Measured Lengths of Each Rock Condition		Calculated Actual	
6	Rock Condition	Percentage of Total TBM Bored Tunnel Length					Days	Total Cost			Days	Total Cost
7		(%)	(m)		(m/d)	($/m)	(d)	($)	(m)	(%)	(d)	($)
8												
9	1	0.16%	=+B9*$B$19		26.35	$9363	=+C9/$E9	=+C9*$F9	INPUT	=+I9/$I$17	=(J9*$B$19)/$E9	=(J9*$B$19)*$F9
10	2	2.73%	=+B10*$B$19		27.00	$10289	=+C10/$E10	=+C10*$F10	INPUT	=+I10/$I$17	=(J10*$B$19)/$E10	=(J10*$B$19)*$F10
11	3	10.59%	=+B11*$B$19		24.30	$11866	=+C11/$E11	=+C11*$F11	INPUT	=+I11/$I$17	=(J11*$B$19)/$E11	=(J11*$B$19)*$F11
12	4	5.28%	=+B12*$B$19		20.25	$13953	=+C12/$E12	=+C12*$F12	INPUT	=+I12/$I$17	=(J12*$B$19)/$E12	=(J12*$B$19)*$F12
13	4Q	23.69%	=+B13*$B$19		17.00	$14933	=+C13/$E13	=+C13*$F13	INPUT	=+I13/$I$17	=(J13*$B$19)/$E13	=(J13*$B$19)*$F13
14	5	46.90%	=+B14*$B$19		15.60	$17073	=+C14/$E14	=+C14*$F14	INPUT	=+I14/$I$17	=(J14*$B$19)/$E14	=(J14*$B$19)*$F14
15	6	10.65%	=+B15*$B$19		12.00	$25272	=+C15/$E15	=+C15*$F15	INPUT	=+I15/$I$17	=(J15*$B$19)/$E15	=(J15*$B$19)*$F15
16												
17	Aggregate Totals	100%	=SUM(C9:C15)		Aggregate Totals		=SUM(G9:G15)	=SUM(H9:H15)	=SUM(I9:I15)	=SUM(J9:J15)	=SUM(K9:K15)	=SUM(L9:L15)
18												
19	Actual Measured Overall TBM Bored Tunnel	INPUT			plus 5% variance		=+G17+G17*0.05	=+H17+H17*0.05	difference above or below 5% variance		If (K17-G19)>0 = K17-G19 else if(K17-G20)<0 = K17-G20, else=0	If (L17-H19)>0 = L17-H19 else if(L17-H20)<0 = L17-H20, else=0
20					minus 5% variance		=+G17-G17*0.05	=+H17-H17*0.05				
21												

22 NOTES:
23 1. Cells for input INPUT
24 2. For measurement purposes, the portion of the tunnel under the St. Davids Gorge, 400m of Type 5 and 400m of Type 6 Conditions will be deemed to have been encountered
25 3. Actual Measured Tunnel Lengths based on metres of rock conditions as measured on a daily basis during tunnel boring
26 4. Actual Measrued Overall TBM Bored Tunnel Length shall be the as-built length as measured by survey
27 5. All Contract Unit Rates include cavity grouting

Appendix 1.1(k)

Appendix 1.1(k) - Contract Schedule

Start Date:	Start Date
Substantial Completion Date:	October 9, 2009
Final Completion Dated:	December 8, 2009

Appendix 1.1(r)

Appendix 1.1(r) - PRELIMINARY DESIGN AND CONSTRUCTION APPROACH

[See attached]

Design and construction methodologies and parameters relating to the initial tunnel rock support presented in this Appendix 1.1 (r) were prepared for proposal purposes by the Contractor and are for informational purposes only. The inclusion of these methodologies and parameters shall not imply any acceptance by OPG of the initial tunnel rock support.

Results of analyses presented in this Appendix 1.1 (r) were prepared for proposal purposes by the Contractor and are included for informational purposes only. The inclusion of these results shall not imply any acceptance by OPG of these results. OPG may require additional analyses to support completion of the 100% design and construction drawings.

EE/jd

Ontario Power Corporation Inc.
(OPG)

Niagara Tunnel Facility Project

Proposal No.: Tunnel Facility Project-001

Document: MH-3001-00

Design Basis and Method Statements for Design and Construction of Intake Approach and Accelerating Walls

May 11, 2005
Project No.: 1051006.00

MORRISON HERSHFIELD

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1.0 GENERAL

1.1 PROJECT OVERVIEW

The proposed Niagara Tunnel Facility aims to convey an inflow of about 500 m^3/s from the Niagara River to the Ontario Power Generation power canal system. This new additional system shall be capable of directing the desired flow under all operating conditions and subject to the specified environmental restraints.

This document shall be read in conjunction with the document titled "Structural Design Analysis" for the two structural component covered by this document, namely the intake approach wall and the accelerating wall.

1.2 DEFINITION OF SYSTEM

The proposed project, layout of which is given in Concept Drawings provided by OPG, will consist of the following key component structures:

(a) Intake Channel and Approach Wall
(b) Accelerating Wall
(c) Intake Structure
(d) Diversion Tunnel
(e) Dewatering Station and associated work
(f) Outlet Structure

1.3 SCOPE

This Draft Design Basis and Method Statements document is for the specific elements (a) and (b), namely the Intake Approach Wall and the Accelerating Wall only.

This document covers the main aspects for design and construction of these structures including the following:

- Preliminary layout of works
- Design approach
- Codes and standards
- Outline specifications
- Construction techniques
- Layout of construction equipment to install the walls
- Sequencing of the work

The Design Basis and Method Statements for the remaining elements of the Niagara Tunnel Facility Project will be addressed by other relevant documents elsewhere in the Proposal submission.

2.0 INTERFACING SYSTEM

The Intake Approach and Accelerating Walls are to interface with and connect to existing structures and facilities as a part of the intake system structures. The Intake Approach Wall and the Accelerating Wall are to be joined to the designated piers of the INCW with minor modification and extension of the structure. The Intake Approach Wall shall be blended into the existing SAB2 intake wall.

The Intake Structure and Outlet Structure will provide control for the water flow between the diversion tunnel and the existing power canal.

Service gates will be located in the Intake and Outlet Structures for dewatering the diversion tunnel.

3.0 FUNCTIONAL REQUIREMENTS

3.1 FUNCTIONAL OBJECTIVES

The Intake Approach and Accelerating Walls shall be capable of directing smoothly continuous supply of water to the Intake Structure to meet the designed flow, while meeting the specified hydraulic and environmental requirements under all operational conditions.

3.2. DAM SAFETY REQUIREMENTS

The structures shall be capable of retaining the stored volume and to pass flows around and through the structure in a controlled manner.

There could be a number of modes of failure of the wall but the probability of such is extremely remote if properly designed. It is expected that failure, if occurring, should be limited to minor displacement or tilting of walls at which instance it could be easily detected and remedied accordingly. The need to close the tunnel in those situations is highly unlikely.

The potential hazard resulting from failure of the Intake Approach and Accelerating Walls appears to be very low as it is unlikely that there is any loss of life resulting from its failure and that the economic value of other losses will also be minimal outside the loss of power generation.

4.0 PERFORMANCE REQUIREMENTS

4.1 LAYOUT DESIGN

The layout design shall:

1. Direct the prescribed quantity of water (about 500 m^3/s) drawn from the Niagara River to the existing power canal system under operating conditions, with minimum head loss and high structural reliability;

2. Ensure an uninterrupted flow of water under all adverse climatic and environmental conditions (i.e. shall provide satisfactory performance for both open water and ice conditions),
3. Satisfy all conditions imposed by the hydraulic, environmental, operational and economic requirements;
4. Consider all safety requirements,
5. Allow provisions for periodic inspection, maintenance and ease of repair or even replacement of structural modules under operating conditions if necessary,
6. Allow construction of the structures, within the limit of the scheduled construction period, in a logical sequence,
7. Permit suitable means of foundation preparation with minimum time required for underwater and in-river operations,
8. Take into account the restrictions on marine construction scheduling as imposed by the Ministry of Environment (MOE).

4.2 DESIGN AND SERVICE LIFE

The tunnel lining system, intake structure and outlet structure shall be designed for a service life of 90 years. Other elements, such as the accelerating wall, approach wall and the intake channel, which are not specifically required to be designed for a 90-year service life, shall be designed to applicable and appropriate codes, guidelines and standards that are commensurate with their intended purpose.

5.0 SAFETY REQUIREMENTS

5.1 STRUCTURAL INTEGRITY

The structure shall be designed in accordance with the Codes and Standards listed in Section 14.0 to ensure adequate structural integrity and safety for all the conditions under which the system is intended to function.

5.2 INDUSTRIAL SAFETY

During underwater construction, in-service inspection and maintenance of the structures, safety of the divers or personnel shall be ensured. The diving operation shall be conducted in a safe manner according to CSA Z275.2.

The layout design of the structures shall take into account the safety of the operating and maintenance personnel.

5.2 SAFETY BY DESIGN

Improving the safety environment of the construction site will reduce worker injuries and save time and cost. But, safety practices alone are not enough to reduce accidents because they are unable to remove hazards inherent in a facility's design or required construction sequences.

Safety measures considered and incorporated in the schematic and design development phase will have direct impact to improve the safety environment of construction workers on the job site. Many designer decisions could also impact the safety of end users, maintenance and repair workers.

In addition to reduction of construction worker injuries and associated costs, pre-project safety planning is also important to implement design features to reduce re-design, rebuild, maintenance, and operating costs.

A safety analysis conducted during design phase is an effective means of identifying unnecessary hazards in the project design. Many of these hazards may be "designed out" through the use of alternative components, systems, or construction methods. Design suggestions will be used to control or to eliminate the hazards.

A computerized design aid may be used to conduct a comprehensive and systematic construction safety analysis during the design phases of the project. The following should be investigated:

1. identification of construction hazard
2. summarize and prioritize hazards
3. investigate lessons learnt and design solutions
4. document project hazard related decisions
5. report on hazard tracking, owner acceptance and residual risk

It is also important to utilize a management tool to ensure comprehensive design team involvement.

As the design proceeds, the contractor and specialist contractors will be included in the design process to ensure that due consideration for constructability, especially for in-water works, will be made in the design and detailing of the work. The input from the contractors will also enable any construction in the water to be carried out safely and will comply with the best and most up-to-date construction practice for these works. The design will be completed through an iterative process that includes these parties.

6.0 STRUCTURAL REQUIREMENTS

6.1 LOADS

The structure shall be designed to withstand all temporary, permanent, construction, environmental, normal, unusual and extreme loads, in all possible combinations.

All structural components shall have adequate capacity to safely sustain the prescribed design loads.

6.1.1 Design Loads

The types of loads for which the structures are to be designed include the following:

(a) Dead Loads (D)
All permanent masses of the structural components, all permanent construction materials, including the permanently located attachments and equipment systems, if any.

(b) Operating Water Pressures (H)
The external water pressure exerted by water above ground is governed by the specified maximum water levels. When used as stabilizing force acting on the structure in a stability analysis, these forces must be conservatively estimated.

(c) Design Flood (F)
The water level under inflow flood scenario varies between the 200-year flood and the Probable Maximum Flood (PMF) as prescribed in the OPG Invitation document.

(d) Hydrostatic Uplift (U)
Uplift pressure exists through cross section within the wall structure, at the interface between the wall structure and the foundation, and within the foundation below the base.

(e) Soil and Silt Pressures (S)
Earth pressures against the structure may occur where backfill is deposited in the exaction. However, it was stipulated by OPG that Passive pressure due to backfill shall not be considered. Silt pressures are considered in the design if suspended sediment measurements indicate that such pressures are expected.

(f) Wind Load (W)
Wind loads applicable at the site location should be computed based on a sufficient low probability factor. For construction design condition (e.g. prior to backfill), wind pressure acting on the structure may be based on a higher probability factor. Usually, wind load is not a governing factor for massive concrete structures.

(g) Ice Load (I)
The structure is to be designed to withstand the forces generated by ice movement against it. Ice forces may include dynamic loads generated by ice floes striking the structure, and static loads generated by thermal expansion or contraction of the ice and by fluctuations in the water levels.
The magnitude of thermal ice load is governed by a number of controlling factors such as ice thickness, shoreline confinement, water velocity, water level fluctuation, rate of temperature rise, etc.

(h) Seismic Loads (E)
The earthquake loadings used in the design of the structure are based on design earthquakes and associated ground motion parameters determined from seismological evaluation for the specific site. Where site specific study has not been conducted, seismic zone maps of the National Building Code proposed for the 2005 revision are to be used.

Two levels of seismic loads are usually considered for the design: (a) the Maximum Design Earthquake (MDE) having an extremely low probability of annual exceedence, and (b) the

Operating Basis Earthquake (OBE) used in conjunction with ice loading and having a probability of annual exceedence of 1 in 200.

(i) Hydrodynamic Loading (H_D)
Hydrodynamic loading includes the effects of the maximum transient heads in the tunnel during the gate closure. Loads due to water hammer shall be provided by a hydraulic study. Unlike the Intake Structure and the Outlet Structure, the Intake Approach and Accelerating Walls are not subject to such dynamic transient loads.

(j) Construction Loads (C)
Construction lifting loads shall be dead weights in air or under water plus 50% for impact allowance during handling, lowering, barging, launching and controlled sinking operations of the precast modules. Construction loads due to mobile or tower cranes will also be considered where appropriate.

(k) Other Loads
In general, loads induced by other factors such as temperature are not significant in mass concrete gravity structures. Hence, these may only be considered where deemed necessary.

6.1.2 Load Combinations

All combinations of loads that may act simultaneously during construction, normal plant operation or abnormal environmental conditions shall be considered.

The loading conditions considered in concrete structure designs and overall structural stability analysis shall include but not limited to the following:

1. Loading Case No. 1 – normal loading condition – Construction
   Any combination of loads that may act simultaneously during the construction period, including lifting and handling loads, crane loads for construction activities, etc.
2. Loading Case No. 2 – normal loading condition – Summer Operating
   Any combination of loads that may act simultaneously during normal operation.
3. Loading Case No. 3 – normal loading condition – Ice Load
   Any combination of loads that may act simultaneously due to ice loading effects on the structural components.
4. Loading Case No. 4 – normal loading condition – De-watering
   Any combination of loads that may act simultaneously during planned dewatering or emergency shutdowns of the tunnel facilities.
5. Loading Case No. 5 – unusual loading condition – IDF[1]
   Any combination of loads that may act simultaneously during a 200-year flood.
6. Loading Case No. 6 - extreme loading condition – PMF[2]
   Any combination of loads that may act simultaneously during this extreme environmental event which has a low probability occurrence.

---

[1] IDF = Inflow Design Flood

7. Loading Case No. 7 – extreme loading condition – MDE[3]
   The Intake Approach and Accelerating Walls, being a conventional structure (i.e. not dam safety related), shall be designed to satisfy the requirements stipulated in the National Building Code of Canada.
8. Loading Case No. 8 – extreme loading condition – Ice Load and OBE[4]
   Any combination of loads that may act simultaneously in an unlikely event that an earth tremor occurs during peak winter season. As the probability of the combination of these two environmental events occurring simultaneously is low, the earthquake load is decreased appropriately.

The most critical design condition for various loading cases shall be assumed.

6.2 DESIGN CRITERIA

6.2.1 Stability Requirement

Sliding stability of the structures shall be verified by limit equilibrium method using un-factored loads. The computed factors of safety against sliding, and resulting stresses along any critical sections within the structure or at the base shall not exceed the minimum acceptable factors of safety and allowable working stresses specified for the normal, unusual and extreme load combinations.

6.2.2 Required Strength

The reinforced concrete hydraulic structures shall be designed in accordance with the Strength Design Method. The structural members will have a required strength to resist design loads and the factored load combinations specified in Sub-Section 6.1.1 and 6.1.2.

The load factors as prescribed in CSA A23.3 shall be applied and the total factored design load shall be increased by the hydraulic factor $H_f = 1.3$. The hydraulic factor is used to improve crack control for massive hydraulic structures which usually are lightly reinforced.

The hydraulic factor is not applicable for sliding or overturning stability analysis.

6.2.3 Design Strength

The strength of a structure or individual member must exceed the demand (required strength) for all foreseeable loads without failure or significant distress. The nominal strength must be reduced by a resistance factor to account for the variability in the strength. For this purpose, the resistance factors prescribed in CSA A23.3-94 shall be applied.

---

[2] PMF = Probable Maximum Flood

[3] MDE = Maximum Design Earthquake

[4] OBE = Operating Basis Earthquake

6.2.4 Serviceability Requirement

An adequate uninterrupted supply of water to the intake tunnel must be assured. Structural members shall be proportioned to minimize deflection limit and the foundation will be designed and constructed with adequate measures to minimize possible settlement.

7.0 DESIGN CONSTRAINTS

The location, dimensional geometry, and transitional shape of the Intake Approach and Accelerating Wall systems are fixed as defined on the Concept Drawings. Extension of the respective INCW piers to connect these two walls will be adjusted during the final design stage as determined by the final tunnel configuration and other more accurate survey data at the site.

For design purpose, OPG stipulated the following limitations:

1. Passive pressure due to backfill shall not be considered.
2. Cohesion at the concrete rock interface shall not be assumed.
3. Rock anchors shall not be used to provide the required stability of gravity structures.

8.0 DESCRIPTION OF TYPE OF STRUCTURES

The Intake Channel, and Approach and Accelerating Walls are positioned upstream of the INCW Structure. The dimensional geometry, alignment, and top elevations of these walls are fixed as defined in the Concept Drawings provided by OPG.

The Intake Approach and Accelerating Walls shall be mainly composed of a series of structurally independent reinforced concrete modules, filled with rock-fill materials and capped with concrete cover slab. Transitional sections to the existing INCW Structure and to the gravity wall of the existing tunnel no. 2 shall be cast-in-place concrete wall sections.

The precast concrete modules shall be designed to have vertical keys for interlocking with adjacent modules to improve retaining back-fill materials and overall lateral stability.

These precast wall units shall be arranged in such an alignment to form a smooth surface to direct the flow of water into the Intake Structure.

9.0 CONSTRUCTABILITY REQUIREMENTS

9.1 CONSTRUCTION METHODS

The effects of construction sequence and methods shall be considered including the following:

1. Application of conventional design and construction methods, if all possible, shall be considered.
2. The effects of special construction material handling methods and equipment including floatation assistance systems, large capacity crane, etc. shall be evaluated.

3. The effects on the structural system due to the maximum variance in degree of levelling of foundation pads shall be taken into account in the design.
4. The timing and method employed for demolition of the existing accelerating wall and disposal of materials shall be carefully considered to minimize environmental impact and off-site disposal.
5. During the design process the contractors and key subconstractors will be involved on an on-going basis to ensure that designs are developed that are practical, constructable and meeting standards. Worker safety will also be a key design consideration.
6. Marine construction period should be kept to a practical minimum in accordance with the restrictions on the marine construction scheduling imposed by MOE.
7. Construction activities at the Intake Channel, and the Approach and Accelerating Walls must not hinder the efficient movement of ice in the vicinity of the INCW.
8. The cofferdam arrangement shall be designed to minimize the interference into Bay 2 of the INCW.
9. Blasting where needed shall be controlled to ensure that the rock beyond the excavation limits is not damaged or de-stabilized by the blasting operation. Blasting velocities shall be carefully monitored to ensure operation of existing equipment will not be affected.
10. Most importantly, the integrity of the foundation of the INCW structure must be fully secured during the blasting activities for the Intake Channel, as well as for the excavation associated with the construction of the Intake Structure and the extension of Piers 1, 2 and 5.

9.2 CONDITION SURVEYS

Through careful planning and use of proper construction techniques, the impact on existing structures and systems by the performance of the construction work should be minimal.

For verify the impact with specific data, condition surveys of existing structures in the near vicinity of the construction sites will be conducted before and after the construction work is complete. These condition surveys will be undertaken by independent qualified consultants employed by OPG.

Adjustment of construction methods may be necessary upon review of some preliminary condition survey reports.

9.3 HYDROGRAPHIC SURVEYS

The preliminary design of the walls is based on lakebed survey results or as shown on drawings provided by OPG. To permit detailed design to proceed, an accurate measurement of the lakebed at suitably close intervals must be carried out. The information provided from dipping or sonar measurements should enable the engineer to ascertain the actual lake bottom along the alignments of the walls. By this the cement sandbag padding requirements as well as the sizes of the precast wall elements can be finalized and any alteration or customization could be made to the concrete blocks prior to them being manufactured, and the engineer and the contractor could act accordingly.

10.0 MAINTAINABILITY REQUIREMENTS

The targets stipulated for these structures will ensure that the maintenance requirements are reduced to the practical minimum.

The layout design shall ensure suitable means of access for personnel and materials for the purpose of efficient operation, maintenance and inspection.

11.0 CONCRETE CONSTRUCTION

The concrete material to be used for the construction of these structures shall be in accordance with the appropriate specification, standards and manuals listed in Sub-Section 12.1 and 12.2.

All concrete is to have the specified 28 days compression strength, water cementing material ratio, and air content in accordance with the requirements of CSA Standard A23.1-00.

11.1 DURABILITY REQUIREMENTS

Concrete in water passage shall be designed to be resistant to the abrasive action of water flow, entrained ice and debris. Hence, concrete with low water/cementitious materials ratio and having adequate strength shall be used.

Based on information provided, it is understood that concrete made with a cement that provides sulphate resistance is only required for the annular grout and reinforced concrete lining, but not these concrete structures.

11.2 CONSTRUCTION TECHNIQUES AND EQUIPMENT

Construction of the walls will generally include the padding of the lakebed and level the placement areas with cement stabilized sandbag, which may involve the use of divers. After confirmation of the stability and accuracy of the padding layer the first layer of precast wall units will be installed. The bottom of the wall, including the void within the padding sandbags will be filled with mass concrete infill to the level shown on the drawings. The remaining layer(s) of the wall will then be installed and rockfill placed inside the voids in the wall, and reinforced concrete capping will be installed. It is expected that construction using barges (in-water activities) and cranes (land activities) will be required to construct the various components of the walls. Where barge is used, appropriate docking and storage facilities should be constructed at the site, and all extra loadings arising from such shall be included in the design of the walls if an impact is identified.

There are areas along the walls where mass concrete infill will be required, primarily to stabilize the bottom of the wall and the sandbag base on which the precast units will be installed.

Prior to the placement of mass concrete in-fill, the area shall be cleaned of silt and debris.

When the mass concrete in-fill area cannot be kept water free, procedures for underwater concreting shall be established to include concrete mix design, appropriate admixtures,

placement schemes, inspection plan, and concrete sampling plan to ensure concrete placed is competent. When the concrete surface has been brought above the water line, all the laitance must be removed from the surface of the concrete before normal concrete placing continues.

For constructing extension of concrete structural elements, the surfaces of the existing component shall be thoroughly scaled. And, prior to placement of new concrete, the concrete surfaces shall first be cleaned by sandblasting, followed by an air-water jet to remove all loose and adhering contaminants to ensure full bonding will be achieved.

During construction the contractor shall adhere to all environmental requirements as stated elsewhere in the contract, and comply with necessary restrictions that may be in place for working near a tourist site. Any area disturbed by construction operations shall be reinstated properly as shown on the drawing, as directed by OPG, or to the pre-construction conditions.

12.0 CODES AND STANDARDS

12.1 CODES, REGULATIONS AND LAWS

The requirements of the following codes, regulations and laws shall be referred to, where applicable:

1. National Building Code of Canada (1995)
2. The Building Code of Ontario (1997)
3. CSA Standard CAN3-A23.3-94: Design of Concrete Structures
4. Lakes and Rivers Improvement Act, Government of Ontario (1986)
5. Dam Safety Regulation under the Lakes and Rivers Improvement Act (Proposed Draft), Ministry of Natural Resources (November 2001)

12.2 OPG SPECIFICATIONS, STANDARDS AND MANUALS

The structure shall be designed and constructed in accordance with the following standards and specifications:

1. Niagara Tunnel Facility Project - Invitation to submit Design/Build Proposals, Ontario Power Generation (Amendment 1, February 2005)
2. Dam Safety Guidelines, Canadian Dam Association (January 1999)
3. Guidelines and Criteria for Approval under the Lakes and Rivers Improvement Act, Ministry of Natural Resources (Draft, May 1997)
4. CSA Standard CAN3-A23.1-94: Concrete Materials and Method of Concrete Construction
5. CSA Standard CAN3-A23.2-94: Methods of Test for Concrete
6. USACE EM1110-2-2000: Standard Practice for Concrete for Civil Works Structures, US Army Corps of Engineers (March 2001)
7. USACE EM1110-2-2104: Strength Design for Reinforced Concrete Hydraulic Structures, US Army Corps of Engineers (August 2003)

8. USACE EM1110-2-2200: Engineering and Design – Gravity Dam Design, US Army Corps of Engineers (June 1995)
9. USACE EM1110-2-2502: Engineering and Design – Retaining and Flood Walls, US Army Corps of Engineers (September 1989)
10. US Bureau of Reclamation Handbook – Design of Gravity Dams, US Bureau of Reclamation (1976)

13.0 PRELIMINARY DESIGN DESCRIPTION

13.1 GENERAL

The Intake Approach and Accelerating Walls have been developed based on the precast reinforced concrete modular system concept. For each module, the basic structural system is an open rectangular box structure. The size of these units is determined mainly based on practical and economical limitations related to transportation requirements. Specifically, the governing factors are the maximum width and gross weight of each modular unit.

The respective wall will be constructed by stacking up either two or three units. The stacked modules are to be filled with rock-fill materials and subsequently fully covered with a concrete slab on the top of the wall.

13.2 FABRICATION

The Intake Approach and Accelerating Wall concrete modules shall be prefabricated under controlled environment in the dry.

13.3 FOUNDATION PREPARATION

The overburden at the Intake Approach and Accelerating Wall foundation location shall be excavated to ensure all loose materials are removed to the exposed rock level.

13.4 PLACEMENT OF SUPPORT PAD

Cemented sand bags used for the supporting pad shall be placed in such a manner that the allowable degree of levelling will be achieved. The variation in the top surface elevation for adjoining interlocking modules shall be less than 40 mm. The maximum relative elevation difference in the finished top surface of the entire wall shall be less than 150 mm.

13.5 ROCK-FILL

Rock-fill materials to be placed within the precast concrete modular units shall consist of clean rock fragments and shall be free from organic materials.

Rock-fill shall be uniformly graded in size up to a maximum size appropriate for this application.

13.6 CONCRETE COVER SLAB

The Intake Approach and Accelerating Walls shall be fully covered with a concrete slab. These cover slabs may be cast-in-place or precast units.

13.7 BACK-FILL

Back-fill materials behind the Intake Approach Wall shall be clean rock fragments and shall be free-draining. No back-fill shall be placed behind any concrete modular unit until it is fully rock-filled first.

Back-fill to form the final prescribed slope shall be placed only after the concrete cover slab is well in place.

14.0 DESIGN ANALYSIS

14.1 CODES, STANDARDS AND SPECIFICATIONS

The Intake Approach and Accelerating Walls will be designed in compliance with the codes, standards and specifications listed in Section 12.

14.2 DESIGN METHODS AND PROCEDURES

The structural systems will be designed by using recognized methods and procedures, which include the established and coded computer software in performing the structural analysis as appropriate for the design.

14.3 STABILITY ANALYSIS

Stability is evaluated in a manner similar to a conventional gravity retaining wall. For stability calculations the interlocking precast concrete modular system is assumed to behave as a coherent block. The system must be stable against sliding along the base of the structure, overturning about the toe of the wall, and bearing capacity failure of the foundation.

15.0 INTAKE CHANNEL

15.1 EXCAVATION

The excavation of the sides of the Intake Channel shall be done by employing line-drilled and controlled blasting to ensure that the surrounding rock beyond the excavation limits is not damaged or de-stabilized. Any rock outside the requisite excavation lines which may be damaged by the construction works shall be removed and backfilled with sound concrete sufficiently anchored back to integral solid rock.

Excavation of the Intake Channel shall be done in two stages. The first stage consists of excavation of the two shallow approach sections in the wet up to designated elevation. The second and final stage will be done in the dry condition provided by a cofferdam.

For the deep excavation area, multiple grout curtains will likely be required to ensure that the area is sufficiently dry throughout the period of excavation and construction of the Intake Structure. If found necessary, rock anchors may be installed to assure no detrimental effects on the rock foundation of the INCW Structure will occur.

15.2 EFFECTS ON INCW STRUCTURE AND SYSTEMS

Excavation by blasting at close proximity of the INCW Structure shall be carefully planned and close control shall be exercised to ensure that the integrity of the control structure and its foundation will be maintained.

In general, ground vibration from construction sources such as blasting will depend on the blasting method and the seismic propagation characteristics of the site. Vibration-induced damage thresholds are usually expressed in terms of peak particle displacement, velocity or acceleration, and sometimes include a frequency-dependent factor.

It is most usual for peak particle velocity to be used, because it has been found to be the best correlated with case history data of damage occurrence and because it has a theoretical underpinned inasmuch as the strain induced in the ground is proportional to the particle velocity.

For this reason, strategically located measurements will be made to monitor the vibration level on the existing structures. The recorded data will be assessed against appropriate vibration damage thresholds to be established by expert judgement based on specific site knowledge and previous case history data.

If necessary, trial blasts should be carried out where initial desk studies show that nearby structures could be at risk or that the sensitivity of system is high. The trials should be designed with a clear concern for the factors that will influence the induced peak particle velocity during the excavation works.

16.0 DEMOLITION OF EXISTING ACCELERATING WALL

16.1 REFERENCE DRAWINGS

Typical details of the existing Accelerating Wall which is to be demolished and removed are shown in reference drawings provided by OPG.

Field survey and inspection of the existing conditions to verify all details and dimensions will be conducted prior to execution of the demolition work.

16.2 Demolition Sequence

Means and methods used in demolition of the existing timber-cribbed Accelerating Wall shall be such as to minimize impact on the operation of the INCW. All in-river activities shall meet all the environmental requirements and safety program established by OPG.

Demolition of the timber-cribbed structure shall be undertaken section by section starting from the far end working towards the INCW structure.

For each section, demolition will begin with breaking and removing the concrete cover slab. After rock-fill is removed to designated level or as agreed by the engineer, the timber cribs will be saw cut across the mid height. The top half will then be lifted and removed. The same procedure is followed for removing the bottom half. Throughout the removal process the timber crib wall must be stabilized by rockfill against being washed away in the current. All remaining rockfill left after the timber is removed shall also be picked up immediately.

16.3 DISPOSAL

All structural materials of the existing Accelerating Wall shall be removed from the Niagara River and disposed to sites approved by OPG. Rock fill materials of good qualities may be re-used for construction of the new Accelerating Wall subject to approval by OPG.

17.0 SEQUENCING OF WORK

The recommended sequences of construction as presently envisage are as follows:

1. The existing Accelerating Wall is removed.
2. The new Accelerating Wall is constructed.
3. Part of the east Intake Approach Wall is constructed.
4. Concurrently with the above activities, excavation of the two shallow sections of the Intake Channel is carried out in the wet.
5. After the completion of the new Accelerating Wall, a cofferdam is installed at the location where the last deep section of the Intake Channel is to be excavated. An ice protection groyne is constructed.
6. The excavation of the last deep section of the Intake Channel is done in the dry, followed by the construction of the extension of the INCW pier 1 and 2.
7. Part of the west Approach Wall is constructed in the dry.
8. After the sectional service gates for the Intake are in place and with balanced water pressure on each side of the cofferdam, the groyne and the cofferdam are removed.
9. The construction of the Intake Approach Wall is complete with backfill to the desired level and slope defined.

The above construction sequencing is feasible given the information and preliminary requirements known to-date. The Contractor shall verify all details and dimensions of the existing site, adjacent structures prior to execution of the site work. If during the course of work, existing conditions are found to deviate from those assumed for design, the engineering consultants shall be notified. Additional analysis or alternate design may be necessary before proceeding further with the work.

Ontario Power Corporation Inc.
(OPG)

Niagara Tunnel Facility Project

Proposal No.: Tunnel Facility Project-001

Document: MH-3002-00

Drafting Design and Method Statements for Temporary Construction Facilities at the Intake and Outlet Areas

May 11, 2005
Project No.: 1051006.00

MORRISON HERSHFIELD

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1.0 GENERAL

1.1 PROJECT OVERVIEW

The proposed Niagara Tunnel Facility aims to convey an inflow of about 500 m^3/s from the Niagara River to the Ontario Power Generation power canal system. These associated works will provide the necessary infrastructure to support the construction of the tunnel and access shafts, the intake structure, outlet structure and other associated works.

1.2 GENERAL DEFINITION OF CIVIL REQUIREMENT

The proposed project, layout of which is given in Concept Drawings provided by OPG. The civil components of this project covered under this document consist of the following:

1. Temporary Facilities, including all Laydown Areas;
2. Roads and Parking Areas;
3. Fencing and gates; and
4. Stockpiles.

This document will also cover the following work components as they are not covered in other sections of this proposal:

5. Demolition and disposal of the Dewatering Structure at the Pump Generation Station (PGS); and
6. Relocation of the waterline as a result of the removal of the dewatering structure.

1.3 SCOPE

ThiS Design Basis and Method Statements document is for the above-named work components for the contractor's works areas, the Intake and Outlet construction staging areas as well as the final stockpile area. Also covered is the works related to the removal of the dewatering structure outside the PGS.

The following aspects of design and construction will be covered

1. Layout of works;
2. Design Approach;
3. Codes and standards; and
4. Outline specifications

2.0 FUNCTIONAL REQUIREMENTS

2.1 GENERAL

The following is a summary of the various elements of the civil and miscellaneous works for the construction staging areas at the intake and outlet structures.

2.1.1 Temporary Facilities

At the intake a construction laydown area will be placed to the south of Niagara Parkway. This facility will be used in conjunction with all associated works at the intake.

At the outlet the construction offices will be located adjacent north south portion of the temporary access road. This site will be fully serviced by temporary utilities from Stanley Avenue. In addition Material Yards will be placed throughout the site within designated areas and will be fully accessible. All areas to be used as works areas or storage will be entirely within the properties of OPG. Areas identified as reserve areas or within prohibited zones (such as those under the overhead power lines) will remain untouched and protected.

2.1.2 Roads and Parking Areas

At the intake site a temporary roadway is being constructed to allow access to the site from Portage Road to the construction laydown area and across Niagara Parkway to the construction area at the intake and will eliminate any need for construction traffic to utilize Niagara Parkway.

At the outlet site a new permanent paved access road is being construction form Stanley Avenue that could be used to service the works area at the part of the site. However only approximately 180 m of this road will be built and will remain in-place until past the end of construction of this project. Beyond the limit of this pave road a temporary roadway is to be constructed to provide access to the material stockpiling area and all areas at the outlet location.

Parking at location near site offices will be provided, as shown on drawings MH-6008 and MH-6009, including potential areas that may be expanded to be used for this purpose. These areas may or may not be paved.

Relocation of recreation trails at the intake areas will be completed also as per drawing no. MH-6008.

2.1.3 Fencing

Fencing will be chain link for all construction and any other areas to eliminate interference between the public and the construction activity.

Hoardings will be placed at locations designated as being close to pedestrians primarily along the Niagara Parkway, as shown on drawing MH-6008.

2.1.4 Stockpiles

During the excavation of the tunnel approximately 2.0 million cubic metres of material will be stockpiled between the two power canals as shown on MH-6009. These stockpiles will be

approximately 5 to 6m in height with 1 (vertical) to 2.5 (horizontal) side slopes and with the top surface level and graded.

According to the Draft Design/Build Agreement and Concept Drawings, specifications for the excavated material potentially contaminated with BTEX are provided. This material is to be placed on a temporary storage pad until chemical testing is completed to determine how this material is to be managed. The temporary storage pad is located in the northeast corner of the main disposal area. Accordingly, runoff in this area will be sent to the retention pond and treated after sampling, if required. The Draft Design/Build Agreement further states the height, compaction, drainage, setback and slope requirements. However, OPG's "Management of Excavated Material" dated December 2004 and OPG's "Management Plan for BTEX" dated December 2004, provides more detail for the permanent and temporary stockpiling of specific rock formations. In particular, the Draft Design/Build Agreement requires a temporary storage area for material potentially contaminated with BTEX and the "Management of excavated Material" requires that the material potentially contaminated with BTEX be permanently stored without temporary storage requirements.

2.1.5 Demolition of Dewatering Structure at Pump Generation Station

As part of the project the Contractor will remove the existing reinforced concrete structure located at the PGS canal including all equipment associated with the gate. The removal of the structure will open up the channel cross section and will increase the flow capacity of the channel to accommodate the additional water brought through the new tunnel. Information regarding the existing dewatering structure include as-built drawings, are provided by OPG.

2.1.6 Relocation of the Waterline

An existing waterline currently crosses the PGS Canal via the dewatering structure, and mounted on the deck surface of the structure. Due to removal of the structure, the waterline has to be re-routed along the west bank of the canal and cross the canal via the road outside the PGS, and reconnected to the section of the waterline on the east bank of the canal. An alternate solution of installing a utility bridge will be considered and evaluated along with the OPG staff to develop the most cost effective and constructable solution.

As the waterline is owned by OPG, discussion with OPG has to be carried out to ensure that any supply disruption, timing of the disruption, temporary cut-off and reconnect arrangements, work inspection and the like are to be conducted properly and with sufficient advance notice.

3.0 REQUIREMENTS

3.1 GENERAL

The following is a detailed summary of the requirements that guided the development of the design of the temporary facilities.

3.1.1 Layout Design

The layout design shall:

1. Provide safe and reliable access to each of the intake and outlet construction staging areas, with proper intersection layout with main public roads and highways.
2. Ensure a safe and reliable stockpiling area for all excavated materials from the tunnel.
3. Ensure that all environmental protection requirements are complied with such as during clearing and tree removal, and that no deleterious materials are introduced into the water and subsoil systems.
4. Take into account all restrictions placed on the excavated materials and ensure compliance with all agree to regulatory measures.
5. Consider all safety and security requirements, including those to trespassers.
6. Allow provisions for periodic inspection, maintenance and ease of repair or even replacement of any of the temporary works if necessary.
7. Allow construction of all temporary works within the limit of the scheduled construction period, in a logical sequence and prior to the core works.
8. Actively involves the contractor throughout the design process to ensure that all their requirements, such as sufficiency of areas, construction production rates, and the like, are duly addressed and updated from time to time.

4.0 CONSTRUCTION RELATED ISSUES

4.1 CONSTRUCTABILITY AND CONSTRUCTION METHODS

The effects of construction sequence and methods shall be considered including the following:

1. Application of conventional design and construction methods, if all possible, shall be considered.
2. Movement off all construction and excavated materials shall ensure the necessary containment and mitigation of any contamination of the existing ground and the canal system and shall be in compliance with the Environmental Management Plan.
3. Tire washing facilities, noise abating devices, properly painted hoarding, and the like, should be in place to avoid any adverse impact to the neighbouring road, residents and visitors.
4. The removal of the dewatering structure requires significant planning and coordination with OPG staff, and observing all the environmental requirements of working in the water. The need to remove construction debris from the canal would probably dictate the use of specialized equipment that would generate as little small fragment of construction debris as possible.

4.2 CONSTRUCTION EQUIPMENT

Only conventional construction equipment are expected to be used in all civil engineering works, except due consideration of the environmental protection should be made when removing the dewatering structure. Collecting device may be considered in the deck removal to minimize contamination of the water resulting from the demolition work, and the intention is to have large block of the structure removed and lifted off instead of fine breaking processes.

The use of barge stationed in the canal as a working platform will be considered, and discussion will be held with OPG to ensure all issues are resolved if this method is to be adopted.

5.0 MAINTAINABILITY REQUIREMENTS

Most civil works are required to be in place and function throughout the entire construction period and therefore must be properly maintained. The targets for all works will ensure that the maintenance requirements are reduced to the practical minimum. The layout design shall ensure suitable means of access for personnel and materials for the purpose of efficient operation, maintenance and inspection of all works.

6.0 CODES AND STANDARDS

6.1 GENERAL

The following is a detailed summary of the regulations and laws that govern the design development and the commitment to the safety.

6.1.1 Codes, Regulations and Laws

The requirements of the following codes, regulations and laws shall be referred to, where applicable:

1. OPSS (Ontario Provincial Standard Specifications)
2. CSA Standard Z107.0-00 (Standard for Certification of Noise Barriers February 2000)
3. CAN/CSA-S6-00 (Canadian Highway Bridge Code)
4. Other CAN standards, see applicable specifications included
5. Other CSA Standards, see applicable specifications included

6.1.2 OPG Specifications, Standards and Manuals

The shall be designed and constructed in accordance with the following standards and specifications:

1. Niagara Tunnel Facility Project - Invitation to submit Design/Build Proposals, Ontario Power Generation (Amendment 1, February 2005)
2. Ontario Provincial Standard Drawings (OPSD)

6.1.3 Conditions of Approval

Generally, during design, construction and post-construction activities, the Contractor shall work in a manner that protects health and the environment and in compliance with the following:

1. The requirements of the Niagara River Hydroelectric Development Environmental Assessment, dated March 1991 including update of July 13, 1992 and amendment dated June 3, 1993;

2. The requirements of the Environmental Assessment Approval, dated October, 14, 1998;
3. The requirements of Approvals obtained by OPG;
4. The requirements of the Environmental Approvals and Third Party Information, dated March 2005;
5. The requirements of Approvals to be obtained by OPG or the Contractor;
6. The requirements of the Draft Design/Build Agreement;
7. The requirements of the Community Impact Agreement, dated December 22, 1993;
8. This Environmental Management Plan;
9. Plans submitted to OPG as outlined in this document and Draft Design/Build Agreement;
10. Applicable statutes, laws and regulations;
11. OPG's Environmental Management System; and,
12. The requirements of federal, provincial and municipal agencies.

In order to meet all of the environmental requirements for the Project, as outlined above, compliance plan has been developed. This plan provides the specific procedures that will be completed during all phases of the Project to ensure compliance with the Draft Design/Build Agreement, Community Impact Agreement, Environmental Assessment, applicable laws, regulations and guidelines, approvals, agency requirements and applicable Project documentation. To effectively document and explain the compliance procedures, this section has been divided into the three phases of the Project: design, construction and post-construction. The compliance plan utilizes procedures such as environmental audits, risk management analysis, quality assurance/quality control, and environmental inspection, monitoring and training, to ensure compliance.

7.0 PRELIMINARY DESIGN DESCRIPTION

7.1 GENERAL

The preliminary design and development of plans for the temporary civil works, which in this case also include the removal of the dewatering structure at the outlet PGS Canal and the relocation of the waterline, have been developed based on the requirements given in the drawings provided by OPG, particularly the Owner's Mandatory Requirements and subsequent clarifications, as well as applicable standards as outlined in the specifications attached herewith.

7.1.1 Temporary Facilities

- Intake Temporary Facilities:

  At the intake a construction laydown area will be placed to the south of Niagara Parkway. This facility will be used in conjunction with all associated works at the intake. This site will be approximately 182 m x 76 m. It will be fenced and a lockable gate provided for security. Their surface will be graded stone and maintained throughout the project life. The facing side to Niagara Parkway of the lay down area shall also have a screen wall erected to downplay the activity within the compound and the public activity along the parkway. For additional reference, refer to Drawing No. MH-6008-00.

- Outlet Temporary Facilities:

  At the outlet the construction offices will be located adjacent north south portion of the temporary access road. This area is fully fenced and will be approximately 400 m x 50 m. This site will be fully serviced by temporary utilities from Stanley Avenue. In addition Material Yards will be placed throughout the site and will be fully accessible and within the fenced construction area. Their surface will be graded stone and maintained throughout the project life. For additional reference, refer to Drawing No. MH-6009-00.

7.1.2 Roadways

- Intake Roadways:

  At the intake site a temporary roadway is being constructed to allow access to the site from Portage Road to the construction laydown area and across Niagara Parkway to the construction area at the intake. This will eliminate any need for construction traffic to utilize Niagara Parkway. Roadside ditches will be provided to carry any surface water generated from the roadway into the existing and natural drainage system. A temporary traffic signal will be installed at the intersection of the Access Road and Niagara Parkway to alleviate conflict with construction traffic crossing Niagara Parkway. For additional reference, refer to Drawing No. MH-6008-00.

  The existing recreation trail will be relocated to a new location as shown on the drawing to minimize interference of visitors to the area and the construction.

- Outlet Roadways:

  At the outlet site a new permanent paved access road is being construction form Stanley Avenue to provide access to the work zones. However only a 180 m section of this road will be built, and beyond this section a temporary roadway is being constructed to provide access to the material stockpiling area and the outlet location. These roadways will be in place until the end of the project and then removed and the area restored to original conditions. Roadside ditches will be provided along these roadways to carry surface drainage from the roadway and other site locations to a detention/settling basin for eventual discharge into the canal system. For additional reference, refer to Drawing No. MH-6009-00.

  All roadway design, horizontal and vertical alignments, road widths, surface details, drainage, intersection details, and the like, will comply with highway design requirement appropriate to the class of the road as provided in the above-quoted references.

7.1.3 Fencing

Fencing providing boundary separation and security to the sites will be primarily chain link fences. This will help to eliminate any potential interference between the public and the construction activities. At the intake area, some of the work zones will be fenced off using full height hoardings to afford even better separation and minimize the impact on the appearance of this tourist area.

For additional reference and specific locations, refer to Drawing Nos. MH-6008 and MH 6009.

7.1.4 Stockpiles

During the excavation of the tunnel a large quantity of material primarily rock will be stockpiled between the two power canals as shown on MH-6009. These stockpiles will be between approximately 5 m to 6 m in height with proper and safe side slopes and with the top surface level and graded.

The stockpiles shall be piled in lifts of not more than 300 mm. The stockpile will be setback at a minimum 20 m from the canals and a perimeter trench will be implemented to gather any surface runoff from the stockpiles, collected in a settling basin and discharged through filter cloth into the canal. The ditch surface shall be protected by seeding, and strawbale flow-checks will be provided at 250 m intervals, and before every culvert and intersecting ditch. When the grade of the ditch is steeper than 10%, rockfill check dam will be installed. No stockpile is within 5 m from any part of the tower structures or the location in plan of the overhead transmission lines. A temporary construction pad will be provided for holding materials suspect of contamination. The runoff will be suitably treated prior to discharge. Excavated materials suitable for aggregate production or other uses will be stockpiled separately.

As stated previously, the specifications for stockpiles are located in the Draft Design/Build Agreement and Concept Drawings and also in OPG's "Management of Excavated Material" dated December 2004 and OPG's "Management Plan for BTEX" dated December 2004. If the specifications in the Draft Design/Build Agreement and Concept Drawings prevail, then the following will be implemented. A temporary stockpile will be located between the canals and a runoff pond provide for runoff from the excavated materials. This will be used for specific contaminated materials from the tunnel excavation. The runoff will be pumped to the water treatment facility prior to final discharge. The runoff pond and the temporary stockpile will be lined with synthetic material or a minimum of an impervious material to eliminate ground contamination.

If the design is to meet the requirements in OPG's "Management of Excavated Material" and "Management Plan for BTEX", then certain rock formations have specific temporary and/or permanent storage requirements based on the information provided by the Reuse of Excavated Materials Committee. The limestones/dolomites above the Rochester Shale formation are to be segregated and stockpiled separately for reuse by the Project. The shales potentially containing BTEX (Rochester, Grimsby and Power Glen formations) are to be isolated permanently in the main disposal area with a perimeter drain leading to the retention pond. The Queenston Shale may be used by the clay/brick industry at a later date and therefore should be stored in the main disposal area separate from the other rock for easy access when required. All other rocks are to be placed in the main disposal area for permanent disposal separately from the other in this area.

The storage area for the excavated material potentially contaminated with BTEX will be approximately 400 m long by 100 m wide and will either have a compacted clay base or impermeable geotextile. Within this area, there will be a 10 m wide buffer area around the perimeter which will contain the drainage ditch/outside berm. The shale will be stockpiled in lifts less than 300 mm and the slope will be no greater than two horizontal to one vertical (2:1). The run-off will be directed towards the retention pond for treatment, if required.

7.1.5 Demolition of the Dewatering Structure

The existing dewatering structure at the PGS Canal is a 45 m long, 6 span reinforced concrete structure, with a 6.7 m wide walking surface on the top. The 5 piers in the water are tall concrete piers with a wide base but tapering up towards the top but all are up to 17 m in height and are sitting on the rock surface of the bottom of the canal, including some embedment into the rock stratum. It is not known whether the structure is manufactured from precast units, but from the information provided, there is definitely a possibility of this and as such it may help to remove the component in convenient chunks instead of breaking into small debris using a concrete breaker.

The 6 span openings are actually gate openings used to close the canal from the main HEP canal for dewatering purposes, though according to information provided to the Proponent, the structure has not been used. OPG provided additional information on the condition of the structure through inspection reports, and suggested that there are damages to certain parts of the structure especially at the abutments and one of the piers (pier 1), and does not use the structure for vehicular traffic anymore.

The method of demolition will be such as to minimize impact on the operation of the PGS and coordination with the timing and duration, as well as the proposed method of removal, will be discussed with OPG and agreed prior to implementation. Sufficient advance notification will be provided to ensure all preparative work be made and all affected personnel informed of the impending work.

The entire superstructure will be removed and the remaining abutment and exposed rock surface stabilized where necessary and where confirmed by the engineer. The pier will be removed up except the last 300 mm which should be intact and firmly fixed into the rock.

Debris catching device will be implemented together with use of barges, at the endorsement of OPG, to minimize concrete debris falling into the water. All sawcutting operations will be controlled and effluent removed using vacuum machine. Large cut reinforced concrete chunk will be removed by lifting from the banks and carting away in truck to designated disposal areas.

7.1.6 Waterline Relocation

During construction an existing waterline will be relocated from the existing PGS dewatering structure prior to the demolition of the structure. The relocation can either be a surface laid/ buried waterline laid along the banks of the PGS Canal, and cross the canal at the roadway located outside the PGS station, or on a new utility bridge over the canal at its existing location. Both alternatives will be evaluated, considering cost, timing, impact to other work, etc., and discussed with OPG staff prior to selecting the suitable approach.

The relocated waterline will be constructed to the same standards and details as the existing waterline.

7.1.7 Disposal

The disposal will be conducted in compliance with the Owner's Mandatory Requirements, section 3.

As stated above, the specifications for stockpiles are located in the Draft Design/Build Agreement and Concept Drawings and also in OPG's "Management of Excavated Material" dated December 2004 and OPG's "Management Plan for BTEX" dated December 2004. On-site permanent disposal of excavated material is required for rock from the Rochester, Grimsby and Power Glen formations and rock other than Queenston formation and limestones/dolomites. The Queenston shale will be temporarily stored at the main disposal area and the limestones/ dolomites will be reused. The section of the permanent disposal area storing the Rochester, Grimsby and Power Glen formations will be either lined with clay or geotextile to reduce potential soil and groundwater contamination. Runoff will be pumped back across the conveyor bridge to the water treatment facility prior to final discharge. The run off pond will be lined with synthetic material or a minimum of an impervious material to eliminate ground contamination.

Any excavated materials suitable for aggregate production will be stockpiled separately and used where applicable. Any surplus will be removed from the site at the end of the contract. No excavated material or discharge of water prior to treatment will be spilled or placed into any watercourse at the site.

8.0 DESIGN ANALYSIS

8.1 CODES, STANDARDS AND SPECIFICATIONS

The facilities will be designed in compliance with the codes, standards and specifications listed in Section 6 above.

8.2 DESIGN METHODS AND PROCEDURES

The civil works will be designed by using recognized methods and procedures, which include the established and industry standard software in performing in the installation of all work.

9.0 SEQUENCING OF THE WORK

The sequence of construction will be in compliance to the overall schedule provided with the submission. The construction of the temporary facilities will be prior to most activities taking place in support of the tunnel excavation and the intake and outlet structures.

10.0 CONSTRUCTION TECHNIQUES AND EQUIPMENT

The work will be completed utilizing standard construction methods. The use of excavators for grading, trucks for transportation of good and excavated materials when required. A conveyor system will be used to transport excavated materials from the outlet of the tunnel to the temporary and surcharge stockpiles. A water treatment facility will be used on site to treat any and all ground water generated for all construction activity. All equipment and their operation will be in compliance with the EMR and the OMR.

The equipment used for the demolition of the PGS dewatering structure include the use of sawcutting or flame cutting equipment, barges, lifting equipment and debris collecting setup. When necessary, underwater work may be required to retrieve concrete components submerged in the water at the bottom of the canal.

Ontario Power Corporation Inc.
(OPG)

Niagara Tunnel Facility Project
Proposal No.: Tunnel Facility Project-001

Document: MH-3003-01

(Revised August 12, 2005)

Outline Design Basis for Intake Sectional Service and Outlet Closure Gates, Hoists, and Guides

August 12, 2005
Project No.: 1051006.00

MORRISON HERSHFIELD

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1.0 INTAKE SECTIONAL SERVICE AND OUTLET

1.1 GENERAL

1.1.1 Intake Stop Log

1. One set of sectional service gates (Stop-Logs) with embedded parts and anchor bolts is to be installed inside the intake structure.
2. The embedded part is of two (2) parts design set in the secondary concrete in the intake structure. The load bearing face, seal face and top of the seal beam are type 304 stainless steel, machined after fabrication.
3. Six stop-Logs are required to close off the opening. They are to be lifted in place (or removed) by mobile crane. One (1) follower assembly for handling the stop-log will also be supplied. The stop-logs are to isolate the tunnel from upper Niagara River GIP at the INCW to facilitate tunnel dewatering by OPG.
4. Two (2) 350 mm valves are installed on the top log for use to fill the tunnel.
5. Installation facilities for the intake stop log to enable installation work to be performed above water will include a custom-designed follower structure (as above), as well as a guiding system to permit accurate installation of each intake stop log using a mobile crane. The design of the guiding system will be finalized during the detailed design stage, but the following 2 options will be considered:
   a. Modification of the existing frames for the INCW stop logs to include external top and bottom guiding beams, and provision of new guiding slots in new approach walls and pier extensions to accommodate these modified structure. The details of the existing stop log will be carefully studied to ensure the modified INCW stop logs can function both as a stop log for the INCW gate, as well as a guide for installation of the new tunnel intake stop logs. This method has the advantage of minimizing the storage requirements by OPG.
   b. A specially fabricated steel guide structure complete with walkways to be bolt-connected to the top of the slot in the roof of the intake structure for insertion of the stop logs. This structure will rise above water level to allow workers / OPG employees to control the stop log installation process from the surface.

1.1.2 Outlet Closure Gate, Hoists and Structure

1. One vertical lift, wheeled outlet closure gate with heated embedded parts and anchor bolts will be installed inside the discharge structure. This gate is stop the flow in the tunnel and to prevent admission of water from the canal into the tunnel during dewatering.
2. The embedded parts are of the two-part design that will be set in the secondary concrete. One bolted splice will be installed in the roller path. The roller path is fabricated of hardened stainless steel ASTM A693, Type 630 H1100 and machined after fabrication. The vertical and lintel seal face are type 304 stainless steel, machined after fabrication. Six (6) heaters per gain will be installed down to elevation 163.50 m.

3. The outlet closure gate is a five (5) sections, articulated type, vertical lift gate with four (4) wheels per section. The embedded track is heated with gain heating elements embedded inside the concrete structure.
4. A dual drum wire rope hoist, driven by one 7.5 kW (10 hp) electrical motor is installed to operate this gate. The cable hoist is located inside a hoist bridge and housing mounted on top of two steel tower structures (one stair tower and one maintenance service bay tower). The steel structure is erected above the outlet structure. One air brake is also installed allowing the gate to be lowered, un-powered, under gravity and at regulated speed.
5. One 5-ton hoist and monorail will be supplied and installed in the maintenance tower and hoist bridge.
6. Insulated metal cladding, doors, louvers, windows, translucent panels and associated hardware will be supplied and installed. Roof will be sloped metal deck.

1.1.3 Outlet Stop-Log (Embedded Part Only)

1. One set of Stop-Log embedded parts with anchor bolts (embedded inside the discharge structure) is to be installed downstream of the discharge gate. Stop-Logs will not be supplied for this gate. The embedded parts are installed in case there is a need to stop water entering the tunnel from the canal.
2. The embedded part is of two (2) parts design set in the secondary concrete in the outlet structure. The load bearing face, seal face and top of the seal beam are type 304 stainless steel, machined after fabrication.

1.1.4 Miscellaneous

1. All sealing surfaces and gate roller paths are stainless steel. All three sets of embedded parts are two-part design and to be set in secondary concrete. The load bearing face and seal face, the lintel and the top of the sill beams are of type 304 stainless steel.
2. The outlet closure gate proposed is a 5-part articulated gate. All 5 individual gates are completely shop assembled including seals. The sections will be field connected by link bars and pins. With this arrangement, the top gate can be lifted against downstream pressure by approximately 200 mm to fill the tunnel.
3. The gate structure material will be made of grade 300 and/or 350 WT Cat. 1 structural steel. The wheels are forged 4145 material, crowned and fitted with 'Timken' tapered roller bearing. Guide shoes will be installed instead of guide wheels.
4. The outlet gate will be sealed against pressure from either side with rubber seal applied on all four sides. The J seal on the sides and the double stem seal on the lintel are Teflon covered. The seals are bolted on with galvanized steel clamp bars and stainless steel bolts. The bottom of the skin plate and all seal mounting faces are machined. Holes for the axels are bored.
5. The hoist bridge and towers are covered with insulated metal sidings with windows, service door; personnel door, steel stair will be installed on the towers for access to the hoist tower.
6. Access ladders and railing around the outlet gate and stop-log opening will also be installed.
7. Electrical control panels for hoist and heaters will be installed inside the hoist house.

8. The intake and outlet gates will be sandblasted to bare metal and shop painted after fabrication.
9. The hoist house interior will be heated and ventilated per Ontario Ministry of Labour, ASHRAE and NFPA standards and requirements.
10. Adequate lighting will be installed inside the hoist house, stairs, tower, and on the outside walls of the tower structure.

1.2 DESIGN PARAMETERS

1.2.1 General

The design of the intake stop-log and the discharge control gate is in accordance with Section 7 of the Owner's Mandatory Requirements as part of the Proposal Invitation document.

1.2.2 Basic Design Parameters

Basic design parameter are outlined as follows:

1. Intake Stop-Log

Tunnel Internal Width	=	12.78 m
Lintel Elevation	=	147.03 m
Sill Elevation	=	132.27 m
Opening Height	=	14.55 m
Normal Maximum Water Level	=	171.65 m
Normal Minimum Water Level	=	170.74 m
200 Years Flood Level	=	172.11 m
PMF	=	173.17 m

2. Outlet Closure Gate

Tunnel Internal Width	=	12.78 m
Lintel Elevation	=	164.50 m
Sill Elevation	=	148.62 m
Opening Height	=	15.88 m
Normal Maximum Water Level	=	169.80 m
Normal Minimum Water Level	=	164.20 m
200 Years Flood Level	=	172.11 m
PMF	=	173.17 m
Surge Water Level at Discharge	=	180.00 m

3. Wire Rope Hoist

Rated Capacity	=	1,560 kN

		(350,000 lb)
Lifting Speed	=	0.16 m/min.
Lowering Speed (Powered)	=	0.16 m/min.
Lowering Speed (Un-powered/Fan)	=	0.31 m/min.
Motor	=	7.5 kW (10 hp), TEFC
Brake	=	Drum Brake
Reducer	=	Flender
Rope	=	30 mm (1-1/2") dia. EIPS GALV. IRWC
Rope Breaking Load	=	890.75 kN (200,000 lb)
Rope Factor of Safety	=	9.70 @ Rated Capacity @ maximum Motor Torque
Drum Diameter	=	1219 mm (48")
Sheave Diameter	=	914 mm (36")

4. Hoist Control

One control panel will be supplied and installed inside the hoist housing. Controls include:

- Raised/Stop/Lower and Emergency Lower Push Button
- One Local/Remote/Maintenance selector switch
- Pilot light for Power On; Gate Raising; Gate Lowering; Gate Close; Gate Fully Open
- Limit Switches for Lower Position (rotary type); Upper Limit; Dogging Position; Anti-Creep;
- Slack Rope and Power Over-Travel Switches

1.3 INSTALLATION AND COMMISSIONING

1.3.1 Embedded Parts

1. Three (3) sets of embedded parts with anchor bolts will be shipped to site for installation in the intake and discharge concrete structure. The installation will be the responsibility of the gate manufacturer and supplier.
2. The gate supplier will also apply secondary concrete ensuring proper alignment of the embedded parts.

1.3.2 Intake Stop-Log

The Stop-Log sections will be dry tested. They will be lifted in place and removed under dry condition. Upon completion of the construction and after the tunnel is filled and the gate is submerged, the gate manufacturer will assist in lifting the Stop-Log sections, removing them from the inlet structure. The gate supplier will also assist to install the slot cover after removing the Stop-Log.

1.3.3 Outlet Closure Gate

The outlet closure gate, along with the hoist structure; housing; access ladders; railing and heater and hoist controls will be installed by the gate supplier. The gate supplier will also commission the gate hoist ensuring proper operations of the closure gate.

1.4 SHOP DRAWINGS AND O/M MANUALS

1.4.1 Shop Drawings

Manufacturer's Shop Drawings indicating details of the gate design and construction will be provided by the gate manufacturer and submitted to OPG for review, acceptance and records. Prior to the completion of the project, Operating and Maintenance manuals will be submitted to OPG for records.

1.4.2 Codes and Standards

OBC	Ontario Building Code
AISC	American Standards Association
	Specification for Structural Steel Building
AISE	The Association for Iron & Steel Technology, Technical Report 6
CSA	Canadian Standards Association
	STD B167 – Safety Standard for Maintenance and Inspection of Overhead Crane
AGMA	American Gear Manufacturing Association STD 6010-F97 – Method for Specifying the Geometry of Spur and Helical Gear, and Standard 420.04
CMAA	Crane Manufacturers Association of America, Specifications 70

The design shall also comply with the Owner's Mandatory Requirement as provided during preparation of proposal of the project.

Ontario Power Corporation Inc.
(OPG)

Niagara Tunnel Facility Project

Proposal No.: Tunnel Facility Project-001

Document: MH-3004-01

Outline Design Basis for Electrical and Mechanical Services

May 11, 2005
Project No.: 1051006.00

MORRISON HERSHFIELD

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1.0 ELECTRICAL SERVICES

1.1 POWER SUPPLY

1.1.1 Supply To Outlet Structure – Permanent Service (Hoist Tower)

Power Sources

1. Power to the site can be provided from one of the existing overhead lines installed in proximity of the site. One of the lines is a 27.6 kV circuit assumed to have sufficient capacity to carry the permanent electrical load of the outlet shaft structure.
2. The line referred to runs in a north-south direction, approx. 1.5 km west of the site of the proposed outlet shaft.

Transmission

1. Power needs to be brought to the site of the proposed outlet shaft via a three-phase pole line, approximately 1.5 km long. Spacing of the poles is anticipated to be approx. 60 m, resulting in a total number of approximately 26 poles. Connection of the spur line to the 27.6 kV supply line shall be carried out by OPG/Hydro One.

Termination

It is proposed that a pad-mounted transformer be provided at the site of the outlet shaft. The transformer shall be rated 225 kVA, 27.6 kV – 600/347V, 3-phase. Transformer's feeders shall as follows:

Primary:

- 3 fuse cut-outs at the dip pole
- 3 lightning arresters, pole mounted
- 3 cable terminations
- 3-#1 AWG, 28 kV, concentric neutral cables in 3-100 mm PVC conduits – cca. 25 m

Secondary:

- 4-350 MCM RW90, 1000 V insulation, in 100 mm rigid PVC conduit, cca. 10 m

1.1.2 Supply To Tunnel Outlet Shaft Portal – Construction Power Service

Power Source

It is proposed that the construction power service be derived from the 110 kV line available at the south of the site. Approximate location of connection point is 500 m south-east of the site of the outlet shaft. Given the proximity to the transformer station where the line originates, it is assumed that ample capacity exists in this feeder to provide for the construction power

requirements, estimated at 13.3 MW. This shall be verified by the Contractor at the commencement of the construction.

Termination

An on site (temporary) substation shall be constructed and shall contain the following components:

- 2-7.5 MVA, 110 kV-4.16/2.4 kV power transformers, outdoor, pad mounted
- Supporting structure for incoming protection & metering equipment
- 5 kV Class secondary switchgear, c/w:
  - 2 main (incoming) switches
  - 1 tie switch
  - 6 feeder switches (tunnelling equipment & support systems + site support/services systems)
- 1-2000 kVA, 4.16 kV-600/347 V pad mounted transformer
- 600/347 V, 2500A low voltage switchgear, outdoor type (or installed in a container/shed), c/w:
  - 2500 a main breaker
  - 6-1600 A/800 AT breakers (for WTP, site office/store, crane, cooling water system etc.)

2.0 MECHANICAL SERVICES

2.1 HEATING AND VENTILATION (HOIST TOWER)

2.1.1 Heating

1. Heating in the form of electric baseboard heaters and wall mounted electric cabinet heaters with built-in thermostatic control will be installed inside the outlet closure gate hoist tower and housing.
2. The heating system will be designed to maintain the indoor temperature at 10°C (50°F) during the heating seasons. This feature is in compliance with the OBC requirements, and to prevent freezing inside the hoist house. Heating will also prevent condensation on electrical and mechanical equipment and ensuring reliable operations of the electrical and mechanical equipment.

2.1.2 Ventilation

Gravity ventilation in the form of strategically located, and appropriately sized louvers will be installed in the hoist house. Sufficient air is designed to circulate through the hoist house maintaining the indoor air temperature at not higher than 6ºC (10ºF) above the outdoor air temperature in the cooling seasons. The feature is to avoid possible accumulation of foul gas and/or odour.

2.1.3 Design Conditions

Indoor Conditions:

- Heating Seasons 10ºC (50ºF) Maximum

- Cooling Seasons 6ºC (10ºF) Higher than Outdoor Air Temperature

Ambient (Outdoor) Conditions:

• Heating Seasons	-5ºC	(23ºF)	ASHRAE 99.6%
• Cooling Seasons	28ºC	(82ºF) DB	ASHRAE 0.4%
	21ºC	(70ºF)	MWB

2.1.4 Plumbing And Drainage

1. Provision is made for the installation of one washroom inside the hoist house.
2. The facility will include one water closet, one lavatory and one electric hot water heater.
3. Domestic water pipe shall be installed connecting the washroom to a nearest Municipal domestic water main. We will also install sanitary drain line connecting the washroom to a nearest Municipal sanitary main.
4. Vent stack and trap-seal-primer will be installed preventing sewer gas from migrating into the washroom.

2.1.5 Code And Standards

1. OBC - Ontario Building Code
2. ASHRAE - American Society of Heating, Refrigerating and Air Conditioning Engineers
3. AMCA – Air Movement and Control Association International
4. ANSI – American National Standards Institute
5. AWWA – American Water Works Association
6. CSA – Canadian Standards Association
7. NFPA – National Fire Protection Association
8. SMACNA – Sheet Metal and Air Conditioning Contractors' National Association

2.2 CONSTRUCTION/SEQUENCING OF THE WORK

The construction will be undertaken using standard construction techniques and standards for the industry. The sequencing will be established to support the overall scheduling of the project.

ONTARIO POWER GENERATION
OPG

NIAGARA TUNNEL FACILITY PROJECT

Outline Design Basis and Method Statements

29/04/2005

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REVISION

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Rev.	Date	Issue, Modification	Prepared	Checked	Approved

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1 GENERAL

1.1 General Project Overview

Ontario Power Generation (OPG) is implementing the Niagara Tunnel Facility Project aiming to bring water from the Niagara River to an existing storage reservoir. The key elements of the project are:

- Intake Structure and Channel
  approx. 200 m long
  approx. 20 m wide
  up to 30 m deep
- Delivery Tunnel
  approx. 10.4 km long
  approx. 12 m internal diameter
- Outlet Structure and Canal
  approx. 400 m long
  approx. 20 m wide
  up to 35 m deep

In addition a dewatering system consisting of 5 vertical shafts with approx. 0.8 m internal diameter, dewatering pipe and culvert is planned. The tunnel shall also be monitored by piezometers and extensometers during operation. Gates are to be situated at the Intake and Outlet. Also new guiding walls are required in the river upstream of the Intake.

It is planned to transfer 500 m^3/s of water with the tunnel facility to the reservoir. The operational time of the facility will be 90 years. It shall be capable of being opened and closed as required. Also dewatering of the facility shall be feasible at unspecified intervals to facilitate maintenance. The intake and outlet structures of the Niagara Tunnel facility are to be located at fixed points. A corridor is provided in plan for the New Diversion Tunnel (No.3), which basically runs parallel with the two existing Diversion Tunnels No. 1 and 2. One other constraint is for the New Diversion Tunnel (No. 3), that subject to the Environmental Assessment Approval no permission is currently given for crossing through the buried St.' David's Gorge. The alignment grade for the tunnel is to be selected such, that crossing under the gorge is realized. At least 100 m of ground overburden have to be considered as a result of such deep alignment. In addition regional swelling and squeezing phenomena and highly aggressive saline groundwater have to be taken into account for implementation of all structures associated with the project.

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1.2 Scope

The outline design basis and method statement covers primarily aspects of tunnel design (hydraulic design, geotechnical design, civil design, structural design etc.) and the design of associated structures, which are

- Diversion Tunnel
- Intake Structure
- Outlet Structure
- Outlet Canal
- Dewatering Shafts, Pipe and Culvert
- Permanent Instrumentation (i.e. tunnel piezometers and extensometers)

Design basis and method statements associated with

- accelerating walls at the intake
- temporary facilities
- roads and parking areas
- rail road trackage and sidings at the outlet area
- fencing, gates and barriers
- stockpiles and water treatment facilities
- cofferdams and temporary docks
- demolition and disposal

are covered elsewhere in the Proposal.

The following aspects of design and construction shall be covered with this document:

- layout of works
- design approach
- codes and standards
- specifications
- construction techniques

Construction aspects associated with

- equipment
- sequencing of the Work and
- layout of construction facilities

are covered elsewhere in the Proposal.

Emphasis is given, that the design basis and construction methodology specified herein is organized such to address the Owner's Mandatory Requirements.

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1.3 Preliminary Design and Construction Considerations for the Diversion Tunnel

1.3.1 Diversion Tunnel Alignment

The Proposal design follows the concept alignment in principle. Only below the buried St' David's Gorge, the alignment is slightly relocated to the north-west to gain maximum rock cover, which is predicted close to the location of geotechnical borehole SD-8. Horizontal and vertical curvature is arranged such to maintain a min. 1000 m radius for to facilitate muck transportation by conveyor belt systems. In addition the alignment close to the existing outlet structure is moved away from underneath the existing Delivery Tunnel No. 1, to facilitate the drilling of the borehole for tunnel piezometers.

The overall depth of the tunnel has been slightly reduced as compared to the concept design. The inclination of fall and raise of the grade near the outlet and intake of the facility is arranged slightly shallower as in the concept design. The dewatering structure has also been moved further away from the buried St' David's gorge as compared to the concept design. A potential fourth Diversion Tunnel may be arranged in parallel to the proposed alignment route.

1.3.2 Diversion Tunnel Lining

Originally two lining alternatives for the Diversion Tunnel have been investigated by the Proponent:

- Single shell lining with precast concrete segments
- Double shell lining with an initial lining of shotcrete, ribs and rock bolts and a final lining of cast in place concrete. Both linings being separated by a waterproofing membrane system.

Although easier to apply in combination with a Tunnel Boring Machine (TBM), the single shell lining alternative has been abandoned for the following reasons:

- The surface roughness of precast segments (K_s = 75 – 80) is inferior to cast in place concrete (K_s = 85 – 90) according to Strickler (see chapter 2.3).
- Although compressible annular grouting mortar is available to compensate deformations resulting from rock squeeze, it is not possible to hold the operational internal water pressure in segmental lining rings. Water could escape through segment joints at pressures up to 14 bar and could adversely affect the rock of formations, which are sensitive to water. High swelling pressures or even worse, erosion of ground around the tunnel would be the undesirable result.
- It cannot be guaranteed, that uniform grouting of the annulus around the segmental lining ring is achieved, since rocks falling from behind the shield of the TBM into the

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annular gap may caurse shadowing and voids when grout is injected. No controlled prestress of the segmental lining ring is possible.

- Many lining segments can be damaged during fabrication, transportation and erection. Either an economical loss or restrictions in durability are the result of rejected segments or massive repairwork.

For such reasons the double shell lining option is the preferred proposal. The cast in place lining solution provides also the following advantages:

- Flexibility with respect to internal diameter. With an expandable steel formwork, sections of minimum rock support requirements may be utilized to adjust the tunnel diameter to provide maximum flow rates.
- The arrangement of a waterproofing membrane between initial lining and final lining prevents the aggressive groundwater to get in contact with the final lining concrete.
- The installation of a comprehensive interface grouting system enables to compress the final concrete lining such, that internal water pressure is held without the lining concrete being cracked in tension. Hence the requirement of steel reinforcement can be eliminated for the final lining. The tunnel structure is tightly embedded into the rock and the enormous interactive load bearing capacity of ground and structure is consequently mobilized.

1.4 Durability Aspects

1.4.1 Service Life and Constraints

The operational design life for the Niagara Tunnel Facility Project shall be 90 years. No outage of the Diversion Tunnel shall occur during such period. The tunnel lining has to resist

- acid and sulphate attack from an unfavourable environment
- high internal and external pressures from ground and water
- the abrasive action of water, ice and debris

within this operational time period.

1.4.2 Design and Construction for 90 Years Service Life

In vision of the extraordinary challenge to meet the specified requirements for a service life of 90 years, the following design aspects have been determined to serve the purpose:

- Construction of a double shell lining instead of a single shell lining. The initial rock support is timely separated from final lining erection, which improves the quality of the final structure in total.

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- Separation of the final lining from the aggressive environment by a waterproofing membrane system. The waterproofing system is vacuum tested to ensure reliable performance. Any exchange of water or chloride between inside and outside of the tunnel is inhibited.

- Tight connection between final structure and the surrounding rock mass to mobilize the load bearing capacity of the rock for the 90 year operation requirement. By no means it shall be allowed that rocks and debris is washed out and voids behind the lining are created. The tight connection is achieved by contact grouting, interface grouting and cavity grouting where required.

- Prestressing of the final lining to create a compressed concrete support ring, which is able to sustain internal waterpressure without steel reinforcement being required. The risk of corrosion for reinforcement within the 90 years design life is such eliminated. The prestressing of the tunnel with interface grouting takes the rock mass surrounding the tunnel close to its original stress state and reduces or eliminates adverse time dependent deformations of the rock mass.

- Design of the concrete structures against uplift uses the self weight of the structure only. Long term rock deformations, which cannot be controlled by stress resistance of the concrete structure are compensated without exerting additional load by a compressible material placed between structure and rock. Overstressing of the concrete during the 90 years of specified operation is therefore avoided.

- In general materials shall be used, which are
  - -- recorded over a design life of 90 years (i.e. concrete, grout etc.)
  - -- tested to serve over a design life of 90 years (i.e. membrane materials, coated steel etc.)
  - -- easy to maintain or exchange if necessary (i.e. sill gates, tunnel piezometers, etc.)

1.4.3 Comprehensive Durability Testing

The testing of materials will be phased in

- testing by the manufacturer against specified performance criteria (base product quality)

- testing on site against particular application criteria (applied product quality)

- testing of sections of the completed structure or product where possible (final product quality).

Hence a high degree of quality assurance will be ensured to achieve the specified product quality required for the 90 years design life of the facility.

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2 HYDRAULIC DESIGN

2.1 Water Surface Elevations

Water surface elevations to be prepared are based on NAD 83 (following the 1973 International Niagara Board of Control Directive).

2.2 Hydraulic Design Approach

The hydraulic conveyance system extends from the intake structure at the GIP to the outlet water level gauge in the outlet canal and includes the intake channel, the intake structure, the tunnel, the outlet structure and the outlet canal to the point immediately upstream from the transition at the junction with the PGS channel. The discharge of the conveyance system will be measured and calibrated considering the head of energy losses between the upstream and downstream level gauges.

The tunnel conveyance system will be designed, detailed and constructed to provide the optimum hydraulic efficiency. This is valid also for the construction of the inlet- and outlet structure and for the outlet canal.

The tunnel will be capable of delivering a GFA with the hydraulic head and energy grade design level defined in Appendix 1.1(aa) to the Design/Build Agreement considering the hydraulic conveyance system defined in Section 8.2(1).

Transient load analysis has been performed based on powered and unpowered closure rates for outlet gate and appropriate intake and outlet water levels. The analysis is provided in chapter 2.4 of this document.

Loads determined from the transient load analysis will be used for input into the design of the outlet gate and structures and tunnel liner. The outlet surge shaft will be sized to limit the transient load while retaining the upsurge water level within the confines of the shaft.

2.3 Steady Flow Conditions

2.3.1 References

For calculation of the steady flow conditions the following literature has been used:

[2.1] Press, Schröder: Hydromechanik im Wasserbau, 1966, Verlag W. Ernst&Sohn

[2.2] Gerhard Seeber: Druckstollen und Druckschächte, 1999, Georg Thieme Verlag

[2.3] Schneider: Bautabellen für Ingenieure, 11. Auflage, 1994, Werner Verlag

[2.4] Bemessungsblätter (tables for calculation) by TIWAG (Tyrolean Hydro Power Company)

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[2.5] Ven Te Chow, Open Channel Hydraulics, McGraw-Hill Book Company, 1959

2.3.2 Diversion Tunnel

2.3.2.1 Selection of the formula for calculation of the flow losses in the tunnel section

Acc. to [2.2], the flow losses in pressure tunnels are mostly calculated using the formula of Strickler, but if it is in the range of application, the calculations would be more exactly using the formula of Prandtl-Colebrook.

Using the basis data for the tunnel of the Niagara project, it can be shown, that the formula of Prandtl-Colebrook reached its limit and gives wrongly sometimes negative roughness coefficients.

Hence the Strickler-Formula is better used for calculations of flow losses in such cases.

Therefore the formula of Strickler has been applied for the calculation of flow losses in the Diversion Tunnel.

2.3.2.2 Roughness coefficients as given in the literature

The literature provides the following coefficients for the Strickler formula for tunnels with final concrete lining:

<u>a) In [2.1] Table 17, page 281, coefficients acc. to Strickler formula:</u>

- Geschliffener Zementputz größter Glätte K = 100
  (polished cement liner, maximum smoothness)
- Betonstollen und Eisenbetondruckrohrleitungen, glatt, sehr sorgfältige Ausführung, unversehrter Glattputz K = 85 bis 95
  (concrete lined tunnels and concrete pressure pipes, smooth, very thorough finish)
- Betonstollen von weniger sorgfältiger Ausführung k = 70 bis 80
  (concrete lined tunnel, less thorough finish)

<u>b) In [2.2] page 22, coefficients acc. to Strickler formula:</u>

- Spritzbeton, je nach Dicke und Ausbruchsart, mechanisch Kst = 50 bis 65
  (shotcrete, depending on thickness and excavation type, mechan.)
- Schalbeton (Stahlschalung) Kst = 80 bis 90
  (concrete with steel formwork)
- Panzerung mit Anstrich Kst = 90 bis 110
  (steel lining with painting)

<u>c) In [2.3], page 13.21, table Manning-Strickler coefficients:</u>

- **Beton: Druckstollen, sorgfältige Ausführung: Kst = 85 bis 95**
  (pressure tunnel with concrete inner lining, thorough finish)

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d) In [2.4] Calculation diagrams of the TIWAG (Tyrolean Hydro Power Company)

- Reibungsverluste für Kreisprofile nach Strickler, Ks = 85 (Betonauskleidung, Stollen) (Friction losses for tunnels, concrete inner lining)
- Reibungsverluste für Kreisprofile nach Strickler, Ks = 100 (Stahlauskleidung, Schächte) (Friction losses for shafts, steel lining)

e) In [2.5], table 5-6, values of the roughness coefficient „n":

- Concrete, "finished" "n" between 0.011 and 0.014, typical = 0.014

"n" means 1/Kst, therefore the coefficient Kst is between 71 and 91, typical 83

2.3.2.3 Roughness coefficients used for calculation

Summary for the coefficients as given in the literature

Literature	Description	Roughness Coefficient
[2.1]	Tunnel, concrete inner lining, smooth, very thorough finish	Kst = 85 to 95
[2.2]	Pressure tunnel with steel formwork	Kst = 80 to 90
[2.3]	Pressure tunnel with concrete lining, thorough finish	Kst = 85 to 95
[2.4]	Tunnel with concrete lining	Kst = 85
[2.5]	Concrete "finished"	Kst = 71 to 91, typical = 83

It is assumed, that according to these coefficients (given in the literature) the Contractor will certainly achieve a roughness coefficient of Kst = 85 in the concrete lined Diversion Tunnel when using a steel formwork with a thorough finish. Depending on other parameters like the length of the formwork section and the thorough execution of the transition from one formwork section to the other, perhaps a higher coefficient could be achieved (range up to Kst = 90)

But as a conservative approach, the roughness coefficient of Kst = 85 is applied to the tunnel section.

2.3.2.4 Transition at change of thickness of inner lining

According to [2.1] the losses for a gradual dilatation into a larger cross section can be calculated as:

$\mathbf{z} = c \times (1-(F2/F1))^2$

Whereas c = Correction factor (at 8° degree: 0.15 to 0.20)
and F1 and F2 is the area of cross section before and after the dilatation.

Example for a dilatation of the inner ling of 0.2m:

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- D1 = 12.00m, F1 = 113.1m2
- D2 = 12.40m, F2 = 120.8m2
- Flow assumed 500 m3/s, therefore at F2 flow velocity v = 4.14 m/s
- c = 0.20

Result: z = 0.0009 and the flow losses hv = 0.0008m, which is negligible.

For a gradual dilatation into a smaller cross section the flow losses are negligible (acc. to [2.1])

Conclusion: If the dilatation is gradually and slow (e.g. does not exceed 8°), the losses at the transition can be neglected.

2.3.3 Channels

2.3.3.1 Formula for calculation of the flow losses in the intake channel and the outlet canal

For the calculation of the hydraulics of the channel the formula of Strickler has been used.

2.3.3.2 Roughness coefficients given in the literature

a) In [2.5], page 110, table 5-6, the roughness coefficients "n" (which is 1/Kst) are provided for:

Channel, Rock cuts:

- smooth and uniform: "n" = minimum 0.025, typical 0.035, maximum 0.04
- Jagged and irregular: "n" = minimum 0.035, typical 0.040, maximum 0.05

This results in Kst-coefficient for the Strickler formula of:

- smooth and uniform: Kst = minimum 25, typical 28.6, maximum 40
- Jagged and irregular: Kst = minimum 20, typical 25, maximum 28.6

b) In [2.3], page 13.21, the following roughness coefficients are listed for rock excavations:

- Rough excavation: Kst = 15 to 20
- Medium rough excavation: Kst = 25 to 30
- Rock excavation, well cut or bored: Kst = 45 to 50

2.3.3.3 Roughness coefficients used for calculation

It is assume that the excavation will be smooth and uniform and with respect to [2.3] considered a well prepared "medium rough excavation"

Therefore we assume that the excavation for the outlet canal can be modelled with a coefficient of Kst = 30 acc. to the Strickler formula.

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The flow at the intake channel is actually 3-dimensional, which is not considered by the formula of Strickler. Therefore a reduced coefficient of Kst = 25 (instead of Kst = 30) is applied at the intake channel to consider possible additional losses in this section.

(Flow losses are 4 cm at Kst = 30 compared to 6 cm for Kst = 25 at the intake channel).

2.3.4 Intake- and Outlet Structure

2.3.4.1 Formula for calculation of the flow losses

For the calculation of hydraulics in the intake- and outlet structures, again the formula of Strickler is used. The calculations have been performed on vertical cross sections.

2.3.4.2 Roughness coefficients presented in the literature

a) In [2.1], page 281, table 17, the following roughness coefficients are presented for concrete.

"Smooth and undamaged liner, smooth concrete with high content of cement: Kst = 80"

b) In [2.3], page 13.21, the following roughness coefficients are listed for concrete:

- Concrete, wood formwork: Kst = 65 to 70
- Concrete, steel formwork: Kst = 90 to 100

2.3.4.3 Roughness coefficients used for calculation

The assumption is, that the surface of the structures can be cast smoothly although some of the surfaces are not flat but curved.

Therefore we assume that the surfaces of the intake- and outlet structures can be modeled with a coefficient of Kst = 80 for the Strickler formula.

2.3.5 Summary of Roughness Coefficients

The formula of Strickler has been used for the calculation of the flow losses for steady flow conditions for the entire water transfer facility. The calculations acc. to Strickler are carried out using vertical cross sections. It has to be noted, that with the used mathematical model (based on the Strickler formula) 3D- flow and associated losses are not considered. However the calculation results are still suitable to represent the flow of water, since the losses, which are not considered will be comparatively small and therefore negligible.

The following roughness coefficients are used:

Intake Channel:	Kst = 25
Intake Structure:	Kst = 80
Diversion Tunnel:	Kst = 85

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Outlet Structure: Kst = 80
Outlet Channel: Kst = 30

Since the transition between different thicknesses of final lining is gradually and slow (e.g. does not exceed 8 ° of opening angle between two cross sections of different size), the flow losses due to the transition are neglected in the tunnel section.

2.3.6 Hydraulic Analysis for Steady Flow Conditions For the Entire Conveyance System

The entire conveyance system has been calculated by computer using the formula of Strickler and the roughness coefficients as stated before.

The base data for the steady flow conditions are:

- H_{ref} (as defined in Appendix 1.1(aa) to the Design/Build Agreement) = 5.60 m.
- The layout of the conveyance system is defined in the Proposal Drawings.
- Roughness as defined in the previous chapters.

The result of the calculations is a discharge of 502 m^3/s for the Proposal.

The printout of the computer calculation results is included in the Appendix 2.1.

2.4 Unsteady Flow Conditions (Transient Load Analysis)

2.4.1 General

For unsteady flow conditions in the conveyance system the operation of the gate in the outlet structure has to be investigated. For lowering the gate two load cases have to be investigated: the powered lowering (max. speed 0.16m/min) and unpowered lowering (max. speed 0.31 m/min). Additionally the load case for raising the gate (max. speed 0.16m/min) has been investigated.

To cover also unfavourable load cases, the maximum discharge for calculation of the unsteady flow conditions was assumed with 550 m^3/s.

The aim of the calculations is to prove that the assumed lowering and raising times and the closing laws of the gate are suitable to retain the upsurge water level within the confines of the surge shaft at the outlet structure.

It has to be noted that for the calculation for the unsteady flow, the closing characteristics for the gate has been assumed. In the detailed design phase the unsteady flow calculations have to be repeated using the manufacturer's real characteristics of the gate which will be installed.

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2.4.2 Computation Method, Software

The transient analyses have been performed using computer software developed by ILF, the efficiency of which has been proven in numerous projects. Large water transmission systems, hydropower stations as well as crude oil and products pipelines have been studied.

The computer software is based on the "method of characteristics".

2.4.3 Computation Procedure

In general the following procedure is adopted:

Starting from a pre-defined steady state condition, the hydraulic behaviour of the system is calculated reviewing different events which might disturb the steady state condition.

Possible disturbances might comprise:

- Scheduled or unscheduled gate valve closure during operation
- Scheduled system shut-down
- Scheduled system start-up
- etc.

The load cases selected for this report were those which result in maximum or minimum pressures in the system, or show special behaviour of the system under transient conditions.

The computations always comprise the entire hydraulically active system.

2.4.4 Mathematical Model

The hydraulically active system has been converted into a numerical (= mathematical) model which conduces as input model for the computer software. The mathematical model includes respectively describes all necessary system parameters like tunnel diameter distribution, liquid properties, levels and stations, e.g. as well as characteristics for all hydraulic relevant equipment like surge shafts, valves, etc.

2.4.5 Presentation of Computation Results

The computation results are presented by:

- Computer Prints, Hydraulic Profiles, "Situation at Time"
  The printouts show the actual flow rate, the actual minimum and maximum pressures for the system nodes and the actual status of equipment at a precise time point.
- Computer Prints, "History of Events"
  The printouts show the development of pre-selected values during the calculation

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2.4.6 Load case 1: "Gate Hoist Lowering Powered (max. speed = 0.16 m/min)"

2.4.6.1 Basic Data

The following basic data have been used:

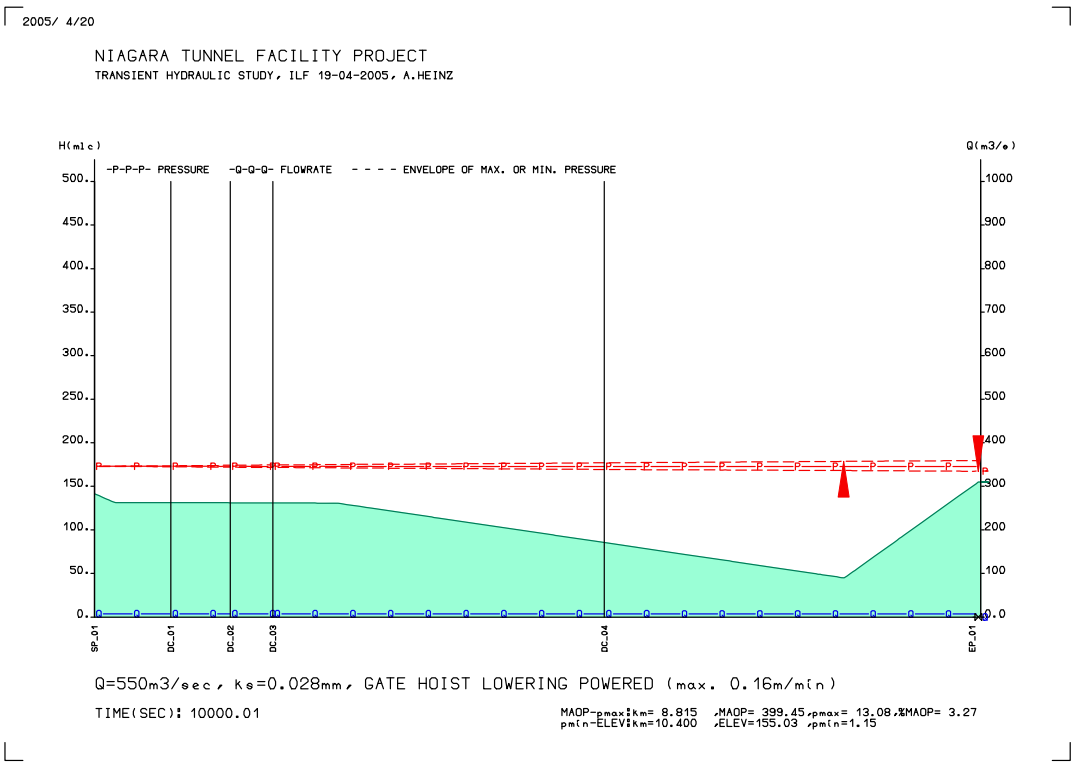
Maximum speed of lowering:	0.16m/min
Discharge at start of the calculations:	550 m^3/s
Roughness of tunnel lining:	ks = 0.028 mm (acc. to Prandtl Colebrook)
	(corresp. K=85 acc. to Strickler at the given conditions)
Valve type:	gate valve
Valve inside diameter:	15.88 m
Valve design pressure:	ASME 150

2.4.6.2 Result

For to retain the upsurge water level within the confines of the surge shaft at the outlet structure a two-speed closure has to be considered.

Closing speed 1:	5955 sec
Point of speed change:	12% remaining open position
Closing speed 2:	38830 sec
Closing time 1 (100% to 12%)	5240.4 sec
Closing time 2 (12% to 0%)	4659.6 sec
Total closing time (100% to 0%)	9900 sec = 165 min
Max. water level in the surge shaft:	179.52 m
Min. water level in the surge shaft:	167.49 m

2.4.6.3 Computer Printout's of the Computation Results



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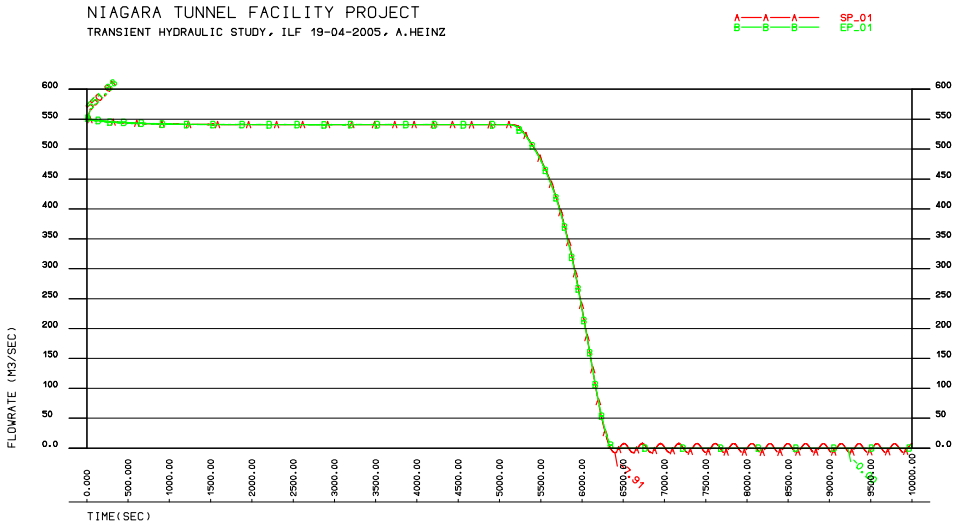

HISTORY OF FLOWRATES

Q=550m3/sec, ks=0.028mm, GATE HOIST LOWERING POWERED (max. 0.16m/min)

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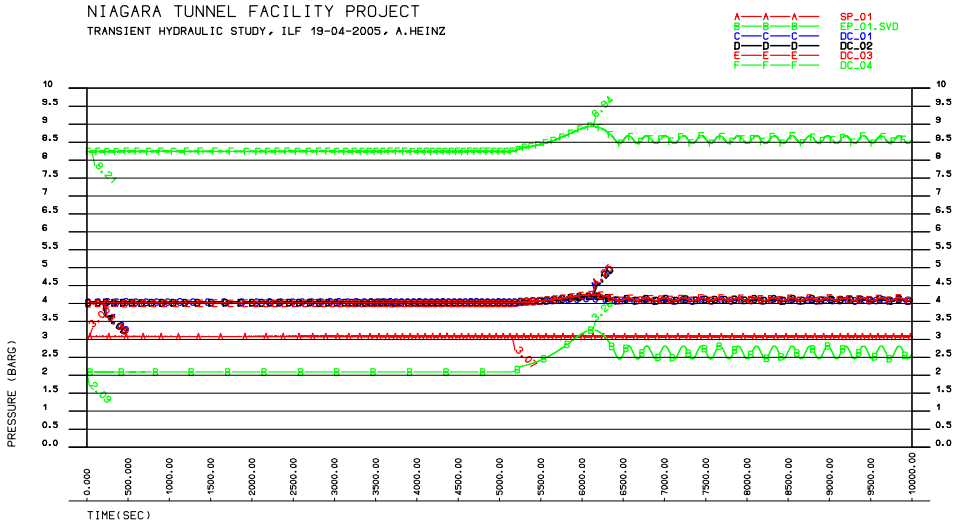

HISTORY OF PRESSURES

Q=550m3/sec, ks=0.028mm, GATE HOIST LOWERING POWERED (max. 0.16m/min)

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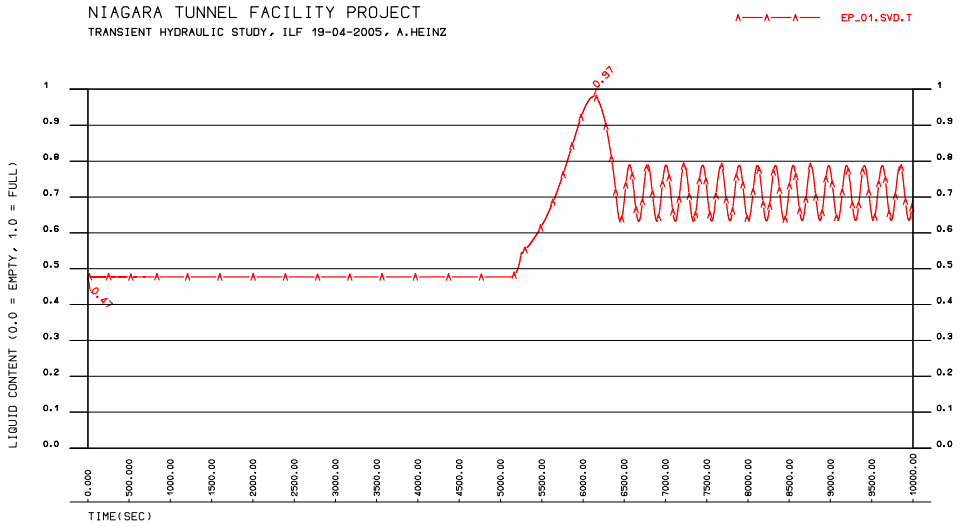
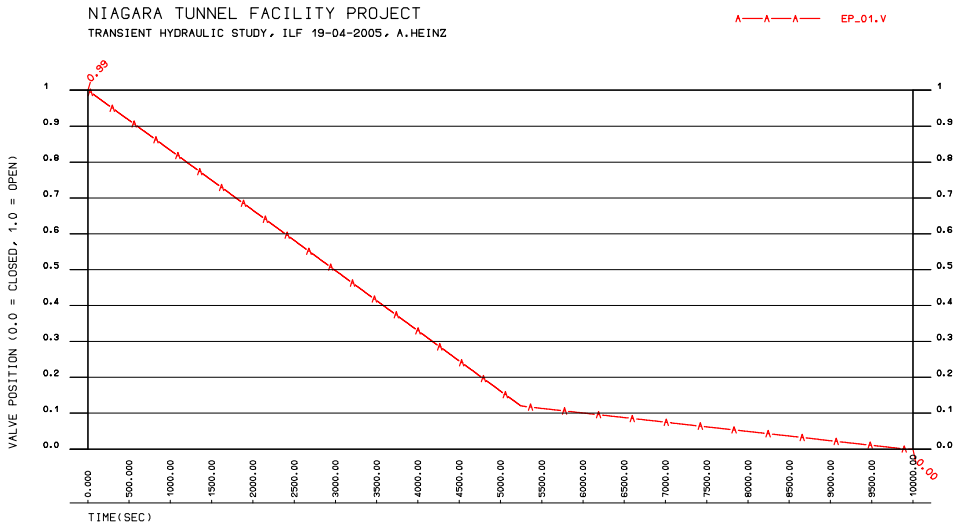


HISTORY OF SURGE VESSEL LIQUID CONTENT

Q=550m3/sec, ks=0.028mm, GATE HOIST LOWERING POWERED (max. 0.16m/min)

2005/ 4/20



HISTORY OF VALVE POSITIONS

Q=550m3/sec, ks=0.028mm, GATE HOIST LOWERING POWERED (max. 0.16m/min)

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2.4.7 Load case 2: "Gate Hoist Lowering Unpowered (max. speed = 0.31 m/min)"

2.4.7.1 Basic Data

The following basic data have been used:

Maximum speed of lowering:	0.31m/min
Discharge at start of the calculations:	550 m^3/s
Roughness of tunnel lining:	ks = 0.028 mm (acc. to Prandtl Colebrook)
Valve type:	gate valve
Valve inside diameter:	15.88 m
Valve design pressure:	ASME 150

2.4.7.2 Result

For to retain the upsurge water level within the confines of the surge shaft at the outlet structure a two-speed closure has to be considered.

Closing speed 1:	3073.55 sec
Point of speed change:	12% remaining open position
Closing speed 2:	38830 sec
Closing time 1 (100% to 12%)	2704.7 sec
Closing time 2 (12% to 0%)	4659.6 sec
Total closing time (100% to 0%)	7364.32 sec = 122.7 min
Max. water level in the surge shaft:	179.61 m
Min. water level in the surge shaft:	167.49 m

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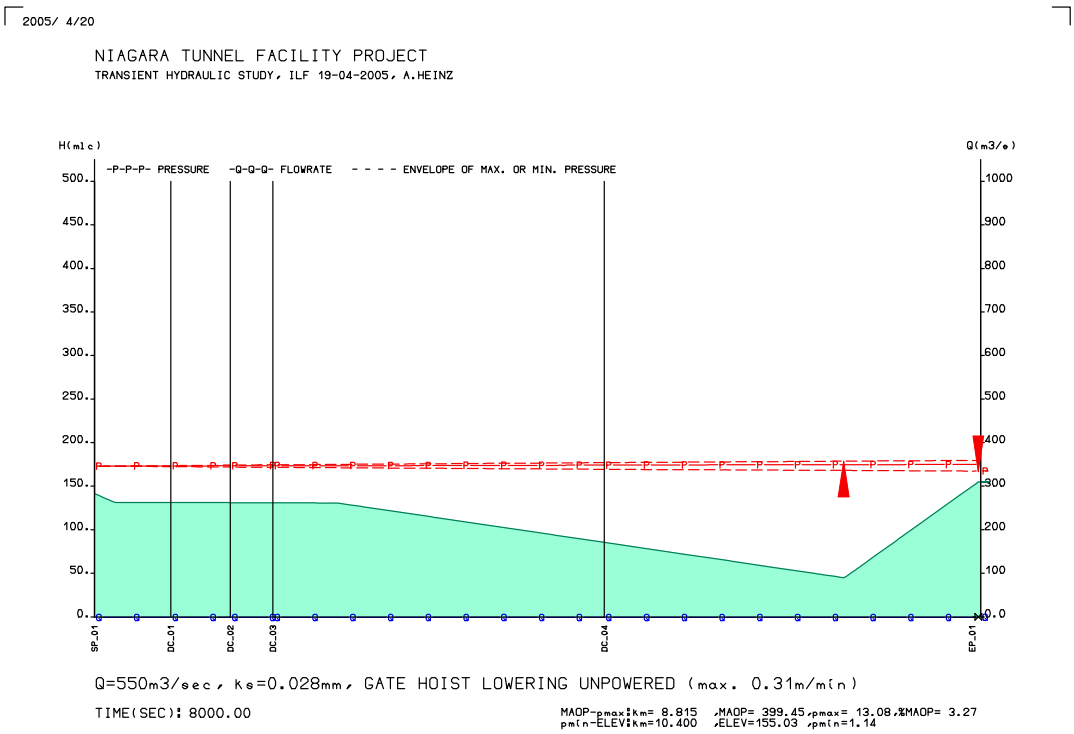
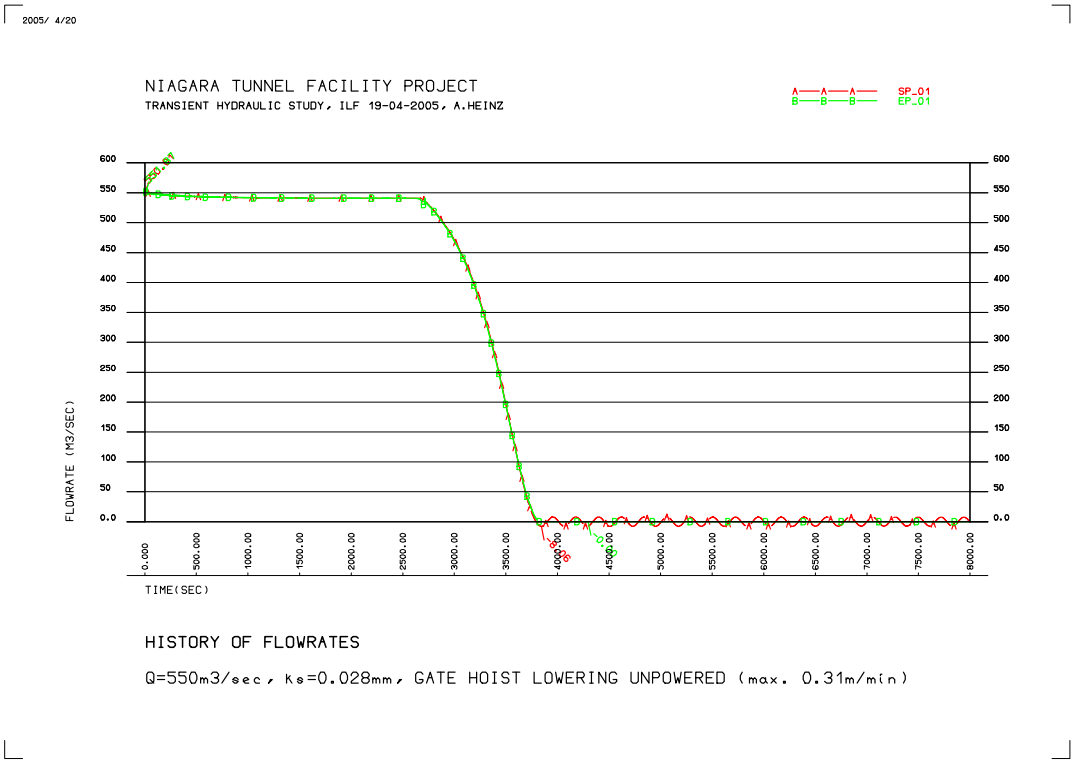
2.4.7.3 Computer Printout's of the Computation Results





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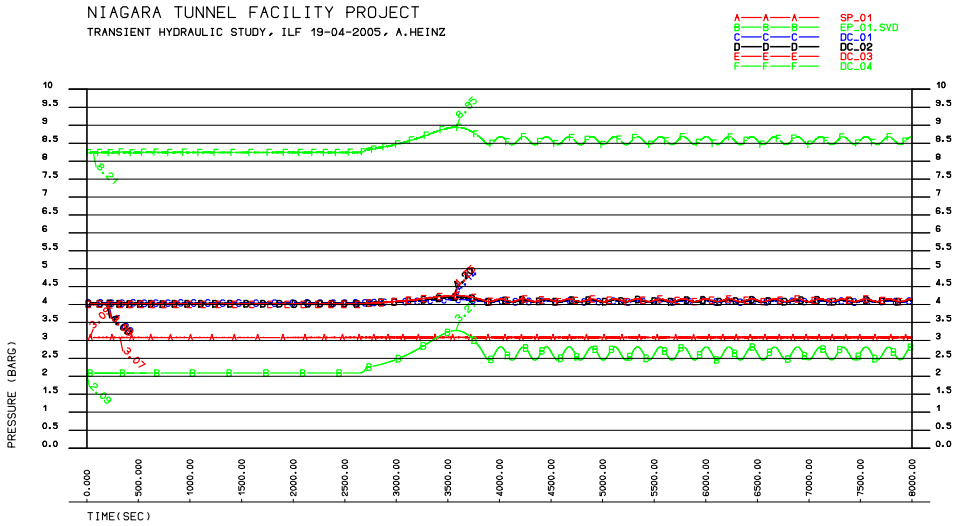

HISTORY OF PRESSURES

Q=550m3/sec, Ks=0.028mm, GATE HOIST LOWERING UNPOWERED (max. 0.31m/min)

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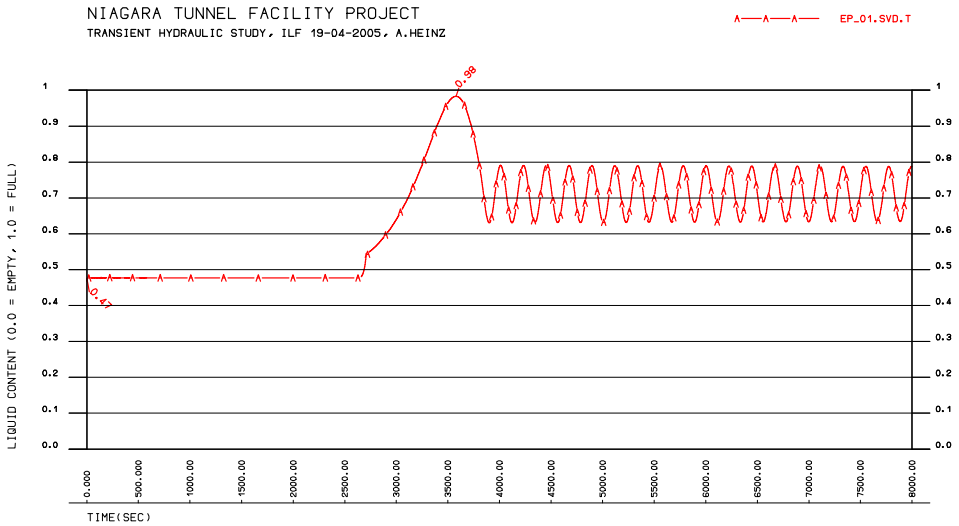

HISTORY OF SURGE VESSEL LIQUID CONTENT

Q=550m3/sec, Ks=0.028mm, GATE HOIST LOWERING UNPOWERED (max. 0.31m/min)

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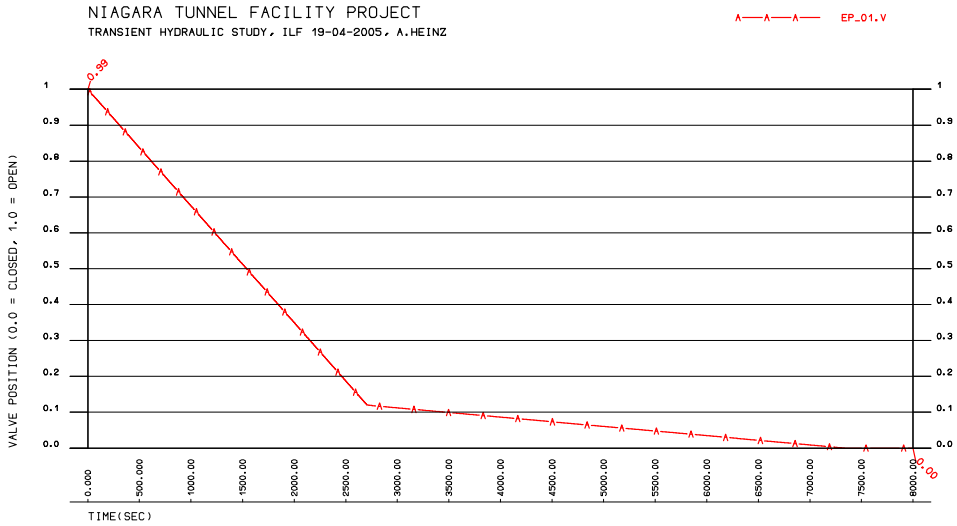

2.4.8 Load case 3: "Gate Hoist Raising (max. speed = 0.16 m/min)"

2.4.8.1 Basic Data

The following basic data have been used:

Maximum speed of raising:	0.16m/min
Discharge at start of the calculations:	0 m^3/s
Roughness of tunnel lining:	ks = 0.028 mm (acc. to Prandtl Colebrook)
Valve type:	gate valve
Valve inside diameter:	15.88 m
Valve design pressure:	ASME 150

2.4.8.2 Result

Raising speed:	5955 sec
Total raising time (0% to 100%)	5955 sec = 99.3 min
Max. water level in the surge shaft:	171.69 m
Min. water level in the surge shaft:	165.39 m

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2.4.8.3 Computer Printout's of the Computation Results

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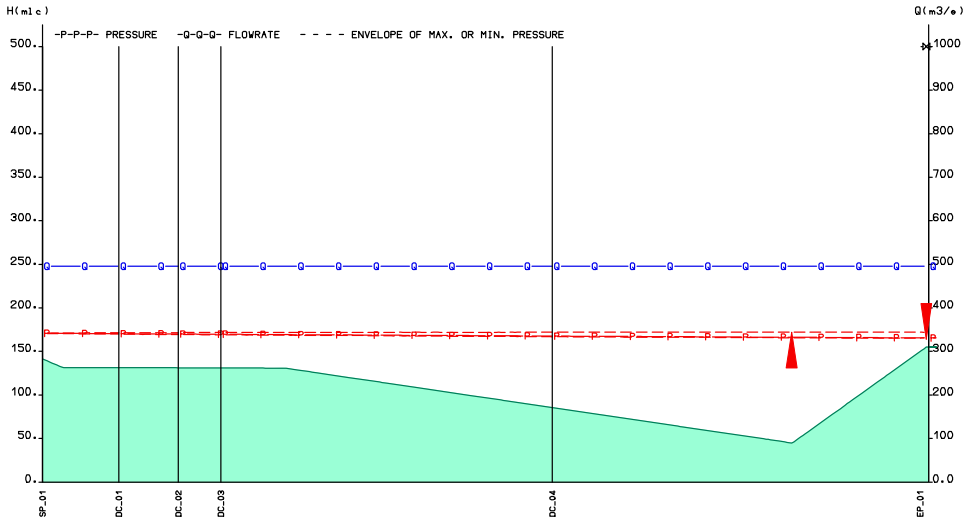
TRANSIENT HYDRAULIC STUDY, ILF 19-04-2005, A.HEINZ



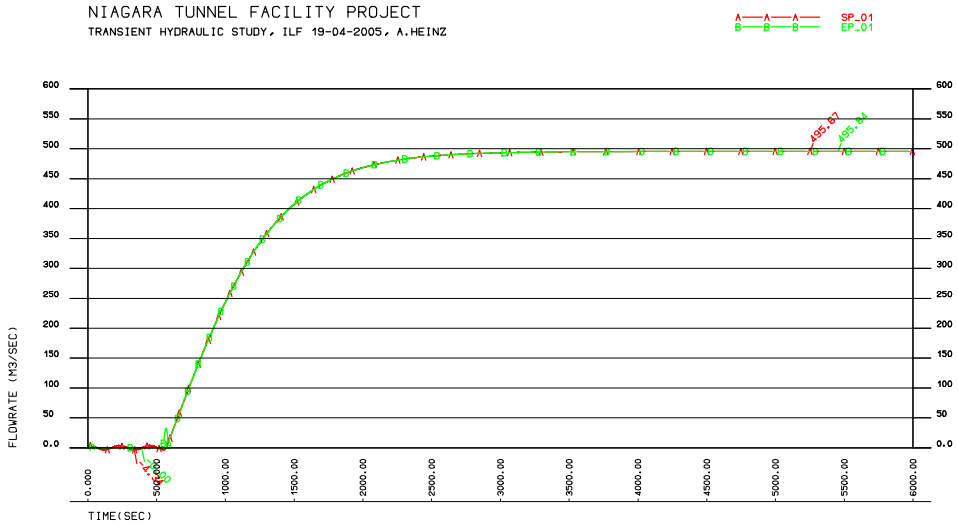
Q=0m3/sec, ks=0.028mm, GATE HOIST RAISING (max. 0.16m/min)

TIME(SEC): 6000.01

MAOP-pmax:km= 8.815 ,MAOP= 399.45,pmax= 12.44,%MAOP= 3.11
pmin-ELEV:km=10.400 ,ELEV=155.03 ,pmin=0.85

2005/ 4/20

NIAGARA TUNNEL FACILITY PROJECT
TRANSIENT HYDRAULIC STUDY, ILF 19-04-2005, A.HEINZ



HISTORY OF FLOWRATES

Q=0m3/sec, ks=0.028mm, GATE HOIST RAISING (max. 0.16m/min)

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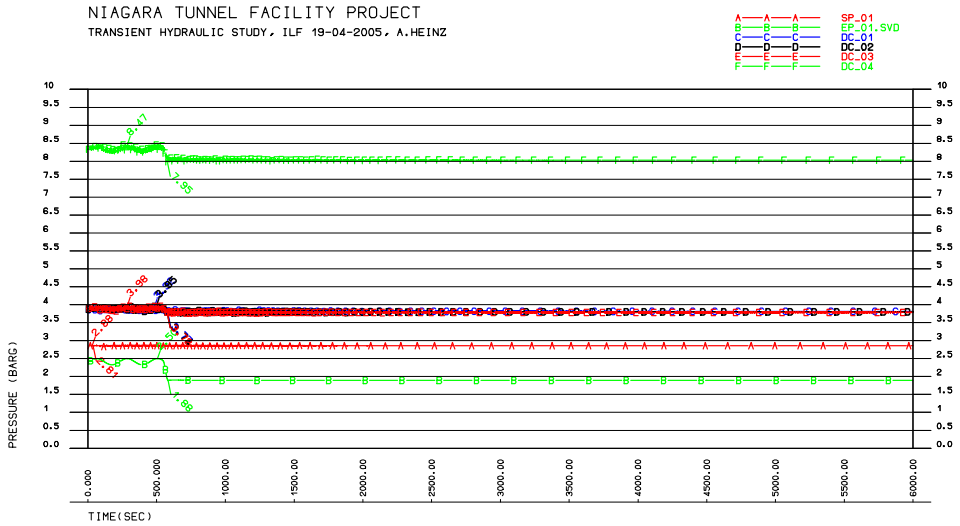

HISTORY OF PRESSURES

Q=0m3/sec, Ks=0.028mm, GATE HOIST RAISING (max. 0.16m/min)

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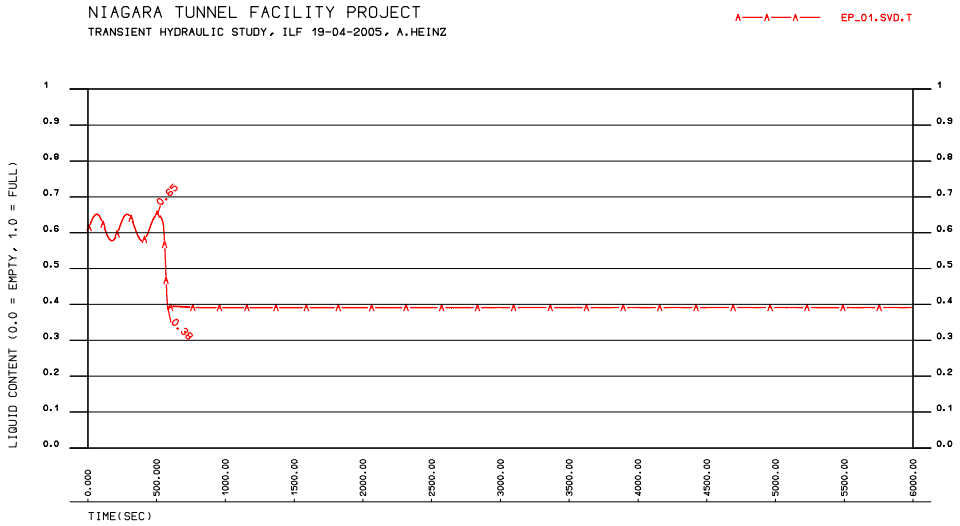

HISTORY OF SURGE VESSEL LIQUID CONTENT

Q=0m3/sec, Ks=0.028mm, GATE HOIST RAISING (max. 0.16m/min)

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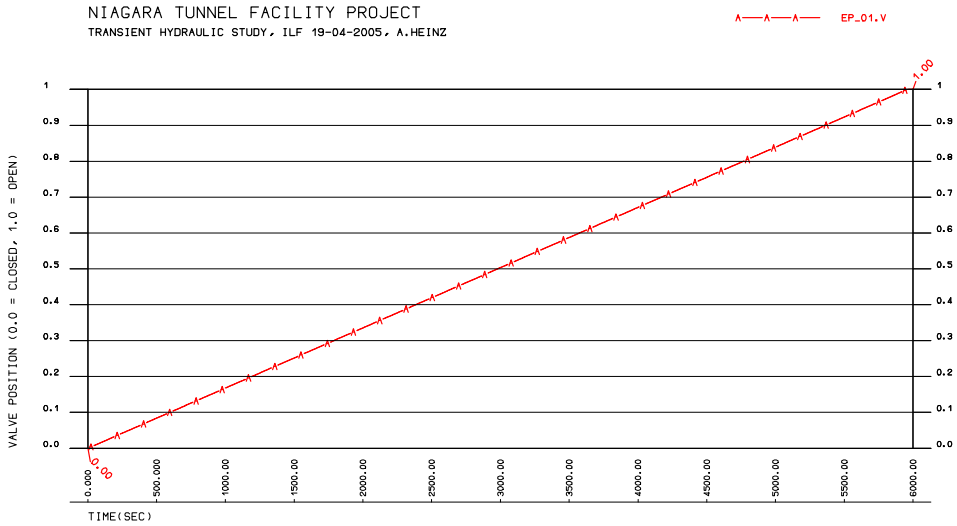

HISTORY OF VALVE POSITIONS

Q=0m3/sec, Ks=0.028mm, GATE HOIST RAISING (max. 0.16m/min)

2.4.9 Computation Results

The above performed hydraulic transient computations lead to the following closing characteristics for the tunnel system endpoint gate valve:

- Total closing time gate valve, powered (max. speed = 0.16 m/min) 165.0 min
- Total closing time gate valve, unpowered (max. speed = 0.31 m/min) 122.7 min
- Total raising time gate valve (max. speed = 0.16 m/min) 99.3 min

As already mentioned above, the computations of these three load cases are strongly influenced by the gate valve zeta v, Kv or Cv characteristics. For the present computations only standard characteristics which provide conservative results have been used. During detail design phase the gate valve manufacturer has to supply the real characteristics and the computations have to be repeated accordingly.
In addition it has to be stated, that during the closing process standard gate valves are hydraulically not active until they reach the set point of approx. 15 to 10 % remaining open position (depends on type and construction of valve). During the first period up to approx. 85 % closure of the gate, when the valve is hydraulically inactive and no pressure surges will be produced, the valve could be operated at a faster closing speed. This fact would minimize the total closing time of the gate. To confirm this statement the mechanical boundary conditions, like size and possible speed of gate actuators, etc., have to be considered as well.

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3 GEOTECHNICAL DESIGN AND CIVIL DESIGN

3.1 Survey

3.1.1 Survey Datum

Drawings and survey relevant data is prepared in NAD North American Datum (NAD83).

3.2 Civil Design Diversion Tunnel

3.2.1 General

The tunnel dimension, the surfaces of linings and lining transitions are designed to deliver the anticipated GFA. The tunnel is capable of being dewatered within a specified time of 3 weeks and the tunnel lining are designed to resisting all internal and external loads that are anticipated during the service life of the Diversion Tunnel.

The final lining concrete is protected by a waterproofing membrane system from the highly aggressive groundwater attack as identified in the GBR.

3.2.2 Tunnel Alignment

The alignment of the Proposal is described in chapter 1.3.1. It shall be noted, that the alignment of the tunnel satisfies the following requirements:

(a) the submerged intake of the tunnel is located beneath Gate 1 of the INCW at the location N 4 770 373.110 and E 658 118.470. The tunnel axis starts with a straight line in plan perpendicular to the centre line of the bridge as indicated on the Concept Drawings.
(b) the outlet structure of the tunnel is located on the northwest side of the SAB2 Canal as indicated on the Concept Drawings. The Diversion Tunnel ends at the location N 4 778 230.990 and E 657 595.510.
(c) the horizontal alignment of the tunnel does remain within the subsurface right of way for the existing tunnels as indicated on the Concept Drawings
(d) the tunnel alignment does allow a future construction of a tunnel similar to the concept design with an intake beneath Gate 4 of the INCW and an outlet structure parallel and located south of the new tunnel outlet structure. The tunnel alignment indicated in the Proposal does allow a future construction of a tunnel also in parallel to the proposed Diversion Tunnel.
(e) the tunnel alignment does not cause severe stresses and strains to the lining of the existing tunnels or to the Toronto Power Generation Station building, wheel pit and dewatering tunnels as determined by numerical analyses. The alignment of the Proposal is crossing the wheel pit and the existing tunnels at a depth, where no influence on the

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existing structures is to be expected.

(f) a dewatering station is provided at the low point of the tunnel. The shafts are located on the Owner's land approx. 50 m east of the eastern rim of the buried St. David's Gorge.

3.2.3 Tunnel Lining Design

1 The tunnel lining consists of

(a) initial shotcrete lining – depending on the excavation and support type applicable for a particular section of tunnel, shotcrete, steel wire mesh, steel ribs and rock dowels are installed for temporary support of ground within adequate time after excavation.

(b) final cast in place concrete lining – which will be capable of accepting all permanent loads.

(c) waterproofing membrane system – which prevents seepage between inside and outside of the Diversion Tunnel and acts as a suitable corrosion protection for the final lining

(d) high pressure interface grouting system – which is designed to prestress the final concrete lining and the surrounding rock such, that no reinforcement of the final concrete lining is required.

Hence the final tunnel lining is watertight under normal operating conditions, rock swelling effects do not occur and the highly corrosive environment that exists along the tunnel alignment does not affect the final tunnel lining.

3.2.4 Tunnel Excavation and Construction

The tunnel will be excavated by means of a TBM starting from the outlet end of the tunnel. The TBM is erected in the flat section of the Outlet canal, pushed into the launch chamber where tunnel boring commences.
At the intake, which is excavated by the time, the TBM arrives, the TBM is dismanteled when leaving the tunnel and taken out of the construction pit in parts.

The use of drill and blast method of excavation will be limited to:

(a) intake structure
(b) intake channel
(c) outlet structure and
(d) outlet canal.

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Two short sections of mined tunnel will also be excavated by drill and blast. These tunnel sections are adjacent to the intake and outlet structures and 12 m and 20 m long respectively. The mined tunnel section at the outlet is used for TBM launch.

The dewatering shafts and tunnel piezometer holes will be drilled from the ground surface by standard boring techniques.

3.2.5 Tunnel Lining Installation

The tunnel initial lining will be installed in due time after excavation from behind the cutter head and from the working platform of the TBM. It consists of steel wire mesh, rock dowels, steel ribs and shotcrete as defined by the applicable support type. The initial lining is installed for the protection of personnel working in the tunnel and used for rock support and drainage of seepage water until the final lining is in place.

Within the TBM backup precast concrete invert segments are placed for to facilitate supply of the TBM advance. The invert segments are placed on a waterproofing membrane layer, which is adequately protected and they are grouted with mortar to be held in place properly. The invert segments serve as a foundation for the formwork of the cast in place final lining and are incorporated in the final lining.

Before the final lining is installed, the preset rings for interface grouting and a waterproofing membrane system consisting of regulating shotcrete, waterproofing membrane and plastic-backed geotextile fleece are fixed to the tunnel surface.

A steel shutter is used to pour the final lining consisting of cast in place concrete in approx. 12 m long sections. Adjustable formwork segments allow to vary the internal diameter of the Diversion Tunnel. Hence, depending on the internal and final lining thickness, maximum flow rates can be accommodated for water transfer. Changes of the internal tunnel diameter as a result of variable lining thickness and adjustable formwork are smoothened by a short transition section to minimize flow losses.

Eventually the final lining of cast in place concrete is prestressed by interface grouting applied between the initial lining and the waterproofing membrane system. The compressed final lining concrete resists the internal water pressure without cracking. The method has been successfully applied in pressure tunnels and shafts of hydro power schemes before (Appendix 3.4).

3.3 Geotechnical Design Approach

3.3.1 Introduction

Tunnel design is governed by the fact that "Rock masses are so variable in nature that the chance for ever finding a common set of parameters and a common set of constitutive

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equations valid for all rock masses is quite remote." [3.15]. Therefore it has to be taken into account that, prior to tunnelling, any design represents a prediction which is either (a) verified on site in the event that all design assumptions are confirmed or (b) adjusted in situ to suit actual conditions. Figure 3.1 indicates the design approach which has been adopted. The design procedure is based on the guideline for the geomechanical design of underground structures [3.9] developed by the Austrian Society for Geomechanics. The first step of the design procedure is to establish geological data in those sections along the tunnel profile with consistent characteristics and then to summarize the geological series with similar mechanical properties. Further, the boundary conditions such as virgin stresses, size, shape and orientation of the opening have to be taken into account in order to establish a possible failure mechanism, thereby establishing the behaviour of the opening. Different failure mechanisms require different support measures as well as models of analysis to design the support measures. In order to simplify procedures at the site, support types are established which are applicable for the various types of behaviour of the opening.

The subject chapter deals with the determination of rock mass types including characteristic rock mass parameters and the allocation of rock mass behaviour types for the Niagara Tunnel Facility.

Note: It is assumed that all geotechnical parameters with a range derived from [3.19] were determined according to chapter 1 clause 9 of [3.19]. Therefore no further modifications of the values were carried out by the Proponent. If no range was given the range was calculated according to chapter 1 clause 8 of [3.19].

All geotechnical and hydrological findings for the project are summarized on drawing PD-01-1002 "Diversion Tunnel, Geotechnical Longitudinal Section" in a condensed form.

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3.3.3 Summary of Geologic Conditions

Twelve stratigraphic formations are identified in the project area, which consist of sequences of sedimentary rock of Ordovician to Devonian age. These are namely the Guelph, Lockport, De Cew, Rochester, Irondequoit, Reynales, Neahga, Grimsby, Power Glen, Whirlpool and Queenston formations. Some of these are only a few meters thick. Eleven of the mentioned formations are expected to be encountered along the tunnel. The uppermost Guelph

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formation will not intersect with the proposed tunnel alignment. The lithological spectrum of the encountered formation covers limestone, dolostone, sandstone and shale.

The rock formations dip gently towards south at an average rate of 5m/km. Major faults are not reported from the project area. However minor faults exist, forming thin shears parallel to bedding, up to a maximum thickness of 100mm and consisting of fine and coarse crushed material. It is assumed that these structures are related to stress relief, common in the Niagara region. Regional joint measurements revealed the existence of 4 major joint sets. The prevailing strike direction are 5°, 85°, 135° and 45°, all dipping at a high angle or vertical.

In situ stress conditions in southern Ontario are characterised by high horizontal stress, exceeding vertical stresses in parts significantly. The stress field is reported to be relatively consistent trending in a north-eastern direction. However the magnitudes of stress and the direction of the maximum stress can vary significantly depending on lithology, depth and topographical features.

Three major groundwater flow regimes are encountered in the rock formations of the project area. The uppermost occurs in the Guelph, Lockport and De Cew formations. These strata form the uppermost aquifer of the project area and are connected to surface water. This aquifer shows the highest permeability of the entire sequence. A second flow regime is associated with the low permeability strata of the Rochester, Neahga, Power Glen and Queenston formations, forming a system of aquitards. A third flow regime is associated with the deeper, higher permeable strata of the Irondequoit, Reynales, Thorold, Grimsby, Whirlpool and upper Queenston formations. These strata form deep lying aquifers. Groundwater elevations are reported to vary significantly from stratum to stratum and from location to location. Some groundwater heads encountered showed artesic behaviour with pressure heads above ground level. It is assumed that these characteristics are associated with the occurrence of natural gas. Water of the two lower flow regimes is reported to be highly corrosive and concrete aggressive, containing relevant amounts of chloride and sulphate. Chemical properties of the uppermost flow regime vary significantly depending on the influence of surface water.

Natural gas occurrence is common on the Niagara Peninsula. However the amounts of gas encountered during previous tunnel constructions were limited.

Geological/geotechnical input data have been derived from OPG documents [3.10]. Based on this data the Rock Mass Types and Rock Mass Behaviour Types have been defined.

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Geotechnical Design

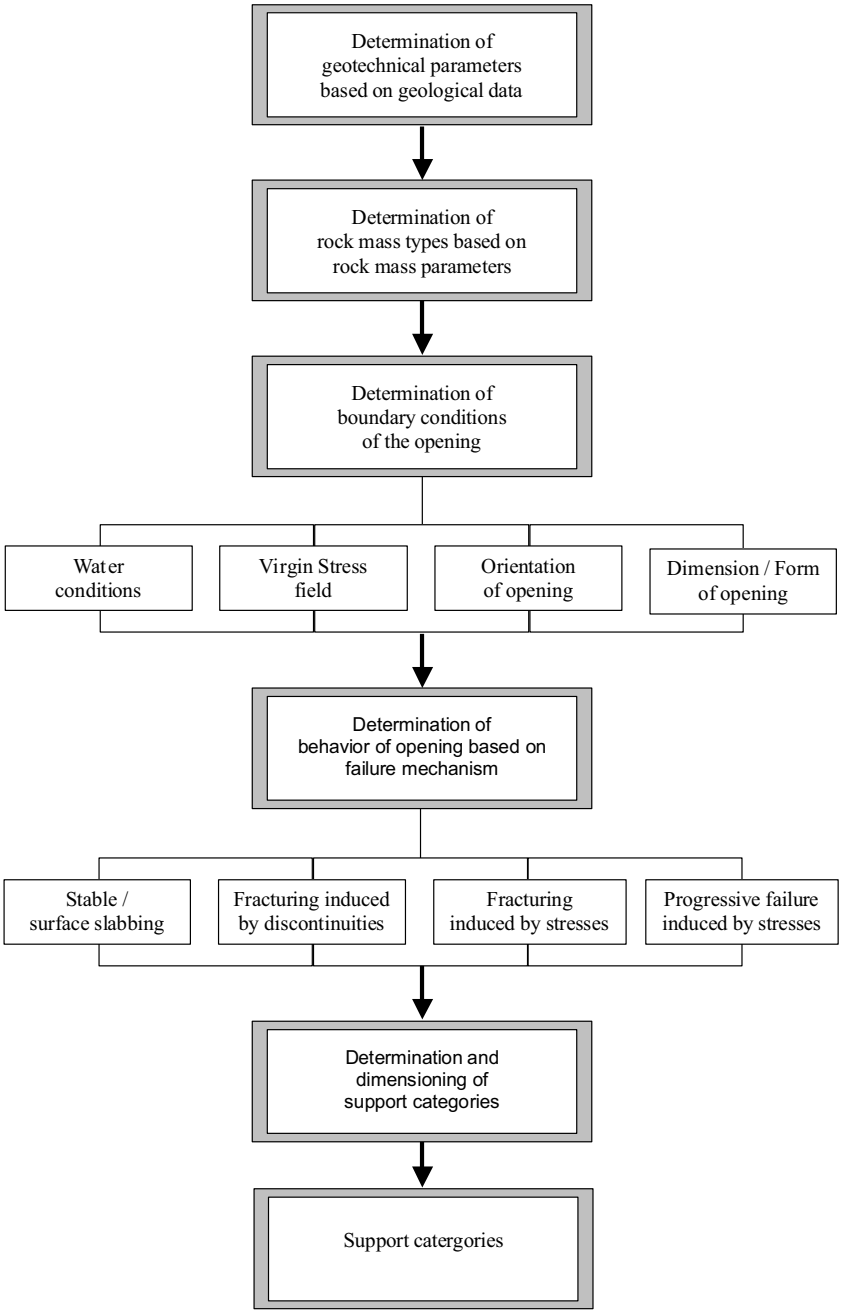

Figure 3.1: Flowchart for the Geotechnical Design

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3.3.4 Rock Mass Types

The rock mass types (RT) are defined using relevant geotechnical rock volumes including lithology, discontinuities and tectonic structures. The characteristics of the rock mass types are governed by:

- Lithology
- Properties of discontinuities
- Strength parameters of intact rock
- Conditions affecting parameters of intact rock and of rock mass

Six characteristic geotechnical parameters are used to define thirteen rock mass types for the Niagara Facility Tunnel project which are summarized in the following table 3.1.

3.3.5 Geotechnical Parameters

The geotechnical rock mass parameters are derived based on Hoek-Brown's mass law described in detail in [3.6]. The general form of the Hoek-Brown's failure criterion is:

$$\sigma_1 = \sigma_3 + \sigma_{ci} \cdot \left(m_b \cdot \frac{\sigma_3}{\sigma_{ci}} + s \right)^a$$

σ_1, σ_3 are the major and minor principal effective stresses

m_b is the Hoek-Brown constant for rock masses

s, a are parameters describing rock mass properties

σ_{ci} is the uniaxial compressive strength of the intact rock (obtained from [3.19], table 6.3)

The Hoek-Brown criterion thus establishes a connection between the principal effective stresses. The rock mass parameters m_b, *a* and *s* can be derived by means of the following parameters:

- Hoek-Brown constant for intact rock *mi*
- Geological Strength Index *GSI*

Values for Hoek-Brown constant *mi* were derived using the *mi*-chart provided with the software RocLab [3.12]. The *GSI* is a parameter introduced by Hoek in 1994, providing a numerical rating of the rock masses based on the structure and discontinuity surfaces of the rock mass. The *GSI* values were derived by evaluating average joint spacing and surface conditions of the individual rock formations, using the *GSI*-chart provided in [3.1] (see also Appendix 3.2).

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Table 3.1: Rock mass types

	Rock Mass Types (RT)						
	RT-1	RT-2	RT-3	RT-4	RT-5	RT-6	RT-7
Formation	Lockport	De Cew	Rochester	Irondequoit	Reynales	Neahga	Thorold
Thickness [m]	43-45	2-3	17-19	2,5-4	3,5-4,5	1,5-2	2-3,5
Lithology	Dolostone, thin to thick bedded, irregular shale partings in the Goat Island member, vugs common, chert nodules common, slightly fractured, gas pockets in upper section	Dolostone, thin to thick bedded, irregular shale partings, zones and nodules of gypsum, moderate to slightly fractured	shale with interbeds of limestone and dolostone, laminated, thin to thick bedded, pyrite and gypsum partings, slightly fractured, gas pockets	limestone, medium bedded to massive, wavy irregular shale partings, few vugs and small pores, slightly fractured, gas producing	Dolostone turing to limestone with depth, argillaceous and siliceous zones, numerous wavy shale partings, slightly fractured	shale, laminated, fissile to thick bedded, pyrite and gypsum partings, slakes during wet-dry cycles, moderately fractured	fine to medium grained sandstone, thin to thick bedded, irregular shale partings, moderately fractured, gas producing
Weathering	slightly weathered	fresh	slightly weathered	slightly weathered	fresh	fresh to slightly weathered	fresh to slightly weathered
Spacing of Discontinuities [m]	0,5	0,5	0,4	0,7	0,5	0,2	0,3
Roughness	slightly rough, some slickensides	slightly rough and planar, some slickensides	slightly rough and planar with occional clay infilling	rough, irregular	rough and planar to slightly irregular	smooth and planar, slickensides	rough and slightly irregular
UCS [MPa]*	106-196 (151)	90-166 (128)	12,1-66 (42)	60-10 (89)	45-141 (101)	12-24 (18)	117-141 (129)
GSI*	60-70 (65)	60-70 (65)	60-70 (65)	60-70 (65)	60-70 (65)	45-55 (50)	60-70 (65)

	Rock Mass Types (RT)					
	RT-8	RT-9	RT-10	RT-11	RT-12	RT-13
Formation	Grimsby	Power Glen	Whirlpool	Queenston Q10 to Q8	Queenston Q7 to Q4	Queenston below St. D. G.
Thickness [m]	12,5-15	10-13	4,5-8,5	>300		
Lithology	fine to medium grained sandstone with interbedded shale, thin to thick bedded, often calcareous, a weathered zone frequently occurs at the top of the formation, moderately fractured, gas producing	shale with siltstone beds and stringers, limestone and dolomite beds, slightly fractured	fine to medium grained sandstone, medium bedded and cross bedded, occasional shale inclusions and chloritic shale partings occur throughout, slightly fractured, gas producing	shale, thin to medium bedded, moderately fractured, gas encountered along primary bedding planes	shale, thin to medium bedded, scattered gypsum nodules occur throughout lower section, slightly fractured, gas encountered along primary bedding planes	shale, thin to medium bedded, scattered gypsum nodules occur throughout lower section,intensely fractured, gas encountered along primary bedding planes
Weathering	fresh	fresh	fresh	fresh to slightly weathered	slightly weathered	slightly weathered
Spacing of Discontinuities [m]*	0,3	0,4	0,5	0,3	0,5	0,1
Roughness	slightly rough and irregular, some slickensides	slight rough and irregular	rough and irregular	rough and slightly irregular, numerous slickensides	rough and slightly irregular, some slickensides	rough and slightly irregular, slickensides
UCS [MPa]**	74-242 (146)	12-34 (24)	108-235 (180)	8-118 (33)	8-118 (46)	8-118 (33)
GSI**	55-65 (60)	55-65 (60)	70-80 (75)	55-65 (60)	60-70 (65)	40-50 (45)

* av. spacing

** min-max (av.)

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The relevant information concerning average joint spacing and discontinuity surface conditions were derived from [3.10] and [3.19]. These values enable the parameters *s* and *a,* to be defined as follows:

$$m_b = m_i \cdot \exp\left(\frac{GSI - 100}{28\text{-}14D}\right)$$

$$s = \exp\left(\frac{GSI - 100}{9 - 3D}\right)$$

$$a = \frac{1}{2} + \frac{1}{6}\left(e^{-GSI/15} - e^{-20/3}\right)$$

D (Disturbance Factor) is a factor which depends upon the degree of disturbance to which the rock mass has been subjected by blast damage and stress relaxation. It varies from 0 for undisturbed in situ rock masses to 1 for very disturbed rock masses. Due to the planed excavation method the *D*-Factor was generally assumed to be 0.

The Hoek-Brown criterion serves to derive the Mohr-Coulomb parameters ϕ' and c'. Furthermore, the modulus of elasticity using the parameters σ_{ci} and *GSI* can also be determined.

$$\phi' = \sin^{-1}\left[\frac{6am_b(s + m_b\sigma'_{3n})^{a-1}}{2(1+a)(2+a) + 6am_b(s + m_b\sigma'_{3n})^{a-1}}\right]$$

$$c' = \frac{\sigma_{ci}\left[(1+2a)s + (1-a)m_b\sigma'_{3n}\right](s + m_b\sigma'_{3n})^{a-1}}{(1+a)(2+a)\sqrt{1 + (6am_b(s + mb\sigma'_{3n})^{a-1})/((1+a)(2+a)}}$$

where $\sigma_{3n} = \sigma'_{3\max} / \sigma_{ci}$

The value of $\sigma'_{3\max}$ is the upper limit of confining stress over which the relationship between the Hoek-Brown and the Mohr-Coulomb criteria is considered.

$$Em(GPa) = \left(1 - \frac{D}{2}\right)\sqrt{\frac{\sigma_{ci}}{100}}10^{((GSI-10)/40} \text{ for } \sigma_{ci} \leq 100$$

$$Em(GPa) = \left(1 - \frac{D}{2}\right)10^{((GSI-10)/40} \text{ for } \sigma_{ci} > 100$$

The results of the calculations are listed in table 3.2.

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Table 3.2: Determination of rock mass parameters according to Hoek-Brown

Formation	Lithology	Joint Spacing		Parameter of intact rock				Rock Mass Parameters							
		Mean		UCS		mi		GSI		φ		C		Def. Modulus	
		J/m	Spac.	[MPa]		[-]		[-]		[°]		[MPa]		[GPa]	
			[m]	mean[1]	range[1]	mean	range	mean	range	mean	range	mean	range	mean	range
Lockport	Limestone	2,1	0,5	151	106-196	9	1	65	5	34	2	9,5	4,0	24	6
	Dolostone	2,1	0,5	125	87-163	9	2	65	5	34	3	7,9	3,0	24	7
DeCew	Dolostone	2,1	0,5	128	90-166	9	2	65	5	34	3	8,0	3,0	24	7
Rochester	Shale	2,3	0,4	42	12,1-65,5	7	1	65	5	32	2	2,5	2,0	15	9
Irondequoit	Dolostone/ Limestone	1,4	0,7	89	60,3-105,2	10	1	65	5	35	2	5,7	2,0	22	8
Reynales	Dolostone	2,1	0,5	101	45-140,8	9	2	65	5	34	3	6,3	4,0	24	8
Neahga	Shale	5,5	0,2	18	12,0-24,0	6	1	50	5	26	3	0,8	0,4	4	2
Thorold	Sandstone	3,7	0,3	129	117,4-141,3	18	2	65	5	40	2	9,5	2,0	24	6
Grimsby	Sandstone	3,9	0,3	146	73,5-242,2	17	2	60	5	38	2	9,9	5,0	18	6
	Shale	3,9	0,3	35	12,8-64,4	7	1	60	5	30	2	1,2	0,6	11	6
Power Glen	Shale	2,5	0,4	24	11,9-33,9	7	1	60	5	30	2	1,3	0,6	9	4
	Sandstone	2,5	0,4	152	71,7-223,8	17	2	60	5	38	2	10,3	6,0	18	6
Whirlpool	Sandstone	1,9	0,5	180	108-234,5	19	2	75	5	43	2	16,0	7,0	42	10
Queenston	Q8-Q10 (app. 30m thick)	3,6	0,3	33	7,5-117,5	7	1	60	5	30	2	1,8	1,0	10	6
	Q1-Q7	1,9	0,5	46	7,5-117,5	8	1	65	5	33	2	2,8	2,0	16	11
	25m below St. David's Gorge	8,2	0,1	33	7,5-117,5	6	1	45	5	24	2	1,3	1,0	4	3

[1]) It is assumed that that the values for UCS of intact rock,obtained from GBR A, table 6.3, were determined according to chapter 1, point 8 and 9 of GBR A

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3.4 Rock Mass

Rock mass behaviour is decisive for the design of the required initial support and final lining of a tunnel. Various methods have been applied in order to determine rock mass behaviour along the proposed tunnel alignment including block stability analyses and FE-modelling. Details of the applied methodology are summarized in [3.17].

3.4.1 Boundary Conditions

The boundary conditions influencing the rock mass behaviour can be listed as follows:

- Rock mass properties
- In situ stress conditions
- Groundwater conditions
- Orientation of the opening
- Dimension and shape of the opening

3.4.1.1 Rock Mass Properties

Rock mass properties to be encountered along the tunnel are presented in chapters 3.3.4 and 3.3.5.

3.4.1.2 In Situ Stress Conditions

Extensive in situ testing was carried out in order to determine stress conditions along the tunnel alignment. The results to be considered for the tunnel design are presented in table 6.14 of the [3.19]. These results cover the Concept Alignment which is basically situated within the Queenston Formation.

For the Proposal, in situ horizontal stress conditions included in GBR-A were adopted for design. Vertical stress is assumed to be governed by the overburden only with the exception of the outlet section. There 3D in situ stress measurements indicate, that vertical stresses are 30% higher than stresses induced by overburden only.

The following table 3.3 summarizes the in situ stress conditions considered for the design.

Table 3.3: Stress Regimes for Design Purposes

In Situ Stress Conditions along the Proposed Tunnel Alignment					
Tunnel section	Horizontal Stress (respect to tunnel)		Vertical Stress		
	[MPa]	[MPa]	[MPa]		
	Radial	Axial	min	max	mean
0+000-2+840	17	11	0,5	2,3	1,4
2+840-7+070	19	17	2,3	3,9	3,1
7+070-8+900	22	16	3,3	3,4	3,3
8+900-10+421,380	15	23	0,6	4,5	2,6

Several attempts have been made in the past in order to predict the effect of in situ stress on rock mass behaviour and support requirements for underground structures. Hoek and

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Brown introduced the Hoek-Brown stability classification based on their experiences from deep lying mines in South Africa. This classification system is based on the evaluation of the relation between σ_1 and σ_c for a K_o = 0,5. To overcome this limitation the Damage Index was introduced, which can be correlated to the Hoek-Brown stability classification (see Figure 3.2).

$$Di = \frac{\sigma_{\max}}{\sigma_c}$$

where:

$\sigma_{\max} = 3\sigma_1 - \sigma_3$ is the maximum tangential boundary stress, and

σ_c is the uniaxial compressive strength of the intact rock.

The below figure shows the correlation between *Di* and the Hoek-Brown stability classification. According to this classification:

$\frac{\sigma_1}{\sigma_c} \leq$ 0,1: stable rock mass, no support required

$\frac{\sigma_1}{\sigma_c} =$0,2: minor spalling, light support

$\frac{\sigma_1}{\sigma_c} =$0,3: severe spalling, moderate support

$\frac{\sigma_1}{\sigma_c} =$0,4: heavy support required

$\frac{\sigma_1}{\sigma_c} \geq$ 0,5: extremely difficult to support

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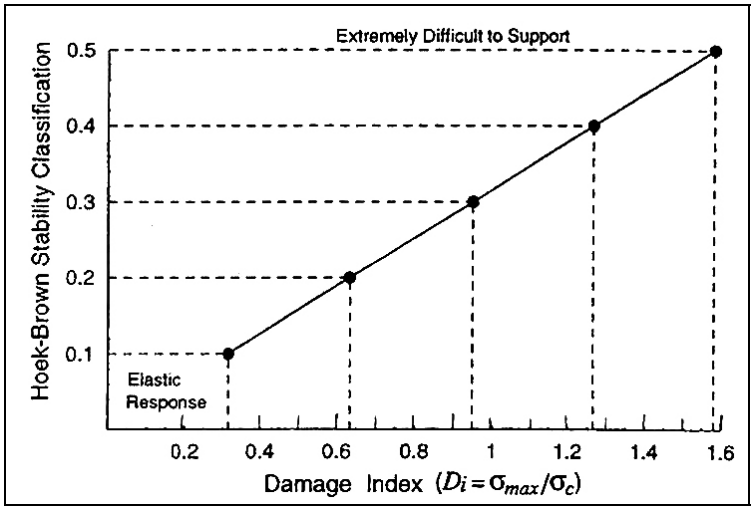

Figure 3.2: Correlation between Damage Index (*Di*) and the Hoek-Brown Stability Classification

The depth of stress induced failure was estimated using the below formula.

$$\frac{Rf}{a} = 0{,}49(\pm 0{,}1) + 1{,}25 * Di$$

Rf is the depth of failure measured from the tunnel center

a is the tunnel radius.

Both procedures are derived from [3.8]. The results of the calculations are summarised in Appendix 3.3 for the four tunnel sections shown in Table 3.3. They were used for choosing the necessary model for evaluating rock mass behaviour (see Chapter 3.4.2).

3.4.1.3 Groundwater Conditions

Groundwater can have a major impact on rock mass behaviour during tunnel construction. Groundwater conditions along the proposed tunnel alignment are expected to vary significantly due to the encountered rock mass properties. Significant groundwater inflow is to be expected within the Lockport and the De Cew Formations. It is assumed that groundwater has no influence on rock mass behaviour of those formations, due to their rock mass properties.

Groundwater inflow in the below situated formations is very limited. Thus it is assumed that groundwater has, despite rock mass swelling, no influence on rock mass behaviour.

Within shale formations, groundwater can trigger rock mass swelling if appropriate clay minerals are available.

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Groundwater inflow to the tunnel was estimated following the procedure described in [3.11]. This procedure follows Heuer's experience [3.3], which shows that tunnel inflow is 1/8 of that predicted by Goodman's equation [3.2].

$$Q = \frac{2 * \pi * kf * H}{\ln(\frac{2 * H}{r})} * \frac{1}{8}$$

where:

Q is tunnel inflow in m³ per second

kf is the permeability

H is the groundwater table above tunnel center

r is the tunnel radius (the calculations were carried out for a tunnel radius of app. 7,2m).

The following table 3.4 summarizes the results of these calculations.

Table 3.4: Estimated Groundwater Inflow for the Niagara Facility Tunnel

Section	Length	Formation	Q [l/s*100m]		
			min	max	av
1	230	Rochester (Outlet)	0,00	1,0	0,1
2	130	Reynals	0,00	0,1	0,1
3	190	Grimsby	0,00	0,6	0,1
4	210	Power Glen	0,00	1,2	0,4
5	460	Upper Queenston	0,00	4,5	0,7
6	305	Lower Queenston	0,00	0,5	0,1
7	530	St. Davids Gorge	0,00	1,4	0,2
8	4445	Lower Queenston	0,00	0,5	0,1
9	2835	Upper Queenston	0,00	5,1	0,9
10	230	Whirlpool	0,00	2,2	0,4
11	320	Grimsby	0,00	1,1	0,1
12	305	Rochester	0,00	1,6	0,2
13	235	Lockport (Inlet)	0,00	92,3	12,3

Note that the above shown sections are listed in direction of the tunnel advance.

The results of the calculations were compared to the water inflow encountered in the test adit which was in total 0,74l/s during and 0,14l/s after tunnel construction for the 612m long tunnel. The test adit is situated in the Queenston Formation, therefore only calculation results for the Queenston Formation can be directly correlated to these findings.

In addition the hydrochemical properties of the encountered groundwater were evaluated in order to predict the influence on steel and concrete. Testing results showed that the groundwater encountered in the formations below the Eramosa member of the Lockport formation contain in general significant contents of chloride and sulphate and thus is to be classified as highly corrosive and concrete aggressive. Excluded from this general assumption has to be a tunnel section around borehole NF4 where chloride and sulphate contents are

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significantly lower. It is assumed that surface water inflow from the existing channel is causing dilution of the groundwater.

The Lockport formation shows highly variable chloride and sulphate contents due to the changing influence of surface water all along the tunnel alignment.

The results of the evaluation of the hydrochemical testing with respect to the tunnel alignment are summarized in Appendix 3.1. The assumed distribution of the hydrochemical properties along the tunnel alignment is shown in [3.14].

3.4.1.4 Orientation of Opening

The orientation of the opening relative to the major discontinuity sets governs the stress relevant for the tunnel design. It also has a major impact on size, shape and stability of rock wedges formed by the intersection of discontinuities and the tunnel opening. Therefore the orientation of the opening is considered in the block stability analysis as well as the FE-analysis.

3.4.1.5 Dimension and Shape of Opening

The distribution of stress around the tunnel opening is governed to a large extent by the size and shape of the opening. They also affect size and shape of potentially unstable blocks during tunnel excavation. Therefore the size and shape of the opening are considered in the block stability analysis as well as in the FE-analysis.

The bored part of the Diversion Tunnel has a circular excavation cross section of 14.44 m diameter. The circular cross section is favourable for redistribution of stresses, which develop in the rock mass around the excavation opening. Rock mass loosening will such be minimized.

A short section of tunnel, adjacent to the Intake and Outlet structures, is excavated by mining methods. The tunnel cross section has to be changed from circular to square on a length, which corresponds to approximately one tunnel diameter. The square end of excavation is up to 19 m wide. The excavation cross section at the interface to the bored tunnel is horse-shaped and 16 m wide and 17 m high at its top.

The cross sections for channels at the Intake and the Outlet area is generally rectangular.

3.4.2 Rock Mass Behaviour Types

In total 8 basic rock mass behaviour types have been identified along the tunnel alignment. It has to be mentioned that some rock mass behaviour types can coexist along a tunnel section since some types represent short term rock mass behaviour (e.g. wedge failure) and some types represent long term rock mass behaviour (e.g. swelling or squeezing rock). During future design phases it may be found reasonable to refine this rock mass classification by partitioning the identified rock mass behaviour types into more subtypes.

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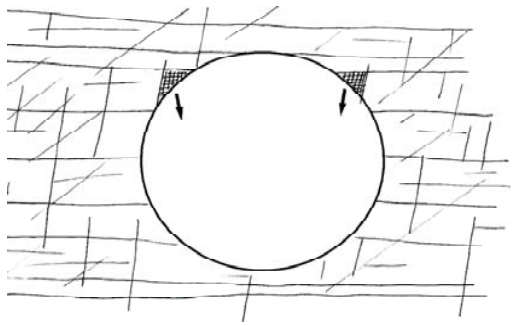
Note that rock mass behaviour types are defined considering an endless long tunnel without any construction stages and support measures.

3.4.2.1 Behaviour Type 1: Stable Rock

Rock mass behaviour was analysed using block theory. The block modelling was carried out applying the software UNWEDGE [3.13].

Rock Mass Behaviour: Stable Rock Mass		
 Sketch of assumed rock mass failure; wedges not in scale		
Formations	Lockport, De Cew, Irondequoit, Reynales, Whirlpool	
Characteristics of Discontinuities	Bedding: Persistence: >20m Spacing: dm - m Roughness: rough to slightly rough, fresh to slightly weathered	Joints: Persistence: <10m Spacing: dm - m Roughness: rough to slightly rough, fresh to slightly weathered
In Situ Stress Conditions	in situ stresses do not exceed rock mass strength	
Groundwater Conditions	groundwater conditions are varying from wet to flowing, significant inflow will occur close to ground surface (Lockport and De Cew Formation)	
Rock Mass Behaviour	local, gravity controlled failure of rock wedges induced by discontinuities; max. wedge size up to several dm^3; groundwater has no influence on rock mass behaviour	
Deformations	minor deformation < 5mm, which stabilize quickly	

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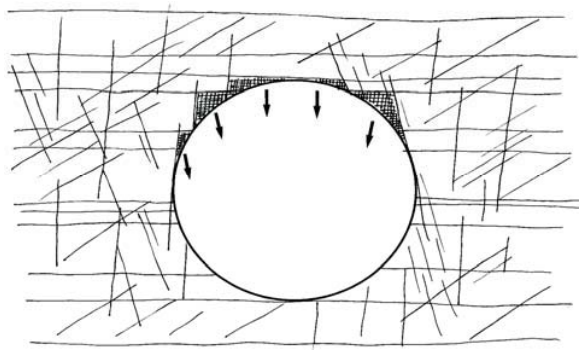
3.4.2.2 Behaviour Type 2A: Failure of Rock Blocks Induced by Discontinuities

Rock mass behaviour was analysed using block theory. The block modelling was carried out applying the software UNWEDGE [3.13].

Rock Mass Behaviour: Failure of Rock Blocks Induced by Discontinuities		
 Sketch of assumed rock mass failure; wedges not in scale		
Formations	Irondequoit, Reynales, Thorold, Grimsby, Whirlpool, Queenston	
Characteristics of Discontinuities	Bedding: Persistence: >20m Spacing: dm - several m Roughness: rough to slightly rough, fresh to slightly weathered, clayey infilling possible (fault gauge)	Joints: Persistence: <10m Spacing: dm - m Roughness: rough to slightly rough, fresh to slightly weathered
In Situ Stress Conditions	in situ stresses do not exceed rock mass strength	
Groundwater Conditions	groundwater conditions are varying from dry to wet	
Rock Mass Behaviour	systematic, gravity controlled failure of rock wedges induced by discontinuities; max. wedge size up to several m³; the assumed groundwater quantities have no influence on rock mass behaviour; changes of the moisture content of the rock mass of shale formations can contribute to rock mass degradation; it is assumed that it takes several month till cracks of sufficient extent develop to delaminate rock blocks	
Deformations	minor deformation < 20mm, which stabilize quickly	

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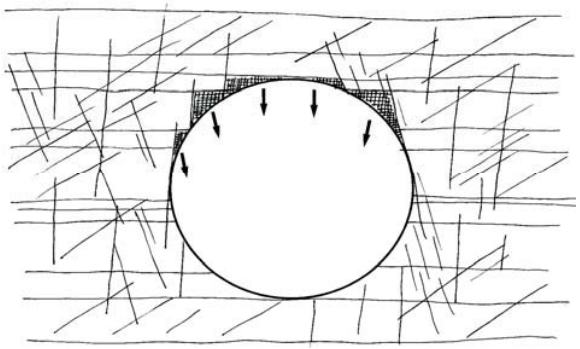
3.4.2.3 Behaviour Type 2B: Failure of Rock Blocks Induced by Discontinuities

Rock mass behaviour was analysed using block theory. The block modelling was carried out applying the software UNWEDGE [3.13].

Rock Mass Behaviour: Failure of Rock Blocks Induced by Discontinuities		
 Sketch of assumed rock mass failure; wedges not in scale		
Formations	Lockport, De Cew	
Characteristics of Discontinuities	Bedding: Persistence: >20m Spacing: dm - several m Roughness: rough to slightly rough, fresh to slightly weathered	Joints: Persistence: <10m Spacing: dm - m Roughness: slightly rough, slightly weathered
In Situ Stress Conditions	in situ stresses do not exceed rock mass strength	
Groundwater Conditions	groundwater conditions are varying from wet to flowing	
Rock Mass Behaviour	systematic, gravity controlled failure of rock wedges induced by discontinuities; max. wedge size up to several m³; groundwater can reduce shear strength of discontinuities	
Deformations	minor deformation < 5mm, which stabilize quickly	

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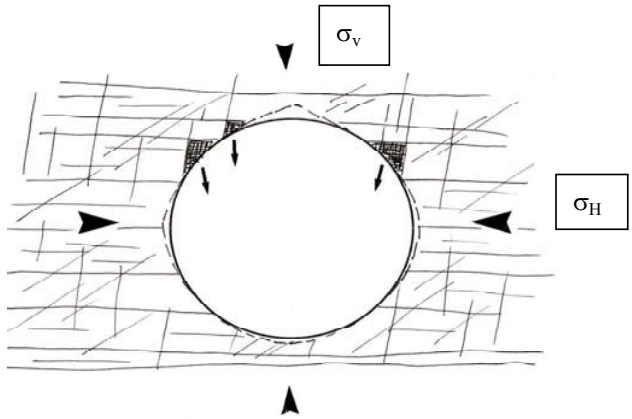
3.4.2.4 Behaviour Type 3A: Failure of Rock Blocks Induced by Stress and/or Discontinuities

Rock mass behaviour was analysed using block theory and the FE-method. The block modelling was carried out applying the software UNWEDGE [3.13].

Rock Mass Behaviour: Failure of Rock Blocks Induced by Stress and/or Discontinuities		
 Sketch of assumed rock mass failure; wedges and stress induced failure depth not in scale		
Formations	Rochester, Irondequoit, Reynales, Neahga, Thorold, Grimsby, Power Glen, Whirlpool, Queenston	
Characteristics of Discontinuities	Bedding: Persistence: >20m Spacing: dm - several m Roughness: rough to slightly rough, fresh to slightly weathered, clayey infilling possible (fault gauge)	Joints: Persistence: <10m Spacing: dm - m Roughness: rough to smooth, fresh to slightly weathered
In Situ Stress Conditions	in situ stresses slightly exceed rock mass strength	
Groundwater Conditions	groundwater conditions are varying from dry to wet	
Rock Mass Behaviour	systematic failure of rock wedges induced by in situ stresses and discontinuities resulting in wedge failure and minor rock mass slabbing and spalling; max. depth of stress induced failure few dm; spalling and slabbing will primarily occur in the roof and sidewalls; max. wedge size up to several m³; the assumed quantities of groundwater inflow have no influence on rock mass behaviour; changes of the moisture content of the rock mass of shale formations can contribute to rock mass degradation; it is assumed that it takes several month till cracks of sufficient extent develop to delaminate rock blocks	
Deformations	minor deformation <20mm, which stabilize quickly	

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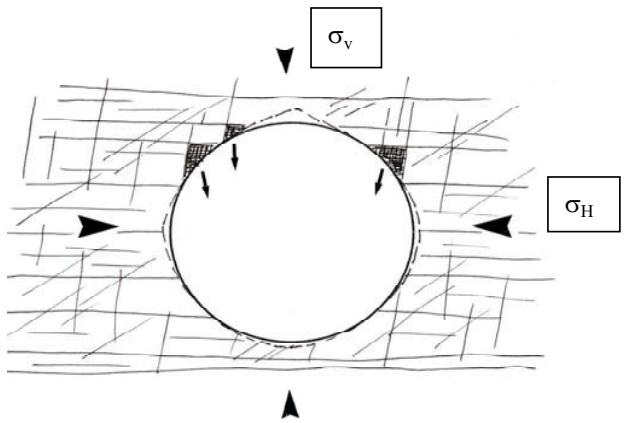
3.4.2.5 Behaviour Type 3B: Failure of Rock Blocks Induced by Stress and/or Discontinuities

Rock mass behaviour was analysed using block theory and the FE-method. The block modelling was carried out applying the software UNWEDGE [3.13].

Rock Mass Behaviour: Failure of Rock Blocks Induced by Stress and/or Discontinuities



Sketch of assumed rock mass failure; wedges and stress induced failure depth not in scale

Formations	Lockport, De Cew	
Characteristics of Discontinuities	Bedding: Persistence: >20m Spacing: dm - several m Roughness: rough to slightly rough, fresh to slightly weathered	Joints: Persistence: <10m Spacing: dm - m Roughness: slightly rough, slightly weathered
In Situ Stress Conditions	in situ stresses slightly exceed rock mass strength	
Groundwater Conditions	groundwater conditions are varying from wet to flowing	
Rock Mass Behaviour	systematic failure of rock wedges induced by in situ stresses and discontinuities resulting in wedge failure and minor rock mass slabbing and spalling; max. depth of stress induced failure few dm; spalling and slabbing will primarily occur in the roof and sidewalls; max. wedge size up to several m^3; groundwater can reduce shear strength of discontinuities	
Deformations	minor deformation <20mm, which stabilize quickly	

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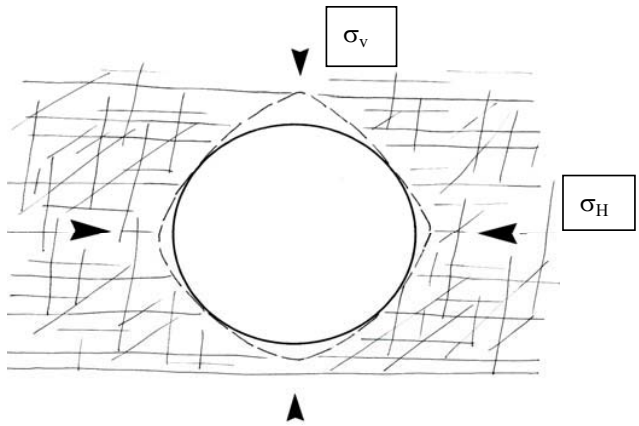
3.4.2.6 Behaviour Type 4A: Brittle Failure Induced by Stresses

Rock mass behaviour was analyses using the FE-method.

Rock Mass Behaviour: Brittle Failure Induced by Stresses



Sketch of assumed rock mass failure; stress induced failure depth not in scale

Formations	Queenston	
Characteristics of Discontinuities	Bedding: Persistence: >20m Spacing: dm - several m Roughness: rough to slightly rough, fresh to slightly weathered, clayey infilling possible (fault gauge)	Joints: Persistence: <10m Spacing: dm - m Roughness: slightly rough, slightly weathered
In Situ Stress Conditions	in situ stresses significantly exceed rock mass strength	
Groundwater Conditions	groundwater conditions are varying from dry to flowing	
Rock Mass Behaviour	in competent rock mass high in situ stress conditions will result in brittle failure of the rock mass in terms of rock mass spalling and slabbing; according to [18] a slab with a max. thickness of 3m has to be considered, accordingly it is assumed that 3m also forms the max. depth of stress induced failure; in very strong, brittle rock, rock failure can be violent resulting in rock burst, according to [16] the app. lower limit of UCS for violent rock burst is 125-165 MPa; groundwater has no significant influence on rock mass behaviour	
Deformations	minor deformations <20mm, which stabilize quickly	

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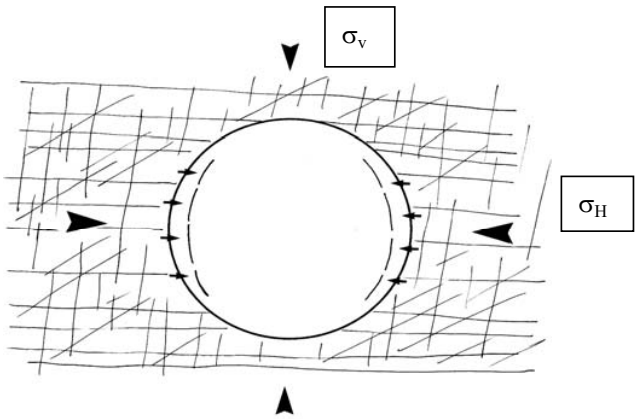
3.4.2.7 Behaviour Type 4B: Squeezing Rock

Rock mass behaviour was analysed using the FE-method.

Rock Mass Behaviour: Squeezing Rock		
 Sketch of assumed rock mass failure; tunnel wall deformation not in scale		
Formations	Lockport, De Cew, Rochester, Irondequoit, Reynales, Neahga, Thorold, Grimsby, Power Glen, Whirlpool, Queenston	
Characteristics of Discontinuities	Bedding: Persistence: >20m Spacing: dm - several m Roughness: rough to slightly rough, fresh to slightly weathered, clayey infilling possible (fault gauge)	Joints: Persistence: <10m Spacing: dm - m Roughness: rough to smooth, fresh to slightly weathered
In Situ Stress Conditions	in situ stresses significantly exceed rock mass strength	
Groundwater Conditions	groundwater conditions are varying from dry to wet	
Rock Mass Behaviour	in incompetent rock mass high in situ stress conditions will result in ductile deformations; the assumed groundwater quantities have no influence on rock mass behaviour; rock squeezing can occur around the whole opening or can be confined to distinct areas e.g. interbedding of incompetent and competent strata (sequence Reynales, Neahga, Thorold) or along weak bedding planes (bedding plane Q8/Q9); long term rock squeeze and swelling are interrelated processes which can be difficult to distinguish	
Deformations	long lasting deformations >20mm	

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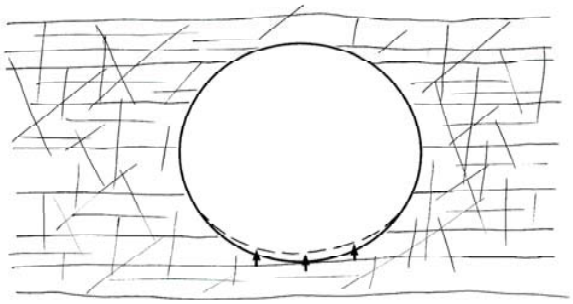
3.4.2.8 Behaviour Type 4C: Swelling Rock

Rock mass behaviour was analysed using the FE-method.

Rock Mass Behaviour: Swelling Rock		
 Sketch of assumed rock mass failure; invert heave not in scale		
Formations	Rochester, Neahga, Power Glen, Queenston	
Characteristics of Discontinuities	Bedding: Persistence: >20m Spacing: dm - several m Roughness: rough to slightly rough, fresh to slightly weathered, clayey infilling possible (fault gauge)	Joints: Persistence: <10m Spacing: dm - m Roughness: slightly rough, slightly weathered
In Situ Stress Conditions	in situ stresses significantly exceed rock mass strength	
Groundwater Conditions	groundwater conditions are varying from damp to wet	
Rock Mass Behaviour	shale formations with a considerable content of swelling clay minerals are prone to rock mass swelling resulting primarily in invert heave; stress relief and the presence of fresh water are substantial for the swelling process; shale interbeds in the sandstone and carbonate formations may also be subject to swelling, however the presence of sandstone and carbonate interbeds tend to inhibit the overall deformation; the swelling process predominatingly occurs in the invert due to gravity related water accumulation, however it can occur at any place around the opening where groundwater is present; long term rock squeeze and swelling are interrelated processes which can be difficult to distinguish	
Deformations	long lasting deformations >20mm	

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3.5 Excavation and Support

3.5.1 Requirements

The requirements for excavation and support are based on the following conditions:

- Safety for working personnel
- Structural stability of excavation and support
- Safety against wedge and block failure
- Stability of the excavation face
- Avoidance of rock mass loosening
- Initial lining capacity
- Allowable deformations

The Diversion Tunnel is aligned through built-up area. However ground conditions are considered to be favourable for tunnelling, that only with a very shallow rock cover surface effects will be registered.

3.5.2 Excavation Methods

The bored tunnel is excavated by means of a hard rock Tunnel Boring Machine (TBM). The TBM consists of main body, cutter head and grippers. Disks on the rotating cutter head break the rock mass, which is conveyed in form of loose chips to the back of the TBM. The forces which develop as a result of forward movement of the TBM are transferred back to the ground by grippers. The TBM as such is only approx. 20 m long, however a 100 to 200 m long backup system is required to manage all the logistics for tunnel excavation and support installation.

The short sections of tunnel at the Intake and Outlet, which require a cross section, which deviates from circular are excavated by drill and blast. Smooth-blasting methods have to be employed to avoid undesired vibrations and subsequent rock mass loosening. A horizontal drilling pattern is to be employed with a borehole length not longer than 4 m.

3.5.3 Support Measures

The following support measures are used and represent in total the initial lining:

- rock dowels
- steel wire mesh
- steel ribs
- shotcrete

A dimple membrane is placed on to the intrados of the initial lining, where water seepage has to be channelled into the temporary construction drainage system to facilitate tunnel construction.

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3.5.3.1 Rock dowels

Fast acting standard Swellex or equivalent rock dowels with a length L = 2,4 m and L = 3,6 m are used to be installed just behind the cutterhead of the TBM.

For the installation of rock dowels further back from excavation, cement/resin grouted rock dowels with a length of L = 2.5 m to 4.0 m are used.

The rock dowels are installed through the steel ribs (UPN-profiles) or with an anchor plate (L x W x T = 100 x 100 x 8 mm) at its base.

They serve as rock reinforcement through bedding – and shear planes and improve block stability. The steel wire mesh installed in the tunnel crown for protection is also attached with rock dowels and short anchors.

3.5.3.2 Steel Wire Mesh

Steel wire mesh with bar size of 6 mm and bar-spacing of 100 mm by 100 mm is installed to

- reinforce the shotcrete and
- to protect personnel from falling rock particles until shotcrete is installed.

In addition the welded steel wire mesh facilitates the application of shotcrete to the tunnel crown and to the sidewalls in the bored tunnel.

3.5.3.3 Steel Ribs

Two types of steel ribs are used for the construction of the bored tunnel.

The light UNP-Profile is used as a crown support element in geological conditions, which require roof protection mainly. It is applied in form of

- UNP 100: H x W = 50 x 100 mm (10,6 kg/m)
- UNP 140: H x W = 60 x 140 mm (16,0 kg/m)

Where heavy steel support is required full round, steel sets are to be used in form of

- IPB 160: H x W = 160 x 160 mm (42,6 kg/m)
- IPB 260: H x W = 260 x 260 mm (93,0 kg/m)

Steel ribs are installed just behind the TBM cutter head with mechanical erectors.

3.5.3.4 Shotcrete

Shotcrete is considered the main supporting element of the initial lining.

The thickness of shotcrete lining depends on the type of rock support to be applied and is ranging from 50 mm to 300 mm. A shotcrete thickness larger than 200 mm is installed in 2 layers at least. Shotcrete thinner than 70 mm is not considered as a structural element. However it serves as a sealing layer to protect the ground from drying out or abrasive water.

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3.5.4 Tunnel Support Application

The arrangement of mechanical and electrical parts on a TBM allows for two locations, where support of excavation may be regularly installed.

The location L1 is situated just behind the cutter head between 4 m and 7 m back from the excavation face. Steel ribs may be installed full round or as a light profile on the crown of the tunnel cross section. Steel wire mesh and rock dowels can also be installed at distinctive locations above springline, where support is not harmed by the gripper loads exerted to the side walls of the tunnel. Shotcrete application is possible in L1 but limited to the absolute minimum requirement. Sensible electronic and mechanical parts of the TBM, which are situated in L1 may be affected by dust and rebound material. Protection measures and cleaning of the TBM as a result of shotcrete application in L1 reduces the rate of tunnel advance considerably.

All support installation in L1 adversely affects the rate of tunnel advance, therefore the intention is to install the majority of the required ground support, from a working platform at location L2 situated 20 m to 40 m back from the excavation face.

Depending on the ground conditions, which prevail in the tunnel at certain locations it is important to gradually increase the amount of support in a way, that the reduction of tunnel advance rate is minimized, but the required level of safety for people working in the tunnel is always maintained.

It has to be acknowledged, that full support of the bored tunnel is only in operation some 40 m back from the excavation. However, the ground support required early is, depending on the prevailing ground conditions, installed already behind the cutter head of the TBM.

In order to allow for gradually increasing support installation in an organized manner, support types are defined.

3.5.5 Support Types

6 Types of support are differentiated for the bored Diversion Tunnel. The support types ranging from support, if required to heavy steel sets and reinforced shotcrete full round to cover a wide range in rock mass behaviour, which is anticipated for the project.

3.5.5.1 Support Type 1:

Support Type 1 consisting of a sealing layer of 50 mm thick shotcrete, which is reinforcement by steel wire mesh. The support type is to be applied in stable rock conditions with a uniaxial compressive strength comparable to lean concrete. Only if rocks are sensitive to water or will degrade if exposed to air the shotcrete and mesh is to be applied.

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3.5.5.2 Support Type 2

In case blocks of ground are differentiable in otherwise stable rock conditions, Support Type 2 is to be applied. It consists of steel ribs in form of UNP-100 profiles, which are bolted with a limited number of rock dowels to fix steel wire mesh to the tunnel crown and sides.

This arrangement shall provide safety for personnel working at the front of the TBM. Further back the steel support is covered with a layer of shotcrete (70 mm thickness) in the top section of the tunnel and additional rock dowels are installed. In case of seepage water dimple membrane panels are fixed to the tunnel crown and wall to drain the water into the invert area. If necessary in ground sensitive to water sealing shotcrete is applied to the invert section of the tunnel equal to Support Type 1.

3.5.5.3 Support Type 3

Support Type 3 is used in friable ground, where small blocks of ground tend to fall from the tunnel crown if left unsupported. It consists of steel rips UNP 140, rock dowels 3,6 m – 4,0 m long and steel wire mesh, which is installed close to the front of the TBM. Further back (i.e. working platform) reinforced shotcrete (t = 100 mm) and more rock dowels are installed to support the full circumference of the tunnel.

3.5.5.4 Support Type 4

Close to the intersection of the tunnel crown and major bedding planes, an increasing number and size of blocks of ground is to be expected. Support Type 4 consisting of steel profiles UNP 140 at close spacing, rock dowels 3,6 m to 4,0 m long and steel wire mesh is to be applied close to the front of the TBM. Reinforced shotcrete (t = 150 mm) and additional rock dowels are installed from the working platform of the TBM that support around the full circumference of the tunnel is realised.

3.5.5.5 Support Type 5

In squeezing ground, where slabbing and spalling is experienced soon after excavation Support Type 5 is to be installed. Support Type 5 consists of steel ribs in form of mid weight IPB 160 steel sets, which are installed close to the front of the TBM around the full circumference of the cross section. As for support types 2 to 4, steel wire mesh is installed in the tunnel crown to provide safety of the personal working at the TBM front. 200 mm of reinforced shotcrete applied from the working platform of the TBM full round is completing Support Type 5.

3.5.5.6 Support Type 6

Support Type 6 is to be installed in heavily squeezing rock, where spalling and slabbing is experienced even in front of the excavation face. Heavy IPB 260 steel sets and reinforced shotcrete (t = 100 mm) are to be installed at the front of the TBM. Additional shotcrete (t = 200 mm) and mesh reinforcement is installed at the working platform to support the full circumference of the excavation cross section.

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3.5.6 Geotechnical Sections along the Tunnel Alignment

3.5.6.1 General

In order to allocate the support types, rock mass behaviour along the tunnel alignment has been evaluated. Five tunnel sections have been identified, which suggest consistent rock mass behaviour being encountered. The following chapters summarize the geological, geotechnical and hydrogeological conditions for each of these sections and the prevailing rock mass behaviour. More detailed information of the geological and geotechnical properties of the encountered rock mass types is provided in chapters 3.3.4 and 3.3.5. The description of the tunnel sections starts at the outlet structure and proceeds to the intake structure.

The following issues apply more or less to all defined tunnel sections:

- The length of each section is based on the tunnel axis. Prolonged interfaces in tunnel crown or invert are not considered when estimating the section length. The length of tunnel sections was rounded to 5m.
- Significant overbreak has to be expected in all tunnel sections where weak bedding planes or flat lying shears occur above the crown. This may result in crown instability. During upslope tunnel advance overbreak is possible when approaching such a feature, during downslope tunnel advance overbreak may occur when leaving such a feature. The depth of the overbreak is controlled by the distance to the overlying plane. During previous tunnel construction works, crown slabs of up to 0,5m were recorded. Relevant discontinuities are reported from all formations encountered in the project area.
- Where rock mass spalling and slabbing occurs, it is expected soon after excavation took place.
- Shale units are prone to change in moisture content, which will result in the development of cracks and degradation of rock mass when surfaces are left unprotected. Due to previous construction experiences it is assumed, that it will take months before relevant cracks develop. Application of sealing shotcrete stops the process.
- Long term rock mass behaviour in terms of rock swelling has to be expected for all shale formations. Laboratory testing proofed that even shale interbeds within the sandstone and carbonate units show swelling potential. However it is assumed that the nonswelling sandstone/carbonate interbeds inhibit overall deformation. Extent and range of the actual swelling will depend to a large extent on the presence of groundwater and the prevailing in situ stress conditions.
- Long term rock mass behaviour in terms of rock squeezing has to be expected within all sections. Previous construction experience reveals that even competent rock mass types like the Lockport formation show long lasting squeezing behaviour.

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The prevailing Support Types applicable to each section of tunnel for the Proposal are shown on drawing PD-01-1002 "Diversion Tunnel, Geotechnical Longitudinal Section". To cover a range of support, which may be used in a particular tunnel section, a distribution of applicable Support Types is defined by:

- Very applicable = 60% probability
- Applicable = 30% probability
- Less applicable = 10% probability

Based on this assumptions, the support measures (i.e. rock dowels, wire mesh, steel ribs and shotcrete) for the Diversion Tunnel are estimated.

3.5.6.2 Tunnel Section 1

Section Length: Starting at the outlet structure, the tunnel section has a length of app. 740m.

Geology/Geotechnics: The tunnel is descending from the outlet structure at a gradient of 7,62% towards the low point. Within this section the tunnel will intersect the total sequence of all formations relevant for the Niagara Tunnel Facility Project including Lockport, De Cew Rochester, Irondequoit, Reynales, Neahga, Thorold, Grimsby, Power Glen, Whirlpool and Queenston Q10 and Q9 formation. Thus the tunnel section is also characterised by frequent changes of lithology and rock mass properties. The spectrum of lithologies to be encountered includes limestone, dolostone, shale and sandstone. The rock mass is in general slightly to moderately fractured and fresh to slightly weathered. In situ stress conditions are expected to be homogeneous throughout the section but their effect on rock mass is changing due to the variability of rock mass properties. In some parts the in situ stresses are expected to exceed rock mass strength in some parts they don't.

Groundwater Conditions: Groundwater conditions are expected to vary between dry and wet. The later can be expected to prevail in Irondequoit, Reynales, Thorold, Grimsby, Whirlpool and Queenston Q10 and Q9 formations. In the tunnel section intersecting the Lockport and De Cew formation no significant groundwater inflow is expected due to grouting in the outlet section.

Expected Rock Mass Behaviour: Rock mass behaviour is expected to be stable to friable and varying within short distance due to frequent changes of rock mass and rock mass properties. In case failure occurs in the rock mass, the prevailing failure mode will change between failure induced by stress and/or along discontinuities, resulting in rock mass slabbing and spalling and/or wedge failure.

3.5.6.3 Tunnel Section 2

Section Length: app. 765m

Geology/Geotechnics: This tunnel section is situated entirely within the Queenston formation, members Q10 to Q6. The prevailing lithology is shale. The rock mass is slightly to moderately fractured and fresh to slightly weathered. In general in situ stress conditions

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exceed rock mass strength throughout the tunnel section. The low point of the tunnel is falling within this section. Thus there is both descending and ascending tunnel advance.

Groundwater Conditions: Groundwater conditions are expected to vary between dry and wet. The later can be expected to prevail in formation member Q10 and Q9 due to the higher degree of fracturing.

Expected Rock Mass Behaviour: Rock mass behaviour is expected to be friable to squeezing. More frequent than in Section 1, failure induced by stress and along discontinuities is expected. This is the prevailing short term failure mode in the rock mass, resulting in wedge failure and rock mass slabbing and spalling.

3.5.6.4 Tunnel Section 3

Section Length: app. 530m

Geology/Geotechnics: This tunnel section is situated entirely within the Queenston formation, member Q7 and Q6. The prevailing lithology is shale. Within Q6 a gypsum nodule horizon occurs. The rock mass is intensely fractured and slightly weathered. In situ stress conditions exceed rock mass strength throughout the tunnel section, in some parts significantly. The tunnel is passing under the buried St. David's Gorge with shallow rock cover. Tunnel advance is ascending at a gradient of 0,10% for the proposed alignment.

Groundwater Conditions: Groundwater conditions are expected to vary between dry and wet. Wet conditions are expected to prevail due to intense fracturing.

Expected Rock Mass Behaviour: Rock mass behaviour is expected to be squeezing with sections of tunnel classified friable. Failure induced by stress is expected to be the prevailing short term failure mode in the rock mass, resulting in rock mass spalling and slabbing. Block failure may also occur due to intense fracturing.

3.5.6.5 Tunnel Section 4

Section Length: app. 7280m

Geology/Geotechnics: This tunnel section is situated entirely within the Queenston formation, member Q10 to Q6. The prevailing lithology is shale. Within formation member Q6 a gypsum nodule horizon occurs. The rock mass is slightly to moderately fractured and fresh to slightly weathered. In general in situ stress conditions exceed rock mass strength throughout the tunnel section. The geological conditions are comparable to Section 2. Tunnel advance is ascending at a gradient of 0,10%.

Groundwater Conditions: Groundwater conditions are expected to vary between dry and wet. The later can be expected to prevail in formation member Q10 and Q9 due to their higher degree of fracturing.

Expected Rock Mass Behaviour: Rock mass behaviour is expected to be friable to squeezing. Failure induced by stress and along discontinuities is expected to be the prevailing short

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term failure mode in the rock mass, resulting in wedge failure and rock mass slabbing and spalling.

3.5.6.6 Tunnel Section 5

Section Length: app. 1090m

Geology/Geotechnics: Within this section the tunnel will intersect the total sequence of all formations relevant for the Niagara Tunnel Facility Project including Lockport, De Cew Rochester, Irondequoit, Reynales, Neahga, Thorold, Grimsby, Power Glen, Whirlpool and Queenston Q10 and Q9 formations. Thus the tunnel section is also characterised by frequent changes in lithology and rock mass properties. The spectrum of lithologies to be encountered includes limestone, dolostone, shale and sandstone. The rock mass is in general slightly to moderately fractured and fresh to slightly weathered. In situ stress conditions are expected to be homogeneous throughout the section but their effect on rock mass is changing due to the high variability of rock mass properties. In some parts the in situ stresses are expected to exceed rock mass strength in some parts they don't. In general the geological conditions are comparable to section 1. Tunnel advance is ascending at a gradient of 7,23%.

Groundwater Conditions: Groundwater conditions are expected to vary between dry and wet. The later can be expected to prevail in Irondequoit, Reynales, Thorold, Grimsby, Whirlpool and Queenston Q10 and Q9 formations. Tunnel sections intersecting the Lockport and De Cew formations can expect groundwater conditions which vary between wet and flowing. Significant groundwater inflow can occur within this part of the section.

Expected Rock Mass Behaviour: Rock mass behaviour is expected to be stable to friable. Due to lithological changes of the rock mass a frequent variation of rock mass properties is expected. The prevailing failure mode will change between failure induced by stress and failure along discontinuities, resulting in rock mass slabbing and spalling and/or wedge failure.

3.6 Invert Segments

Invert segments made of precast concrete are placed to support rails of the construction trains for material supply and the backup system of the TBM. Any seepage water entering the tunnel during excavation shall also be diverted to the deep point of the alignment via the invert segments.

The concrete may be reinforced with standard bar reinforcement or steel fibres. There is no connection planned between invert segments and the initial lining, which is installed for rock support during excavation of the tunnel. However invert segments are connected to the final lining and participate in carrying all permanent design loads. Two types of standard segments are envisaged for use Type A is 600 mm thick and installed in the upper levels of the tunnel alignment. Type B is 700 mm thick and installed in the deep sections. Purpose

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built segments are placed at locations where the lining thickness changes to avoid abrupt steps at interfaces. Up to 100 mm difference in lining thickness can be compensated without causing significant effects on the flow rate of water transfer.

3.7 Cavity Grouting

In the permeable section of the Lockport and Decew Formations cavity grouting is envisaged to seal the excavated Diversion Tunnel.

Cavity grout is injected through four metre long boreholes evenly distributed around the cross section of the tunnel and spacing app. 2,5 m in longitudinal direction. Since no long-term use is expected from cavity grouting, Ordinary Portland Cement is used for binder. If mortar or cement grout is to be applied, will be determined on site and confirmed by grouting trials. Also the suitable water-binder-ratio is to be determined on site.

To determine material quantities for bidding purpose a water-binder-ratio of 1:1 is selected. Based on the experience described in the GBR, section 8, 100 kg take of binder/cement is calculated per meter borehole length in the Diversion Tunnel. The length of section to be grouted is assumed to be 20 % of the Diversion Tunnel located in the Lockport and Drew Formations. The interfaces between the Diversion Tunnel and major bedding planes will also be treated by cavity grouting, if required.

On average 25 m deep holes spacing 3 m are drilled for grouting purposes at the Intake Structure and Channel. A grout-take assumed to be 200 kg of cement/binder per meter borehole is considered in the assessment of quantities.

30 m deep holes spacing 3 m are drilled for grouting purposes around the periphery of the Outlet Structure and Canal. A grout-take of 100 kg of cement/binder per meter borehole is considered in the assessment of quantities.

The cavity grouting operation is carried out in several phases using new groutholes to be drilled at intermediate locations and checking the efficiency of the grouting operation after each phase is finished.

3.8 Waterproofing Membrane System

To prevent seepage of aggressive ground water into the Diversion Tunnel, a waterproofing membrane system is placed between the initial lining and the final lining. The waterproofing membrane system consists of

- regulating shotcrete
- Membrane-backed geotextile
- waterproofing membrane

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Regulating shotcrete is to provide the smooth surface, which enables membrane installation and counteracts any potential damage on sharp corners and edges of the waterproofing membrane during placement, concreting and during the specified design life.

The geotextile also protects the waterproofing membrane and enables subject to the thin membrane-backing the flow of interface grout.

The waterproofing membrane is designed to act as an impermeable layer between initial and final lining and to sustain all pressures and strains throughout the specified design life of 90 years.

3.9 Final Lining

The final lining consists of cast in place concrete without steel reinforcement. The final lining is min. 600 – 700 mm thick and compressed by interface grouting at high pressures to sustain internal water pressures, which develop during standard operation, without cracking. It is erected with using approx. 12 m long steel shutters, that run on the invert segments installed before hand. The steel skin used for formwork is designed to fullfill tight smoothness criteria set for flow of water in the Diversion Tunnel. Abrasivity is also counteracted by the smoothness of the concrete surface such maintained. Ordinary Portland Cement is used for the manufacture of final lining concrete, since particular resistance to aggressive water is not required due to the presence of the waterproofing membrane. When interface grouting is executed at pressures higher than the external water pressure, the presence of groundwater around the outside of the tunnel can be excluded.

3.10 Contact Grouting

Contact grouting is to be carried out after concreting of the final lining is finished.

Contact grout is injected in the tunnel roof between the back of the final lining concrete and the waterproofing membrane. The aim is to close all voids, cracks joints and inconsistencies in the final lining concrete resulting from the concreting operation and to provide a tight interface between rock mass / initial lining and final lining. The contact grouting procedure is carried out through injection lines (hoses with values) installed in the roof of the tunnel.

The injection lines are spot-welded to the waterproofing membrane and have openings at regular intervals to release the grout. Cement grout consisting of Ordinary Portland Cement compatible to the final lining concrete is used.

For the determination of quantities a 10 mm gap is assumed around one quarter of the tunnel circumference in the roof area.

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3.11 Interface Grouting

The interface grouting at pressure high enough to sustain internal water pressures has been originally developed for pressure tunnels and shafts at hydropower schemes. Grout is injected between initial lining and waterproofing system at pressures up to 30 bar to open the interface and prestress the final lining at one hand and the rock mass surrounding the tunnel on the other hand. The final lining is compressed and the rock mass around the tunnel is brought close to its original stress state before excavation of the tunnel took place.

The interface grouting operation is carried out after final lining installation in stages through a system consisting of grout-hose-rings installed at the surface of the initial lining.

Circular grout hose lines with valves at regular intervals are placed between initial lining and the waterproofing membrane system. This shall ensure an evenly distributed flow of grout along the membrane-backed extrados of the waterproofing system and facilitate filling of joints and cracks in the initial lining and rock mass with grout.

The ends of grout hoses are guided through the waterproofing membrane system and through the cast in place final lining into the tunnel. By pumping grout to the interface between membrane and initial lining a circumferential joint is opened and filled with cement grout. The final lining is prestressed against the rock by the grout pressure acting in the circumferential joint. The deformations of initial lining, final lining and the rock mass are locked after the cement grout has hardened.

Since grout escapes into the cracks and fissures of the rock mass, the ground is consolidated and sealed against ingress of water at the same time.

The interface grouting rings are located at regular intervals (3 m to 4 m). Grout blocking rings are installed every 12 m approx. to control the flow of grout.

The grouting procedure follows a defined pattern of pressure application with aid of two or more pumps, hence creating a consistent flow of grout along the tunnel. For estimating purposes 100 m advance rate per day is assumed for the interface grouting process. The average gap to be filled with cement is assumed to be 3 mm thick.

Grouting is carried out in a first phase at every other interface grouting ring from both ends of the grout hose. If necessary the remaining rings are grouted in a second phase of interface grouting. The success of grouting is carefully monitored by precise deformation measurements of the final lining around the full circumference of the tunnel. Pumping pressures defined by structural analysis, are such controlled within allowable limits.

All operational pressures and loads are carried by the compressed final lining concrete ring after successful grouting. Shrinkage of concrete and the shrinkage due to the drop in temperature when filling the tunnel with water are carefully considered in calculations for the required grouting pressure.

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3.12 Dewatering System Shafts

5 dewatering shafts will be located on the centreline of the tunnel at approx. km 8.9 of the Diversion Tunnel so that the Owner's pumping equipment can be positioned over the tunnel invert. Each shaft is circular and drilled with a minimum diameter of 1.05 m in overburden and 0.915 m in rock to accommodate a min. 750 mm steel pipe as shown on the Proposal Drawings. The pipe is coated with 3 HDPE and lined with fusion bonded epoxy to resist the corrosion-aggressive environment. The annulus around the pipe is grouted to prevent water seepage between different geological formations along the outside of the pipe. One 2.0 m x 2.0 m wide sump is provided at the invert below one of the dewatering shaft locations such that a submersible pump can be positioned below the tunnel invert to achieve the required operating submergence in the final stage of dewatering.

The water pumped from the tunnel during dewatering will be discharged into a Water Collection Sump and conveyed via a buried 227 m long 1.0 m dia. HDPE Pipe and a 3.45 m wide chute into the SAB2 Canal.

The shafts are capped for normal operation of the tunnel and the cap is protected from pressure surges with air vents.

3.13 Intake Structure, Outlet Structure and Channels

3.13.1 Intake Structure, Intake Channel

The location and dimensional geometry of the intake channel and intake approach wall are fixed as defined on the Concept Drawings. The adjustments for final tunnel slope and diameter are shown in the Proposal Drawings. The alignment and dimensional geometry of the ice accelerating wall is generally shown on the Concept Drawings. The design of surfaces of structures and excavations as shown on the Proposal Drawings is intended to convey water smoothly into the intake structure and shall provide satisfactory performance for both open water and ice conditions.

The intake structure location, internal dimensional geometry, and transition from the shape at the entrance to the circular shape of the tunnel are fixed as defined on the Concept Drawings. Adjustment to the geometry for tunnel diameter and tunnel slope is shown on the Proposal Drawings.

100-mm of compressible material is provided between the rock surface of excavated walls and the intake and outlet structures to accommodate movement due to time-dependent deformations of the rock.

Suitable venting will be provided at the intake behind the Sectional gate to permit aeration of the tunnel during filling and dewatering. Vent sizing is 1,0 m diameter, but will be adjusted such as to limit noise levels during filling and dewatering to the relevant noise restrictions in future design stages.

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A cover will be provided over the top of the Sectional service gate openings in the intake structure to avoid the possibility of ice being drawn into the structure. The cover is of ample mass to prevent dislodgement and will be detailed alt future design stages to prevent seizing of the cover after prolonged submergence. Appropriate lifting devices will be provided on the covers to enable the Sectional service gate follower to engage and lift the gate slot cover.

3.13.2 Excavations for Channels and Structures

Smooth plasting techniques will be employed to excavate the sides of the intake channel and outlet canal. Care is taken to ensure, that the rock beyond the excavation limits is not damaged or destabilized by the blasting operation. Any damaged rock will be removed and backfilled with concrete adequately tied back to sound rock to produce the required excavation lines.

The need for preset rock reinforcement prior to blasting for the intake excavation to secure the integrity of the foundation of the INCW control structure will be examined upon detailed inspection of the structure and surrounding ground conditions.

During excavation, methods will be employed to prevent damage to existing structures and buildings and affect operation of existing equipment. Blasting velocities will be carefully controlled and the affected structures will be monitored to ensure adequate control.

Any exposed shaly rocks (e.g. the Rochester Formation) or shale layers which are susceptible to deterioration upon exposure to wetting and drying cycles and large temperature differences will be immediately protected by sealing shotcrete.

Overburden slopes are designed subject to analysis results at 1:1.5 (temporary slopes for excavations of trenches, sumps, etc.) and 1:2 (permanent slopes) grades. Vertical excavations for trenches are only allowed to a depth of 1.2 m.

3.13.3 Outlet Canal Rock Plug Removal

The rock plug between the Outlet canal and the existing PGS canal will be removed by excavation under water. The outlet gate will be closed to provide balanced water conditions during rock plug removal.

The excavated material will be removed from the PGS canal and taken to the muck depot prior to the PGS canal being brought back into operation.

A sounding survey of the PGS canal will be performed before and after removal of the rock plug to verify that no excavated material remains within the PGS canal and the results submitted to the Owner.

Protection measures will be installed to ensure that no material is carried down the PGS canal during and after removal of the rock plug.

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3.14 Additional Ground Investigations proposed

The rock surface in the area of the Diversion Tunnel crossing under the buried St' David's Gorge is steep and highly uneven that predictions of rock elevation are uncertain. Seismic investigations and several boreholes suggest, that the difference in rock surface elevation vary within meters by an order of magnitude (i.e. $\pm$ 10 m). Since the vertical alignment of the tunnel is aiming to be optimized during detail design stage in vicinity of the buried St' David's Gorge, several boreholes are proposed exactly on the tunnel axis to confirm the elevation of rock at the base of the gorge.

The geotechnical drilling operation will be concentrated between km 8+550 and km 8+850 of the Diversion Tunnel.

The borehole location are planned, where the seismic investigations predict the deepest elevations along the tunnel alignment.

3.15 Instrumentation

3.15.1 Purpose

Instrumentation will be installed and monitored until Final Completion by the Contractor.

Movements of existing structures and buildings affected by the Work are monitored to ensure their protection, structural integrity and safety.
In particular the existing Toronto Power Station and the Niagara GS Power Station will be closely monitored by precise levelling. Also the existing tunnels, as far as accessible, will be closely monitored. Where the Diversion Tunnel is bored at shallow depth with less than two diameter cover under existing roads, services and buildings, the surface will be monitored and any settlement and tilting documented.

It is proposed to monitor the response of rock adjacent to the tunnel at regular intervals of 200 m with convergence monitoring sections throughout the advance of tunnel excavation. In addition a long-term measuring section consisting of piezometers and extensometers is planned close to the dewatering shafts or tunnel piezometer holes, since the wiring for instruments could be integrated into the backfill of borehole casings. However it is intended, that such suitable monitoring section, where rock's response to the tunnel during construction, filling and commissioning is maintained, is selected by the Owner.

3.15.2 Instrument Types

Surface movement monitoring (SM) is carried out with survey equipment and surface movement monitoring points (SMMP). The SMMP is a marker fixed to a surface, and used for the measurement of the vertical and horizontal movements of that surface. For SMMP permanent pins on structures or grouted rods in rock are used. Survey equipment

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(theodolite, level, electronic distance measuring device, tape extensometer), is capable of measuring vertical and horizontal movements of the SMMPs to ±1 mm.

Borehole Extensometers (EX)— is a device installed in boreholes for monitoring the changing distance between two or more than two points along the axis of the borehole. The EX to be used is of the vibrating wire type and capable of determining the relative position of each anchor to the surface installation with a repeatability of ±0.1 mm. Multiple Point Borehole Extensometers or several Single Rod Extensometers will be used to measure differential movements at each location to be monitored.

Piezometer (PI)—A groundwater piezometer is a device that is sealed within the ground so that it responds only to groundwater pressures around itself. Tunnel Piezometers are used to measure the water pressure within the tunnel. Piezometers to be provided are of the vibrating wire type and shall be capable of measuring the head of water at the piezometer tip to a repeatability of ±0.1 m.

Plumbline—A plumbline is a device to measure the relative tilt of a structure between two or more locations and is used for predominantly vertical structural elements, such as walls of pits and shafts.

3.15.3 Surface Movement Monitoring

SM will be carried out on masonry, buildings and road structures like bridges from prior to commencing any excavation until completion of final structures or linings in the area affected by the excavation. Buildings include, but are not limited to, INCW structure Bays 1 to 53 and the INCW control and maintenance buildings, existing Toronto Power Station and the Niagara GS Power Station.

A series of SMMPs will be installed and monitored on the INCW structure on Bays 1 to 3 above the intake excavation with a spacing of no more than 5 m.

A series of SMMPs will be installed and monitored at the pier nose of Piers 1 and 2.

A plumbline will be installed at the pier nose of Piers 1 and 2 extending to rock level. The plumbline shall have measuring tables at min. three locations.

3.15.4 Excavation Monitoring

On 2 vertical or near vertical rock cuts at the intake and outlet excavations at approximately the midpoint horizontal extensometers will be installed, that have monitoring positions (anchors) at 20, 10, 5 and 2 m from the wall of the excavation. Electrical leads are in watertight conduits leading to a lockable watertight box located at the deck level, which allows long-term monitoring of wall movement

3.15.5 Instrumented Tunnel Sections

The following instrumentation for long-term monitoring is provided for the section of the tunnel as selected by the Owner (see. Drawings PD-01-1008 and PD-01-1009: Diversion

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Tunnel, Geotechnical Measurements and Diversion Tunnel, Geotechnical Measurements, Surface and Subsurface)

- A permanent array of eight extensometers that have monitoring positions (anchors) at 25, 10, 5, 2 and 1 m radially from the surface of the tunnel excavation. Installation is completed and the initial readings taken, subject to installation of the initial lining, before the tunnel face advances more than 25 m beyond the array. This array of extensometers is capable of being monitored remotely from the surface during the initial filling and operation of the tunnel.
- A permanent array of six piezometers around the exterior of one section of the tunnel final lining and one on the interior of the lining at the tunnel invert. The array of piezometers is capable of being remotely monitored from the surface during the initial filling and operation of the tunnel.
- Electrical leads for extensometers and piezometers are routed in watertight conduits, adequately fixed to the tunnel crown and extending up one of the boreholes used for dewatering shafts or tunnel piezometers leading to a lockable watertight box located at approx. ground level.

3.15.6 Tunnel Piezometers

(see. Drawing PD-01-1021: Diversion Tunnel, Tunnel Piezometers, Sections and Details)

Tunnel piezometric levels are measured at two locations along the alignment of the tunnel at approximate km 1.4 and km 7.3. Each location consists of two piezometers, 2 m to 20 m apart. The borehole for one piezometer is extending through the tunnel lining at the tunnel crown to the ground surface. The cable for the other piezometer is routed in watertight conduits embedded in the final lining to the same borehole. The final locations will be agreed with the Owner prior to installation.

Piezometer holes are cased with HDPE casings with a minimum 95 mm inside diameter. The annular gap between the rock and the casing will be grouted to prevent groundwater migration between the different rock formations.

Detailing of the piezometer fitting at the tunnel crown, shown on the Proposal Drawings, ensures that the velocity head is not measured and that degradation of the adjacent tunnel lining or fitting does not occur. The fitting is made of stainless steel and designed to facilitate maintenance or replacement of the instrument, in case damage does occur.

The piezometer pit at the ground surface, which contains the data logger is made of concrete and set out to a depth that problems of ground movement due to frost heave are prevented. A watertight, lockable cap is also provided.

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4 STRUCTURAL DESIGN

4.1 Diversion Tunnel

The design basis and design criteria for the structural design of the diversion tunnel are included in the structural design analysis for the Diversion Tunnel, document PR-00-4001. Also any reference to standards and codes is given in this document.

4.2 Intake and Outlet Structures

The design basis and design criteria for the structural design of the intake and outlet structures are included in the Draft Design Basis for Concrete Structures. Further details are given in structural design analysis for Intake and Outlet Structures, document PR-00-4004. Also reference to standards and codes is given in these documents.

4.3 Intake and Outlet Canal

The design basis and design criteria for the slope design of the channels are included in the slope stability analysis for excavations, document PR-00-4003. Also reference to standards and codes is given in this document.

4.4 Dewatering Shafts, Pipes, Culverts and Minor Items

The design basis and design criteria for the design of dewatering shafts, pipes buried in the ground, culverts for transport of water and minor items like foundations and shallow shaft pits are included in the stability analysis documents PR-00-4002 and PR-00-4005. Also reference to standards and codes is given in these documents.

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5 APPENDICES

5.1 Hydraulic Design

APPENDIX 2.1: Steady Flow Analysis for the Proposal

5.2 Geotechnical Design

APPENDIX 3.1: Summary of the hydrochemical properties of groundwater

APPENDIX 3.2: GSI-Chart

APPENDIX 3.3: Damage Index and Depth of Stress Induced Failure

5.3 Civil Design

APPENDIX 3.4: Interface Grouting References

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APPENDIX 2.1: Steady Flow Analysis for the Proposal

Niagara Tunnel Facility Project
Hydraulic calculation and longitudinal profile

ILF Project I 921 Date: 26.04.05

Input: **Discharge:** 502 m3/s

1) **Intake Channel** Roughness 25 Kst

2) **Intake Structure** Rouhgness 80 Kst

3) **Tunnel** Rouhgness 85 Kst
Tunnel outer diameter 14,44 m

>>> strg+a Calculation of the tunnel outer diameter
>>> strg+y Calculation of the discharge

4) **Outlet Structure** Roughness 80 Kst

5) **Outlet channel** Rouhgness 30 Kst
Length 306,96 m
in section 28 (after dilatation and up to the gauge, originally 292m)

Assumptions for calculation:
- Calculation acc. to the formula of Strickler
- Kst coefficients acc. to the Strickler formula
- Circular inner profile in the tunnel
- Tunnel profile filled, no free surface flow
- lower Kst-coeff. in the intake tunnel to consider 3D-flows and its losses

Tunnel	INPUT		Result
Section	Length	lining thickn.	Inner Diameter
No.	(m)	(m)	(m)
1	1.119	0,83	12,78
2	3.295	0,93	12,58
3	4.877	0,98	12,48
4	1.107	1,08	12,28
5	32	0,83	12,78
Sum:	10.429	(m)	

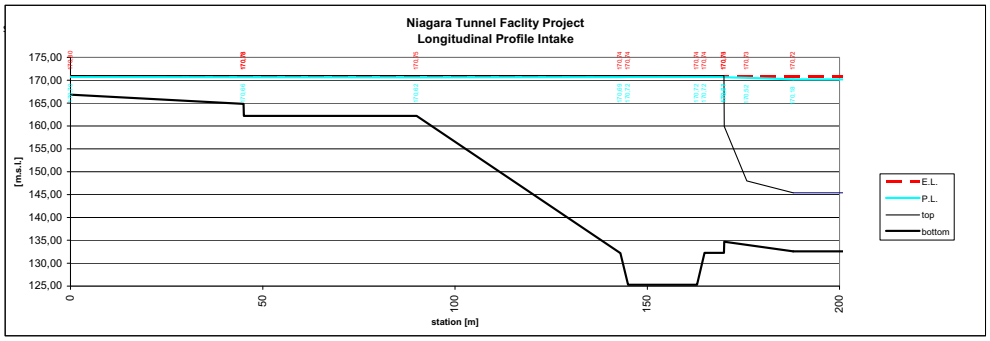
2.) Hydraulic Losses in the system

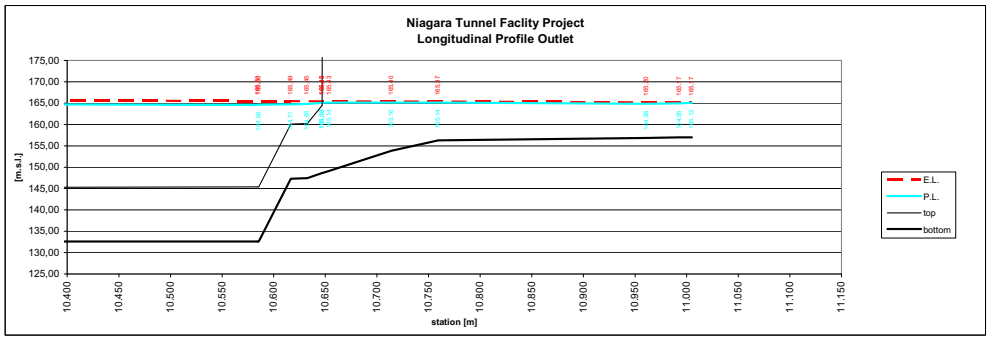
inlet gauge = E.L.

section	section	stat. beg.	stat. end	L	v	kST	hv,r	zeta 1	hv,zeta	hv, tot.	E.L. beg.	E.L. end	P.L. beg.	P.L. end
		[m]	[m]	[m]	[m/s]	[-]	[m]	[-]	[m]	[m]	[m.s.l.]	[m.s.l.]	[m.s.l.]	[m.s.l.]
intake channel	1	0,00	0,10	0,10	1,42	25	0,00	0,00	0,00	0,00	170,80	170,80	170,70	170,70
	2	0,10	45,00	44,90	1,51	25	0,02	0,00	0,00	0,02	170,80	170,78	170,69	170,66
	3	45,00	45,10	0,10	1,57	25	0,00	0,00	0,00	0,00	170,78	170,78	170,65	170,65
	4	45,10	90,00	44,90	1,60	25	0,02	0,00	0,00	0,02	170,78	170,75	170,65	170,62
	5	90,00	143,00	53,00	1,05	25	0,01	0,00	0,00	0,01	170,75	170,74	170,70	170,69
	6	143,00	145,00	2,00	0,69	25	0,00	0,00	0,00	0,00	170,74	170,74	170,72	170,72
	7	145,00	162,90	17,90	0,65	25	0,00	0,00	0,00	0,00	170,74	170,74	170,72	170,72
	8	162,90	164,90	2,00	0,70	25	0,00	0,15	0,00	0,00	170,74	170,74	170,72	170,72
intake structure	9	164,90	169,90	5,00	0,78	80	0,00	0,00	0,00	0,00	170,74	170,74	170,71	170,71
	10	169,90	170,00	0,10	1,06	80	0,00	0,25	0,01	0,01	170,74	170,73	170,68	170,67
	11	170,00	175,90	5,90	2,00	80	0,00	0,00	0,00	0,00	170,73	170,73	170,52	170,52
	12	175,90	187,90	12,00	3,27	80	0,00	0,00	0,00	0,00	170,73	170,72	170,18	170,18
tunnel	13	187,90	1.306,53	1.118,63	3,91	85	0,50	0,00	0,00	0,50	170,72	170,22	169,94	169,44
	14	1.306,53	1.307,53	1,00	3,97	85	0,00	0,00	0,00	0,00	170,22	170,22	169,41	169,41
	15	1.307,53	4.601,15	3.293,62	4,03	85	1,61	0,00	0,00	1,61	170,22	168,61	169,39	167,78
	16	4.601,15	4.602,15	1,00	4,07	85	0,00	0,00	0,00	0,00	168,61	168,61	167,76	167,76
	17	4.602,15	9.478,00	4.875,85	4,10	85	2,49	0,00	0,00	2,49	168,61	166,12	167,75	165,26
	18	9.478,00	9.479,00	1,00	4,17	85	0,00	0,00	0,00	0,00	166,12	166,12	165,24	165,24
	19	9.479,00	10.584,58	1.105,58	4,23	85	0,61	0,00	0,00	0,61	166,12	165,51	165,21	164,59
	20	10.584,58	10.585,58	1,00	4,07	85	0,00	0,00	0,00	0,00	165,51	165,50	164,66	164,66
	21	10.585,58	10.616,58	31,00	3,91	85	0,01	0,00	0,00	0,01	165,50	165,49	164,73	164,71
outlet structure	22	10.616,58	10.632,58	16,00	3,44	80	0,01	0,05	0,03	0,04	165,49	165,45	164,89	164,85
	23	10.632,58	10.647,01	14,43	2,74	80	0,00	0,01	0,00	0,01	165,45	165,45	165,07	165,06
	24	10.647,01	10.647,11	0,10	2,42	80	0,00	0,05	0,01	0,01	165,45	165,43	165,15	165,13
	25	10.647,11	10.654,11	7,00	2,41	80	0,00	0,00	0,00	0,00	165,43	165,43	165,14	165,14
outlet channel	26	10.654,11	10.714,11	60,00	2,15	30	0,03	0,00	0,00	0,03	165,43	165,40	165,19	165,16
	27	10.714,11	10.759,38	45,27	2,15	30	0,02	0,00	0,00	0,02	165,40	165,37	165,16	165,14
	28	10.759,38	10.961,07	201,69	2,52	30	0,17	0,00	0,00	0,17	165,37	165,20	165,05	164,88
	29	10.961,07	10.993,07	32,00	2,09	30	0,02	0,05	0,01	0,03	165,20	165,17	164,98	164,95
	30	10.993,07	11.005,07	12,00	1,04	30	0,00	0,05	0,00	0,00	165,17	165,17	165,12	165,12
	total			11005,07			5,55	0,61	0,08	5,63		165,17		165,17

outlet gauge = E.L.

total friction losses [m] in the intake channel	0,062	m
total friction losses [m] in the intake strukture	0,019	m
total friction losses [m] in the tunnel	5,230	m
total friction losses [m] in the outlet structure	0,059	m
total friction losses [m] in the outlet channel up to outlet gauge	0,229	m
total friction losses [m] between position of intake gauge and outlet gauge	5,60	m = Sum of losses





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APPENDIX 3.1: Summary of the hydrochemical properties of groundwater

Borehole	Elevation [m]	Formation	Lithology	pH	Conductivity [µS/cm]	Cloride [mg/l]	Sulphate [mg/l]	Water Inflow [l/s]
Inlet Section: 0+000 to 3+490 (3.490m)								
NF28	146,10	Rochester	Shale	7,0	45.240	26.000	1.480	
NF3	134,10	Lockport Goat Isl.	Dolostone	7,6	2.800	450	1.370	0+000 to
NF2	130,02	Lockport Goat Isl.	Dolostone	7,1	9.800	29.000	1.463	2+485
NF3	129,60	Lockport Gasport	Dolostone	7,3	10.000	55.000	1.550	Max: 1830
NF2	122,52	Lockport Gasport	Dolostone	7,6	32.000	17.000	1.281	Av: 259
NF3	119,10	De Cew	Dolostone	7,7	56.000	55.000	1.349	2+485 to
			Mean	7,4	25.973,3	30.408,3	1.415,5	3+490
			Standarddev.	0,3	21.738,7	21.485,8	99,1	Max: 14
			Min	7,0	2.800,0	450,0	1.281,0	Av: 2,0
			Max	7,7	56.000,0	55.000,0	1.550,0	
Central Section I: 3+490 to 5+605 (2.115m)								
NF28	72,60	Queenston, upper	Shale	6,7	56.840	45.000	1.050	
NF28	128,10	Irondequoit	Limestone	6,4	99.760	91.000	1.060	
NF28	105,60	Grimsby	Sandstone	6,2	90.480	83.000	1.080	
NF28	-11,40	Queenston, lower	Shale	6,9	56.840	46.000	1.430	Max: 16
			Mean	6,6	75980,0	66250,0	1155,0	Av: 3,5
			Standarddev.	0,3	22423,3	24185,1	183,8	
			Min	6,2	56840,0	45000,0	1050,0	
			Max	6,9	99760,0	91000,0	1430,0	
Central Section II: 5+605 to 7+725 (2.120m)								
NF4	87,50	Queenston, upper	Shale	7,7	5.600	1.120	6	Max: 75 Av: 12
Central Section III: 7+725 to 10+030 (2.305m)								
NF30	-18,50	Queenston, lower	Shale	6,4	95.120	81.000	820	
NF30	79,00	Queenston, upper	Shale	6,1	104.400	108.000	980	
NF30	112,00	Power Glen	Shale	5,7	90.480	85.000	1.100	
NF30	98,50	Whirlpool	Sandstone	5,8	78.880	66.250	1.200	Max: 35
NF30	133,00	Reynales	Dolostone	7,1	8.820	2.500	1.570	Av: 5,5
			Mean	6,2	75540,0	68550,0	1134,0	
			Standarddev.	0,6	38412,9	39842,8	281,9	
			Min	5,7	8820,0	2500,0	820,0	
			Max	7,1	104400,0	108000,0	1570,0	
Outlet Section: 10+030 to 10+277,780 (247,78m)								
NF35	159,60	Rochester	Shale	7,2	2.150	630	110	
NF6	150,79	Rochester	Shale	6,6	76.000	60.000	14	
NF6	155,29	Rochester	Shale	6,7	70.000	60.000	11	
NF6	144,79	Rochester	Shale	6,4	67.000	48.000	11	
NF6	175,79	Lockport Gasport	Dolostone	8,0	8.000	24.000	12	Max: 5,0
			Mean	7,0	44.630,0	38.526,0	31,6	Av: 1,0
			Standarddev.	0,6	36.312,7	25.783,4	43,8	
			Min	6,4	2.150,0	630,0	11,0	
			Max	8,0	76.000,0	60.000,0	110,0	

Niagara River Water (Trailrace SAB No.1)	8,5	285	19	23
Adit Water Supply (Whirlpool)	8,1	592	71	62

Water inflow was calculated using the procedure proposed by John H. Raymer (RETC Proceedings, 2001)

Classification of the pH-Value according to DIN 4030, Part 1

		Degree of aggressiveness	Measures: Cement according to DIN 1164	Measures: Concret permeability Acording to DIN 1045
	> 6,5	no		
	≤ 6,5 and ≥ 5,5	Low		
	< 5,5 and ≥ 4,5	High		
	< 4,5	Very High		

Classification of the Sulphate Content according to DIN 4030, Part 1

	< 200 mg/l	No	-	-
	≥ 200 and ≤ 600 mg/l	Low	-	≤ 50 mm
	> 600 and ≤ 3000 mg/l	High	HS-Cement	≤ 30 mm
	< 3000 mg/l	Very High	HS-Cement	≤ 30 mm

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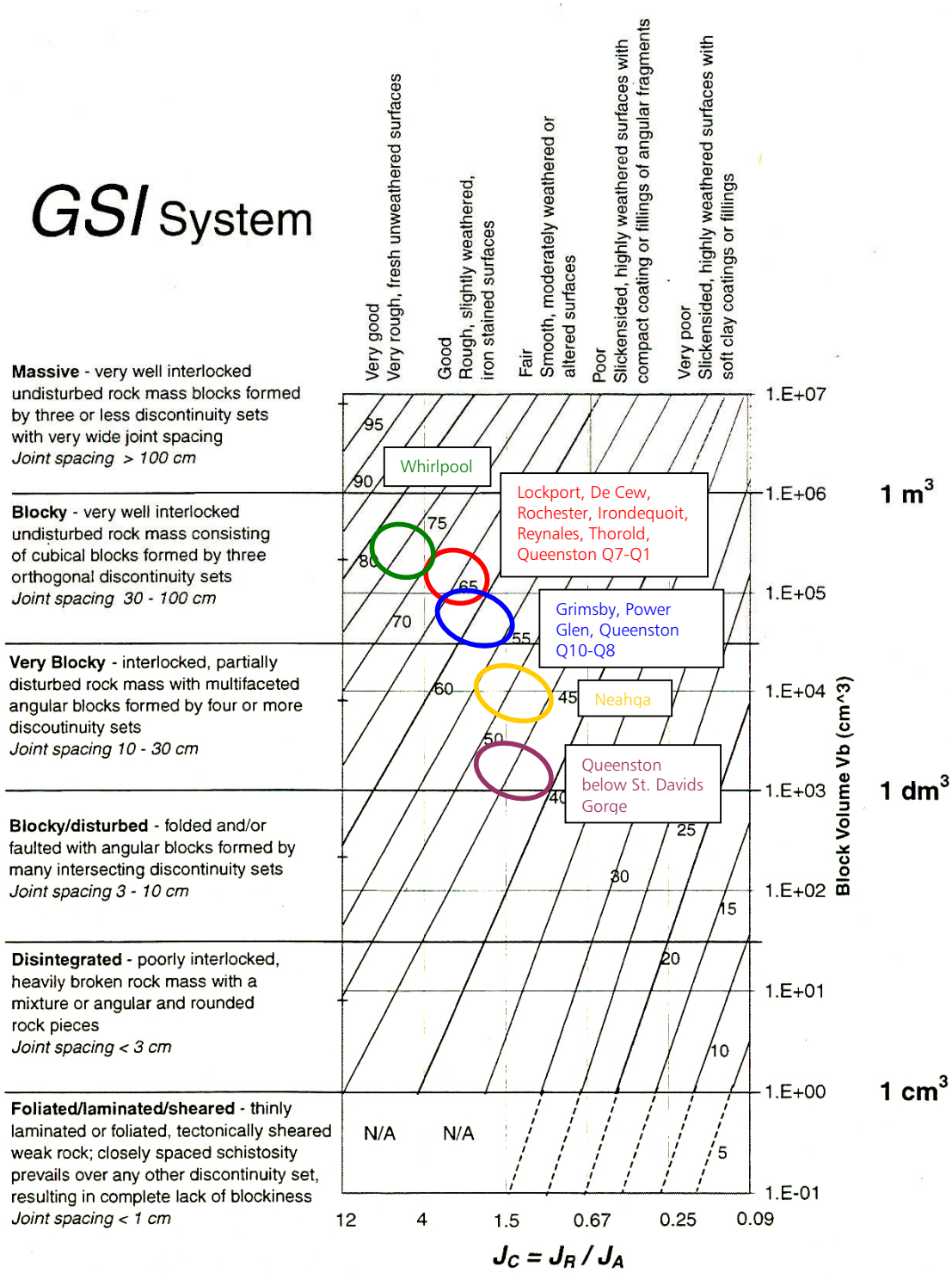
APPENDIX 3.2: GSI-Chart



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APPENDIX 3.3: Damage Index and Depth of Stress Induced Failure

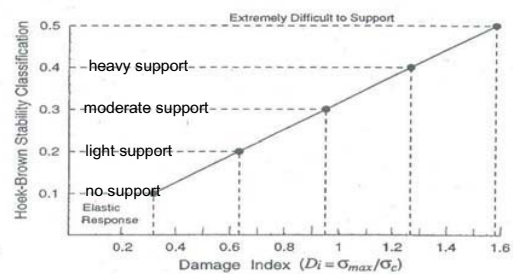
BERATENDE INGENIEURE	Project:	I921: Niagara Tunnel Facility Project	Bearb.:	L.S.
	Object:	In Situ Stress	Gepr.:	
	Titel:	**Damage Index and Depth of Stress Induced Failure**	Datum:	March 05

Tunnel Section 0+000 to 2+840

$$\sigma_{max} = 3 * \sigma 1 - \sigma 3$$

$$Di = \frac{\sigma_{max}}{\sigma_c}$$

$$\frac{Rf}{a} = 0{,}49(+/-0{,}1) + 1{,}25 * Di$$



σ1	σ3	σmax
17	2,3	48,7

Formation	Lithology	σc_{av}	σc_{min}	σc_{max}	Di_{av}	Di_{max}	Di_{min}	Rf/a_{av}	Rf/a_{max}	Rf/a_{min}
Lockport	Limestone	151	106,0	196,0	0,3	0,5	0,2	0,9	1,1	0,8
	Dolostone	125	87,0	163,0	0,4	0,6	0,3	1,0	1,2	0,9
DeCew	Dolostone	128	90,0	166,0	0,4	0,5	0,3	1,0	1,2	0,9
Rochester	Shale	42	12,1	65,5	1,2	4,0	0,7	1,9	5,5	1,4
Irondeque	Dolostone/ Limestone	89	60,3	105,2	0,5	0,8	0,5	1,2	1,5	1,1
Reynales	Dolostone	101	45,0	140,8	0,5	1,1	0,3	1,1	1,8	0,9
Neahga	Shale	18	12,0	24,0	2,7	4,1	2,0	3,9	5,6	3,0
Thorold	Sandstone	129	117,4	141,3	0,4	0,4	0,3	1,0	1,0	0,9
Grimsby	Sandstone	146	73,5	242,2	0,3	0,7	0,2	0,9	1,3	0,7
	Shale	35	12,8	64,4	1,4	3,8	0,8	2,2	5,2	1,4
Power Glen	Shale	24	11,9	33,9	2,0	4,1	1,4	3,0	5,6	2,3
	Sandstone	152	71,7	223,8	0,3	0,7	0,2	0,9	1,3	0,8
Whirlpool	Sandstone	180	108,0	234,5	0,3	0,5	0,2	0,8	1,1	0,7
Queenston	Q8-Q10 (app. 30m thick)	33	7,5	117,5	1,5	6,5	0,4	2,3	8,6	1,0

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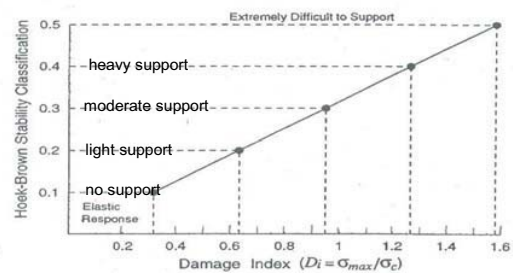
BERATENDE INGENIEURE	Project:	I921: Niagara Tunnel Facility Project	Bearb.:	L.S.
	Object:	In Situ Stress	Gepr.:	
	Titel:	**Damage Index and Depth of Stress Induced Failure**	Datum:	March 05

Tunnel Section 2+840 to 7+070

$$\sigma_{max} = 3 * \sigma 1 - \sigma 3$$

$$Di = \frac{\sigma_{max}}{\sigma_c}$$

$$\frac{Rf}{a} = 0{,}49(+/-0{,}1) + 1{,}25 * Di$$



σ1	σ3	σmax
19	3,9	53,1

Formation	Lithology	σc_{av}	σc_{min}	σc_{max}	Di_{av}	Di_{max}	Di_{min}	Rf/a_{av}	Rf/a_{max}	Rf/a_{min}
Queenston	Q8-Q10 (app. 30m thick)	33	7,5	117,5	1,6	7,1	0,5	2,5	9,3	1,1
	Q1-Q7	46	7,5	117,5	1,2	7,1	0,5	1,9	9,3	1,1

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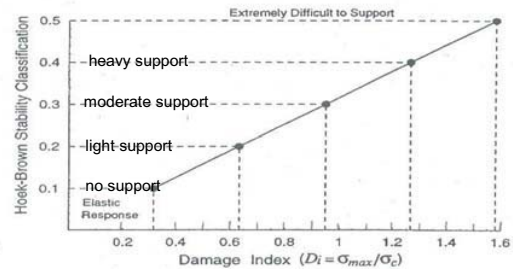
BERATENDE INGENIEURE	Project:	I921: Niagara Tunnel Facility Project	Bearb.:	L.S.
	Object:	In Situ Stress	Gepr.:	
	Titel:	**Damage Index and Depth of Stress Induced Failure**	Datum:	March 05

Tunnel Section 7+070 to 8+900

$$\sigma_{max} = 3 * \sigma 1 - \sigma 3$$

$$Di = \frac{\sigma_{max}}{\sigma_c}$$

$$\frac{Rf}{a} = 0{,}49(+/-0{,}1) + 1{,}25 * Di$$



σ1	σ3	σmax
22	3,4	62,6

Formation	Lithology	σc_{av}	σc_{min}	σc_{max}	Di_{av}	Di_{max}	Di_{min}	Rf/a_{av}	Rf/a_{max}	Rf/a_{min}
Queenston	Q1-Q7	46	7,5	117,5	1,4	8,3	0,5	2,2	10,9	1,2
	25m below St. David's Gorge	33	7,5	117,5	1,9	8,3	0,5	2,9	10,9	1,2

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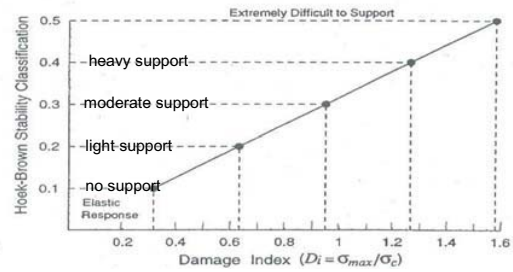
ILF BERATENDE INGENIEURE	Project:	I921: Niagara Tunnel Facility Project	Bearb.:	L.S.
	Object:	In Situ Stress	Gepr.:	
	Titel:	**Damage Index and Depth of Stress Induced Failure**	Datum:	March 05

Tunnel Section 8+900 to 10+421,380

$$\sigma_{max} = 3 * \sigma 1 - \sigma 3$$

$$Di = \frac{\sigma_{max}}{\sigma_c}$$

$$\frac{Rf}{a} = 0{,}49(+/-0{,}1) + 1{,}25 * Di$$



σ1	σ3	σmax
23	4,5	64,5

Formation	Lithology	σc_{av}	σc_{min}	σc_{max}	Di_{av}	Di_{max}	Di_{min}	Rf/a_{av}	Rf/a_{max}	Rf/a_{min}
Lockport	Limestone	151	106,0	196,0	0,4	0,6	0,3	1,0	1,3	0,9
	Dolostone	125	87,0	163,0	0,5	0,7	0,4	1,1	1,4	1,0
DeCew	Dolostone	128	90,0	166,0	0,5	0,7	0,4	1,1	1,4	1,0
Rochester	Shale	42	12,1	65,5	1,5	5,3	1,0	2,4	7,2	1,7
Irondeque	Dolostone/ Limestone	89	60,3	105,2	0,7	1,1	0,6	1,4	1,8	1,3
Reynales	Dolostone	101	45,0	140,8	0,6	1,4	0,5	1,3	2,3	1,1
Neahga	Shale	18	12,0	24,0	3,6	5,4	2,7	5,0	7,2	3,8
Thorold	Sandstone	129	117,4	141,3	0,5	0,5	0,5	1,1	1,2	1,1
Grimsby	Sandstone	146	73,5	242,2	0,4	0,9	0,3	1,0	1,6	0,8
	Shale	35	12,8	64,4	1,8	5,0	1,0	2,8	6,8	1,7
Power Glen	Shale	24	11,9	33,9	2,7	5,4	1,9	3,8	7,3	2,9
	Sandstone	152	71,7	223,8	0,4	0,9	0,3	1,0	1,6	0,9
Whirlpool	Sandstone	180	108,0	234,5	0,4	0,6	0,3	0,9	1,2	0,8
Queenston	Q8-Q10 (app. 30m thick)	33	7,5	117,5	2,0	8,6	0,5	2,9	11,2	1,2
	Q1-Q7	46	7,5	117,5	1,4	8,6	0,5	2,2	11,2	1,2

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Appendix 3.4: Interface Grouting References

PRESSURE TUNNELS LINED WITH CONCRETE PRESTRESS BY INTERFACE GROUTING APPLIED						
Project	**Year**	**Maximum Internal Water Pressure**	**Lining Geometry**		**Rock Mass Type**	**Interface Grouting Pressure**
			ID	thickness		
		MPa	mm	mm		MPa
KW Kaunertal Section 1	1963	1,40	4000	450	Firm Gneiss	2,50
KW Kaunertal Section 3	1964	1,60	4000	400	Mylonite Gneiss	4,00
KW Enzinger-boden	1967	0,64	3100	375	Firm Granite-Gneiss	3,50
KW Fragant	1968	2,60	2250	230	Firm Granite-Gneiss	4,00
KW Hongrin-Leman	1968	1,35	4000	300	Limestone Schist	4,00
KW Gordon	1977	3,00	8200	600	Firm Quarzite	3,50
PSW Kühtai	1979	5,50	4000	300 - 700	Hornblend Gneiss	4,00
PSW Drakensberg	1981	6,30	5500	750	Sandstone Siltstone	8,00
KW Amlach	1988*	1,10	3400	250	Dolomite Schist	3,00
Niagara		1,40	12600	700	Sandstone Siltstone	2,20

* The development of Hydropower Schemes came to a standstill in Europe since 1988

* * *

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I921/PR-00-4001/Rev.1

ONTARIO POWER GENERATION
OPG

NIAGARA TUNNEL FACILITY PROJECT

STRUCTURAL DESIGN ANALYSIS FOR THE DIVERSION TUNNEL

August 2005

ILF CONSULTING ENGINEERS

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REVISION

0					
Rev.	Date	Issue, Modification	Prepared	Checked	Approved

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APPENDICES: SPECIFIC ANALYSIS SECTIONS
Appendix 11: 2D FE Calculation Results
Calculation Section B/0 (Close to Intake)

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Appendix 12: 2D FE Calculation Results
Calculation Section C/0 (Below Existing Tunnels)

Appendix 13: 2D FE Calculation Results
Calculation Section D/0 (Bedding Plane between Q8 and Q9)

Appendix 14: 2D FE Calculation Results
Calculation Section E/0 (Under Gorge)

Appendix 15: 2D FE Calculation Results
Calculation Section F/0 (Deepest Section)

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1 INTRODUCTION

1.1 General

This report provides a comprehensive stability analysis for the structural tunnel design for the proposed Diversion Tunnel. Induced stresses in the initial support due to excavation as well as short- and long-term stress analysis on the final lining are considered in detail. The type of analysis depends on the potential failure mode during excavation and installation of tunnel support. In order to determine the required tunnel support, the following calculation models are applied:

- 3 dimensional and 2 dimensional Finite Element Methods
- Elastic Beam-Spring-Model Methods
- Key-Block Theory Methods
- Convergence-Confinement Methods

The sequenced and combined application of these methods makes it possible to get a level of detail, which enables to evaluate a safe and economic tunnel design.

1.2 Diversion Tunnel Alignment

The proposal design follows the concept alignment in principle. Only below the buried St' David's Gorge, the alignment is slightly relocated to the north-west to gain maximum rock cover. In addition the alignment close to the existing outlet structure is moved away from underneath the existing Delivery Tunnel No. 1, to facilitate the drilling of the borehole for tunnel piezometers. The overall depth of the tunnel has been slightly reduced as compared to the Concept Design.

2 REFERENCES

2.1 Documents

[1] Ontario Power Generation (2005): Niagara Tunnel Facility Project, Geotechnical Data Report, Volume 1 to 12.

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[2] Ontario Power Generation (2005), Niagara Tunnel Facility Project, Owner´s Mandatory Requirements, Invitation to Submit Design/Building Proposals, App. 1.1.

[3] Ontario Power Generation (2005), Niagara Tunnel Facility Project, Geotechnical Baseline Report, part of: Invitation to Submit Design/Building Proposals, App. 5.4.

[4] STRABAG/ILF (2005): Niagara Tunnel Facility Project, Geotechnical Baseline Report, GBR-B.

[5] STRABAG/ILF (2005): Niagara Tunnel Facility Project, Design Basis and Method Statements.

2.2 Drawings

(1) STRABAG/ILF (2005): Niagara Tunnel Facility Project - Diversion Tunnel, Plan and Longitudinal Section (PD-01-1001 and PA-01-1001)

(2) STRABAG/ILF (2005): Niagara Tunnel Facility Project - Diversion Tunnel, Geotechnical Longitudinal Section (PD-01-1002 and PA-01-1002)

(3) STRABAG/ILF (2005): Niagara Tunnel Facility Project - Diversion Tunnel, Toronto Power Station, Detail Plan and Sections (PA-01-1003)

(4) STRABAG/ILF (2005): Niagara Tunnel Facility Project - Diversion Tunnel, Typical Cross Sections (PD-01-1004 and PA-01-1004)

(5) STRABAG/ILF (2005): Niagara Tunnel Facility Project - Diversion Tunnel, Rock Support Types 1 and 2 (PD-01-1005 and PA-01-1005)

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(7) STRABAG/ILF (2005): Niagara Tunnel Facility Project - Diversion Tunnel, Rock Support Types 5 and 6 (PD-01-1007 and PA-01-1007)

2.3 General References

{1} John M. et al. (2003), Shotcrete lining design: Factors of influence, RETC 2003 Proceedings, 726-734.

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3 SUMMARY OF RESULTS

In the following an abridgement of the subsequent comprehensive documentation of all calculation results is presented:

3.1 Initial Support Design

a) Wedge Analysis:
The wedge analysis is carried for support types 2 to 4, which are applicable for support of blocks which may fail. The results show that in general support types 2 to 4 are sufficient to support all rock loads produced by block failure. Restrictively it has to be mentioned that few blocks will require additional spot bolting.

b) "3 m slab":
The calculations proof that a rock load due to a "3m slab" can be supported by one of the initial support elements:

i. HEB 160 spacing 1.8 m, or

ii. >20 cm shotcrete full round or

iii. rock bolting , raster 0.9mx2.0m, l=6m, F=240kN

c) Stress Induced Calculations:
On the basis of preliminary calculations (using a Convergence-Confinement Method and 3D-FE Calculations) the relevant stress release factors and load-transfer factors (time-dependent load transfer to the individual support elements behind the face) have been derived for a subsequent use within detailed 2D-FE calculations. The results show that the individual support classes along the Diversion Tunnel are capable to support all short-term load effects.

3.2 Final Lining Design - Grouting Pressure - Internal Water Pressure

Based on the FE-method the interaction between primary lining and subsequently installed and pre-stressed final lining has been investigated. Hereby the initial support was simulated in such a way, that it does not contribute to any load-bearing capacity during operating time. In addition to rock loads the final lining is designed for:

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a) Long-Term Grouting Pressure:
The high pressure interface grouting has been designed to pre-stress the final lining and the surrounding rock such that internal water pressure does not mobilize any tensile stresses in the lining. Due to the internal water pressure (maximum 1.4 MPa) a long-term grouting pressure in the range of 0.15 to 0.77 MPa is to be expected.

b) Short-Term Grouting Pressure:
The expected constrains of the final lining concrete due to shrinkage, creep and temperature has been analyzed in order to evaluate the short-term grouting pressure, which has to be applied to the individual sections. It results a relevant final lining shortening of maximum 0.5 ‰ in radial direction. These constrains require a short-term grouting pressure in order of 1.45 to 2.15 MPa.

3.3 Short-Term Ground Behaviour

Generally in-situ stresses are characterized by high horizontal stresses, exceeding vertical stresses in parts significantly. Within this high-stress level environment stress changes and stress redistribution around excavation leads often to full mobilization of strength capacity of the rock. The failure zone that forms around the opening is then a function of the tunnel geometry, the excavation procedure, the in-situ stress regime and the strength of the rock mass.

Within the more competent rock formations of Lockport, DeCew, Irondeque, Reynales, Thorold, Power Glen and Whirlpool only small failure zones above the tunnel crown and below the invert can be observed. The calculations show that the weaker rock formations, such as Grimsby, Rochester and especially Neahga and Queenston tend to widespread areas of failure zones at the shoulders as well as underneath the invert. During interface grouting, the failure zones reach further into the rockmass at the shoulders as well as underneath the invert.

Within the rock mass the development of shear strains is small, thus softening behavior of the rock mass has not been observed. Sheared, weak bedding planes exist between many of the rock formations and within the Queenston Formation. Especially the primary bedding planes present between the subunits of the Queenston Formation will affect the stresses and strains around the tunnel during and after excavation. Using a discontinuum approach different bedding plane levels were considered: (a) 2 m above tunnel heading, (b) within tunnel - 3

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m below heading, (c) in the centre of the tunnel opening. A sensitivity analysis indicated that the bedding plane above the tunnel crown is most severe for tunnel design. Calculation results in widespread failure zones below the invert and on top of the tunnel crown; shear displacement within bedding plane exceeds peak strength - therefore strain softening was introduced as soon as 10 mm shear displacement was reached in any point.

The failure zones do not affect the stability of the opening because the numerical calculations results in balanced forces.

3.4 Influence on Existing Structures

Along the proposed tunnel alignment the existing Diversion Tunnels 1 and 2 will be above the new excavation

The FE-calculations show that the influences due to the excavation and lining installation, as well as operating with respect to stress and strain state are marginal. No significant increase of stresses around existing structures has been observed. Within the less competent rock strata marginal additional deformations will be mobilized, but mobilization of failure zones is restricted to a small area. This will be reviewed in detail design.

3.5 External Water Pressure

The high pressure interface grouting is designed to prestress the final concrete lining and the surrounding rock. Thus water seepage along the outside surface of the tunnel is prevented. However the water pressure from water seepage has been considered as a "worst case" scenarios..

3.6 Dewatering of the Tunnel

Dewatering of the proposed Diversion Tunnel has been considered as a temporary load case in the proposal design and will be considered as a normal load case in detail design

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3.7 Long-Term Analysis

a) Swelling:
It is expected that swelling has not to be taken into account for the present tunnel lining system as the tunnel lining incorporates an impermeable water proofing membrane so that long-term rock swelling does not develop (no accessibility to fresh water). In addition the high pressure interface grouting, which is designed to pre-stress the final concrete lining and the surrounding rock, will additionally suppress potential swelling pressures.

b) Rock-Squeeze
Squeeze is usually associated with the long-term creep behavior of rock, initiated by the relief of high in-situ horizontal stresses. The long-term behavior has been taken into account by using a reduced stiffness modulus $E_{rock}(t)$ for the time t. The potential stress increase around the excavated tunnel has been analyzed using the Convergence-Confinement Method. The long-term stress increase has then been applied to the FE-calculations. Those calculations proof that the final lining is able to support the long-term stress increase in the vicinity of the tunnel.

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4 DESIGN CRITERIA

4.1 General

The purpose of the Design Criteria is to locate general criteria, technical background information, guidelines, requirements and procedures. This information will be used for the subsequent analysis and design of the initial support for excavation and of the final lining of the proposed Diversion Tunnel.

4.2 Lining System

Lining system design criteria assume tunnel construction will utilize a double shell lining consisting of an initial support and a final lining separated by a waterproofing membrane. The waterproofing membrane system prevents seepage between inside and outside of the Diversion Tunnel and acts as a suitable corrosion protection for the final lining. The final lining will be installed once tunnel excavation is completed. The initial support is designed to carry the rock loads, which develop during stress redistribution upon excavation.

High pressure interface grouting, which is designed to prestress the final concrete lining and the surrounding rock is applied, such that internal water pressure does not cause cracking of the final lining concrete and that water seepage along the outside surface of the tunnel is prevented.

4.3 Codes and Standards

[a] Canadian Standard Association, S16-01: Limit States Design of Steel Structures, December 2001.

[b] Canadian Standard Association, A23.3-94: Design of Concrete Structures, December 1994 (reaffirmed December 2000).

[c] National Building Code of Canada (1995)

[d] The Building Code of Ontario (1997)

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4.4 Structural Materials

4.4.1 Shotcrete

In order to model time-depended behaviour of the shotcrete (creep and hardening), short term and longterm stiffness (modulus of elasticity) of the shotcrete are taken into account. For a short time after the tunnel lining installation, the so-called "young" shotcrete (i.e. the characteristics of shotcrete before it has reached final design strength) is used in calculations. A reduced modulus of elasticity (HME) is applied; This HME reflects the behaviour of ground, shotcrete material and reinforcement. The values for HME are derived from the literature {1}.

	Modulus of Elasticity for green (young) shotcrete (HME) in MPa	
Rock Mass Behavior / Shotcrete Material and Reinforcement	Slow Stress Redistribution Ductile Behavior	Fast Stress Redistribution Brittle Behavior
1-day-strength <10 MPa slightly reinforced	1,000 - 3,000	1,500 - 3,000
1-day-strength <10 MPa moderately reinforced	3,000 - 5,000	3,500 - 6,000
1-day-strength <10 MPa heavily reinforced or steel-fiber reinforced	4,000 - 6,000	4,500 - 7,000

Table 1: Modulus of Elasticity for Young Shotcrete

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For hardened shotcrete a value for Young's Modulus of 15,000 MPa is used.

4.4.2 Reinforcement

The reinforcement of the shotcrete has not been explicitly modelled in the calculations.

4.4.3 Rock Dowels

The load bearing capacity of a rock dowel in tension is determined by the ultimate tensile strength.

The shear strength of steel bars, according to the Mises's hypothesis, is given by:

$$\tau = \frac{\sigma_t}{3^{1/2}} = 0.58\ \sigma_t$$

Where: σ_t = tensile strength,
τ = shear strength.

4.4.4 Steel Ribs

The following material properties apply in accordance with CSA S16-01 [a]:

Minimum yield stress f_y – 410 MPa,

Modulus of elasticity E_s – 200,000 MPa.

4.4.5 Final Lining Concrete

Normal density concrete has been applied to subsequent calculations and has at least the properties shown below (in accordance with CSA A23.3.94 [b]):

Specified compressive strength f_c' = 35 MPa at 28 days
Poisson´s ratio ν = 0.2
E-modulus $E_C = 4500\sqrt{f_c'}$

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The actual compressive strength used in the calculation will be based on the 90 days strength as determined by testing.

4.5 Design Loads

4.5.1 Structural and Dead Loads

Dead load of structural and non-structural elements is based on unit weight and computed volume of the materials. The following unit weights is used:

Unreinforced Concrete	24.0 kN/m³
Structural Steel	78.5 kN/m³
Rock / Soil	see GBR for details [4]
Water	10.0 kN/m³

4.5.2 Live Loads

Live Load consists of any non-permanent load placed on or in the tunnel.

4.5.3 Ground Pressure

Ground loads on the tunnel lining are not predetermined in FE-calculations, since full overburden is modelled.

Geostatic loads have to be defined in accordance with the load case considered for structural calculations with Beam Spring Models.

4.5.4 Hydrostatic Pressure

It has to be distinguished between the internal hydrostatic pressure and the external ground water pressure. Relevant water pressures to be applied to the subsequent calculations are summarized in chapter 5.2.6.

4.5.5 Seismic Loads

Underground structures are generally less sensitive to seismic effects than surface structures, therefore no seismic loads are considered for preliminary

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design. At detail design stage a seismic analysis based on actual data will be carried out.

4.5.6 Thermal Forces

Temperature changes cause thermal strains and internal forces in the final lining. Temperature variations during and after concreting are related to heat of hydration. The temperature is assumed to cool down to approx. 10 °C on the shotcrete/rock interface (extrados) and to 10 to 20 °C (seasonal variations before filling the tunnel) on the intrados of the final lining concrete. When filling the tunnel with water, the concrete temperature is assumed to drop from max. 20 °C to a minimum of approx. 4 °C on the intrados. The extrados of the final lining remains at a temperature of 10 °C as a conservative assumption.

This drop in temperature will cause a design-relevant contraction of the lining. It results in a loss of prestress of the final lining as a consequence.

Concrete Lining Thickness d	Max. temp. gradient before filling the tunnel with water °C	Max. temp. gradient after the tunnel is filled with water °C
extrados (rock)	+10	+10
centre line	+15	+7
intrados	+20	+4
ΔT (d)	10	6

Table 2: Temperature Gradient in Final Lining Concrete

4.5.7 Concrete Shrinkage

Concrete shrinkage is caused by the migration of the excessive water from the interior of the concrete mass and leads to shortening of the concrete per unit length. Since the final lining is restraint the shortening of the concrete leads to stresses in the lining. Shrinkage strains are assumed to be constant over the entire lining thickness.

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The shrinkage strain mainly depends on the ratio of volume to surface of the structure, on the drying time of the concrete and on the humidity of the environment.

A concrete shrinkage strain of $\varepsilon_s = -15.7 \times 10-5$ is applied based on experience with comparable tunnel linings.

4.5.8 Concrete Creep

Creep will be taken into account by reducing Young's Modulus for concrete. From experience a stiffness-reduction-factor between $\mu = 1.5$ and $\mu = 2.3$, dependent on the concrete age, may be assumed. In the calculations an average reduction factor of $\mu = 2.0$ is applied. This leads to a reduction of Young's Modulus for concrete to 50%.

4.5.9 Long-term Rock Squeeze

4.5.9.1 General

The tunnel lining system for the Diversion tunnel is designed to be *capable of adequately supporting all loads including those imparted on the lining from long-term rock swelling [2].*

It is recognized, that high horizontal stresses are prevealing in the rock formations in Southern Ontario. Rock excavation at surface and underground relieves the initial state of stresses, providing an initiating mechanism for time-dependent deformation to occur.

4.5.9.2 Time Dependent Deformation Behaviour

It has to be emphasized that the time dependent deformation phenomenon is described in terms of **"rock squeeze"** and **"swelling"**. It is well recognized that these processes are interrelated, and the individual effects of each are difficult to distinguish. Both effects can continue for many years [4].

Squeeze is usually associated with the long-term creep behaviour of rock, initiated by the relief of high in situ horizontal stresses. There is a well documented history of rock 'squeeze' affecting surface excavations in the upper dolostones and dolomitic limestones. This squeeze, however, may include the effects of swelling of the shale interbeds in these rock units [4].

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4.5.9.3 Swelling Behaviour

Swelling to be assumed for design purposes in the Queenston Formation is given in the Owner's Mandatory Requirements [2]. There is no available data regarding suppression of swell potential for the other formations.

Generally swelling involves a volume increase and is initiated by the relief of the high in situ stresses. However, swelling also requires the presence of fresh water. The process is associated with ionic diffusion of salts from the connate pore water in the rock. The swelling phenomenon can be suppressed under applied stresses.

For swelling to occur, the necessary conditions are:

- the relief of initial stresses, which serves as an initiating mechanism,
- the accessibility to fresh water,
- an outward salt concentration gradient from the pore fluid of the rock to the ambient fluid.

The proposed tunnel lining system includes the following features:

- The tunnel lining incorporates an impermeable liner in form of a waterproofing membrane system. No accessibility for fresh water is allowed and long-term rock swelling does not develop.
- The state of effective stress in the rock mass after excavation affects the rate of swelling. The high pressure interface grouting, which is designed to prestress the final concrete lining and the surrounding rock will additionally suppress potential swelling pressures because effective stresses in the rock mass.

The processes "swelling" and "rock squeeze" are interrelated. Model assumptions for rock swelling are presented in chapter 5.2.4.3.

4.5.9.4 Rock Squeeze Behaviour

The rock expansion upon unloading observed in previous constructions [4] is not necessarily associated with the swelling of clay minerals, although in the presence of swelling clay minerals the time dependent deformation is generally greater.

Rock squeeze is defined as substantial time-dependent deformation in the vicinity of the tunnel as a result of load introduced by redistribution of stresses

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adjacent to the excavated tunnel. Model assumptions for rock squeeze behaviour are presented in chapter 5.2.4.4.

4.5.10 Load Combinations

For load combinations not including earthquake, factored loads are determined in accordance with CSA A 23.3. Herein the effect due to specified loads multiplied by a load factor α, a load combination factor ψ and an importance factor γ is considered:

$$\alpha_D D + \gamma \psi (\alpha_L L + \alpha_T T)$$

where:

- Load factors α for:
  - Dead loads D: $\alpha_D = 1.25$
  - Live loads L: $\alpha_L = 1.5$
  - Temperature loads T: $\alpha_T = 1.25$
- Load combination factor ψ:
  - $\psi = 1.00$ when L or T is considered
  - $\psi = 0.7$ when a combination of L and T is considered.
- The importance factor is equal to 1.0 for all load combinations.

4.6 Analysis Assumption

4.6.1 Analysis Methods

The type of analysis depends on the potential failure mode during excavation and installation of tunnel support. The failure mechanism is generally differentiated into the following failure modes:

- failure of rock blocks,
- fracturing induced by stresses and/or discontinuities,
- progressive failure induced by stresses,
- failure induced ahead of tunnel face,

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- failure of tunnel face.

The following calculation methods are used (also shown in the flowchart of Figure 1):

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FLOW CHART - "STRESS ANALYSIS"

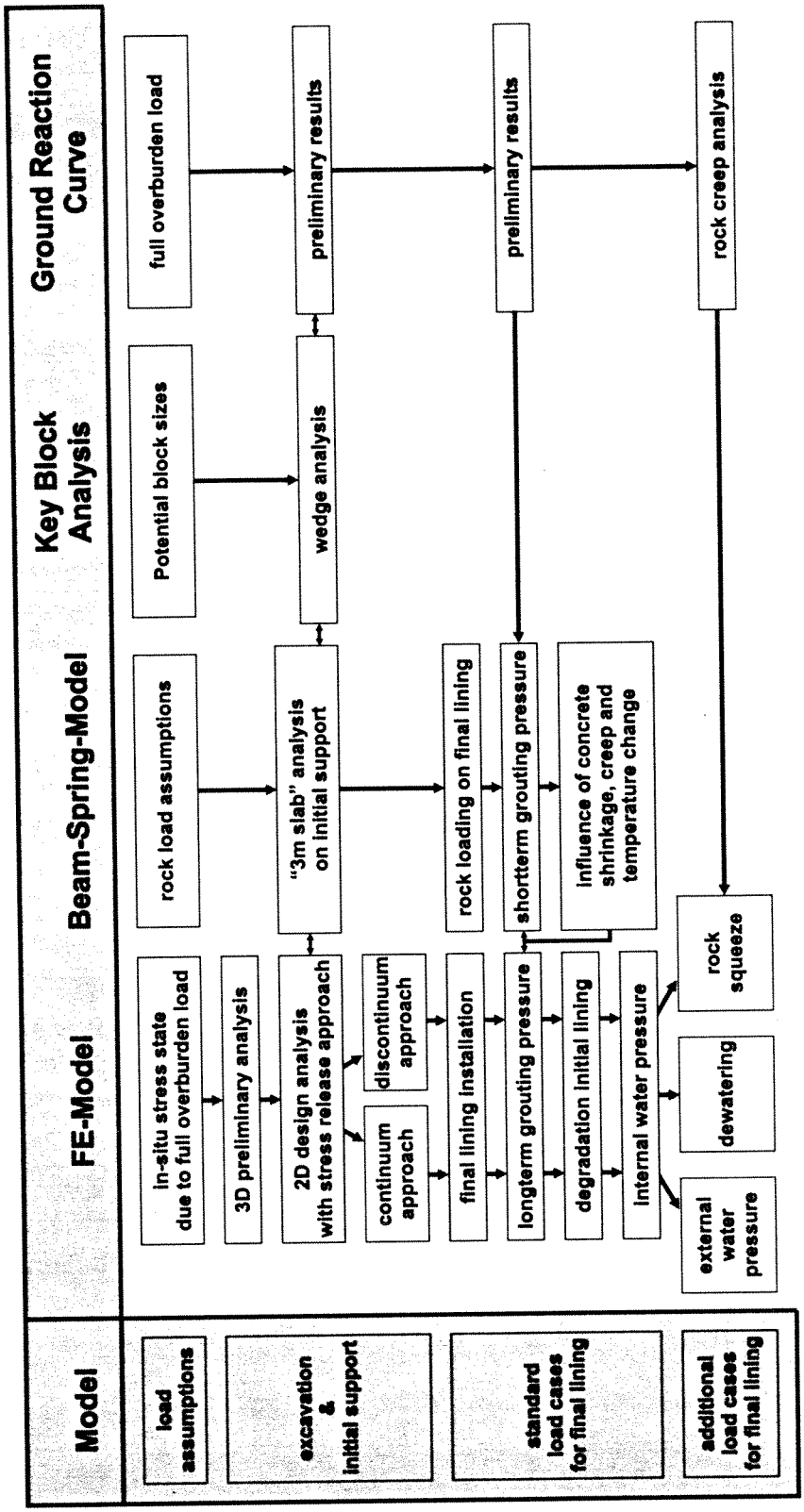

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Figure 1: Flow Chart "Stress Analysis"

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4.6.2 Initial Support

The initial lining is subject to variations in stresses and strains during its intended use. Rock load, water load, chemical/physical influence of aggressive water, swelling phenomena of the surrounding rock, swelling and shrinking processes in the concrete, etc.. The resulting changes in stiffness and in strength determine the load-bearing behaviour of the support system.

The full contribution of load bearing capacity of the initial lining over the operation time of the Diversion Tunnel cannot be considered due to the above mentioned influence and the combination of adverse effects. It is assumed that the initial lining may gradually loose its load-bearing capacity. It deforms and thus exerts stresses and strains on to the final lining.

This aging process of the initial lining is simulated by modelling a transition from a purely elastic to an elasto-plastic material behaviour. The analysis model takes into account a potential change of stiffness and strength of the initial lining over time due to

- corrosion/failure of the reinforcement,
- degradation, weathering of shotcrete,

A conservative approach according to the "Gray Rock Philosophy" {7} is selected: The initial lining is modelled elasto-plastic as part of the rock with adequate strength parameters. Tensile stresses are to be avoided. The modulus of elasticity is reduced.

4.6.3 Final Lining

The final lining is analysed for all permanent and temporary loads. The analysis is carried out under the assumption that the initial lining does not contribute to resist the superimposed loads and displacements.

4.7 Tunnel Lining Design

4.7.1 Concrete Design

The initial lining consisting of rock dowels, steel ribs, steel wire mesh and shotcrete is checked against the design strength of concerte. In the calculation, the contribution of steel elements (reinforcement, dowels, ribs) to the bearing

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capacity of the initial lining is ignored. The degree of safety of the lining (α degree of mobilization of the strength of the unreinforced concrete) is expressed by checking the safety factor f_{NM}, which is the ratio of the design normal force N_{sd} and the resisting normal force N_{rd}, considering the calculated eccentricity $e = M_{sd} / N_{sd}$ of the unreinforced shotcrete only.

The final lining consisting of cast in place concrete is checked against the factor f_{NM} in the same way as the initial lining.

The minimum safety factors f_{NM} are listed as calculation results in chapter 6.

The following formula is used for the design of unreinforced concrete:

$$N_{rd} = \phi_c \cdot f_c' \, d\left(1 - 2\frac{e}{d}\right)$$

N_{rd} is the resisting normal force with b = 1 m
d ...thickness of the tunnel lining
e ...eccentricity (e = M/N)

The resistance factor of concrete Φ_c is assumed to be 0.60 according to CSA A23.3-94 [b]. The required design factor $f_{NM} = N_{sd} / N_{rd}$ for design check of the lining is:

$f_{NM} \geq 1$.

Herein the computed structural forces N will be multiplied by a factor $\alpha_L = 1.5$ according to CSA A23.3 in order to get the design structural forces N_{sd}.

In addition the maximum eccentricity is controlled by

$e / h_w \leq 0.33$.

h_w represents the structural height of the element.

4.7.2 Steel Design

Steel- if required - is designed according to CSA S16-01 [a].

4.7.3 Safety factors

The following factors of material resistance are selected:

- concrete $\Phi_c = 0.6$

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- steel $\Phi_s = 0.9$

The load factors are generally selected in accordance with the Design Criteria, chapter 4.5.10. Reduced factors are applied solely for following extraordinary load cases:

a) short-term prestressing pressure for interface grouting with a load factor $\alpha_L = 1.0$ is in accordance with CSA A23.3-94 [b], since the grouting operations is carefully monitored and the pressure can be instantly controlled.

b) worst-case scenarios of a groundwater pressure on the lining (worst credible assumption as outlined in chapter 5.2.6) in combination with an unfrequent temporary operation state "Dewatering of Tunnel".
Factors for such a load-combination "worst case - temporary state" have been assumed to be:
load factor $\alpha_L = 1.0$
resistance factor of concrete $\Phi_c = 0.6$

In the detail design the load factor of 1.25 (instead of 1.0) will be used for external hydrostatic water pressure. (A design check proved the application of the load factor of 1.25 for external hydrostatic water pressure to be o.k.)

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5 DESIGN BASIS

5.1 General

It has to be appreciated that, prior to tunnelling, tunnel design represents a prediction which is either verified on site to ensure, that all design assumptions are confirmed, or which has to be adjusted in-situ to suit actual conditions.

The initial steps of the tunnel design procedure are to collect geological data, then to establish geotechnical parameters in those sections along the tunnel profile with consistent characteristics and finally to summarize the geological series with similar mechanical properties.

Further, the boundary conditions such as virgin stresses, size, shape and orientation of the opening are taken into account in order to establish a possible failure mechanisms, thereby establishing the potential behaviour of the rock mass while the opening is excavated. Different failure mechanisms require different support measures and different models of analysis to design the support measures. In order to simplify procedures at the site, support types are established which apply to the various types of behaviour of rock mass as a result of excavation.

5.1.1 Geology

Twelve stratigraphic formations are identified in the project area. They consist of sequences of sedimentary rock of Ordovician to Devonian age. These are namely the Guelph, Lockport, De Cew, Rochester, Irondequoit, Reynales, Neahga, Grimsby, Power Glen, Whirlpool and Queenston formations. Some of these are only a few meters thick. Eleven of the mentioned formations are expected to occur along the tunnel structure. The uppermost Guelph formation will not intersect with the proposed tunnel alignment. The lithological spectrum of the encountered formation covers limestone, dolostone, sandstone and shale (see Design Basis and Method Statements [5] for details).

5.1.2 Calculation Sections

3 preliminary Finite Element Calculations were defined:

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Calculation	approx. Station [m]	Location	Rock Mass Type	Analysis Method
1	1+213.5	Turbine Pit	Lockport / DeCew / Rochester	FE back analysis
2	general	not specific	Rochester	3D-FEM 2D-FEM
3	general	not specific	Queenston	3D-FEM 2D-FEM

Table 3: Preliminary Calculation Sections

Five calculation sections were defined along the tunnel. The details of each section are included in the subsequent table 4:

Calculation Section	approx. Station [m]	Location	Rock Mass Type	Analysis Method
B/0	0+080	Close to Intake	Lockport	2D-FEM BSM CCM
C/0	1+800	below existing Tunnels No. 1/2	Upper Queenston	2D-FEM BSM CCM
D/0	not specific	Tunnel Section including Bedding Plane Q8/Q9 of Queenston Formation	Queenston Q8/Q9	2D-FEM Discontinuum Analysis
E/0	8+660	Section under Gorge	Queenston	2D-FEM BSM CCM

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F/0	8+920	Deepest Section	Queenston	2D-FEM BSM CCM

Table 4: Analysed Calculation Sections - Proposed Tunnel Alignment

legend: 3D-FEM: 3-dimensional FE-Calculations
2D-FEM: 2-dimensional FE-Calculations
BSM: Beam-Spring Model
CCM: Convergence Confinement Method

Calculations with Key Block Theory depend on the varying trend and plunge of the tunnel axis. The tunnel sections to be analysed by KeyBlockTheory are summarized in Chapter 5.2.8.

5.1.3 Groundwater

Three major groundwater flow regimes are encountered in the rock formations of the project area. The uppermost occurs in the Guelph, Lockport and De Cew formations. This aquifer is connected to the surface water and shows the highest permeability of the entire sequence. A second flow regime is associated with the low permeability strata of the Rochester, Neahga, Power Glen and Queenston formations, forming a system of aquitards. A third flow regime is associated with the deeper permeable strata of the Irondequoit, Reynales, Thorold, Grimsby, Whirlpool and upper Queenston formations. These strata form deep lying aquifers. Groundwater elevations are reported to vary significantly from strata to strata and from location to location. Some groundwater heads encountered showed artesic behaviour with pressure heads above ground elevation.

The following maximum groundwater levels (measured groundwater levels within the Queenston Formations as indicated in the GBR in determination of the external hydrostatic water pressure) are applied to the calculations with respect to the ranges of the groundwater level (see Design Basis and Method Statements [5] and Geotechnical Longitudinal Section (2) for details):

Calculation Section	approx. Station [m]	max. el. [m] groundwater level
B/0	0+080	168.0

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A/1	1+213.5	160.0
B/1	1+400	160.0
C	4+380	165.0
D	6+665	130.0
E	8+660	150.0
F	8+920	150.0

Table 5: Maximum Groundwater Levels for Calculations

5.2 Input Parameters

Generally best estimate values for ground and lining properties are applied to the analysis. The effect of variation of the selected design values for these properties has been continuously checked by means of sensitivity analysis.

The range of parameters that is used to appreciate parameter variability in the design is defined in the GBR-A, "Required Response 3" [4].

5.2.1 In-Situ Stresses

In-situ stress conditions in southern Ontario are characterised by high horizontal stress, exceeding vertical stresses in parts significantly. The stress field is reported to be relatively consistent trending in a north-eastern direction. However the magnitudes of stress and the direction of the maximum stress can vary significantly depending on lithology, depth and topographical features (see Design Basis and Method Statements [5] for details).

The in-situ stresses applied to the calculations are based on the Geotechnical Data Report [1] and are summarized in GBR-B [4] and in Design Basis and Method Statements [5]:

Calculation Section	B/0	B/1 and C	A/1 and D	F	E and G
Lockport	6.1	11.3			
DeCew					

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<table>
<tr><td>Rochester</td><td>3.7</td><td colspan="3">13.2</td></tr>
<tr><td>Irondeque</td><td colspan="4">6.5</td></tr>
<tr><td>Reynales</td><td colspan="4" rowspan="2">4.1</td></tr>
<tr><td>Neahga</td></tr>
<tr><td>Thorold</td><td>1.8</td><td colspan="3">12.0</td></tr>
<tr><td>Grimsby</td><td>1.5</td><td>10.2</td><td colspan="2">10.3</td></tr>
<tr><td>Power Glen</td><td>4.0</td><td colspan="3">5.0</td></tr>
<tr><td>Whirlpool</td><td>2.3</td><td>5.6</td><td>2.0</td><td>4.4</td></tr>
<tr><td>Queenston</td><td>4.3</td><td>4.5</td><td>2.0</td><td>4.5</td></tr>
</table>

Table 6: In-Situ Stress Conditions (Stress Ratio: Horizontal Stresses / Vertical Stresses)

The vertical stresses are generally based on the full overburden gravity load of the rock mass. Insitu testing showed, that the vertical stresses are 30% above the calculated vertical stresses.

The above mentioned stress ratios are used to initialize the primary stress field within the FE-calculations. In case widespread plastic zones develop during initial state, either increase of vertical stress or decrease of horizontal stress has to be applied to the analysis in order to ensure stable initial conditions of the analysis model.

5.2.2 Rock Mass Strength & Stiffness Parameters

The rock mass parameters used in the analysis are based on table 6.16 of the Geotechnical Baseline Report [4].

The strength and deformation properties to be considered with the calculations are summarized for the proposal design in Table 7 below and will be updated in detail design.

Formation	ϕ [°]	c [MPa]	E [GPa]
Lockport	34	7.9	24

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DeCew		34	8.0	24
Rochester		32	2.5	15
Irondeque		35	5.7	22
Reynales		34	6.3	24
Neahga		26	0.8	4
Thorold		40	9.5	24
Grimsby		30	1.2	11
Power Glen		38	10.3	18
Whirlpool		43	16.0	42
Queenston	Upper QF (30m)	30	1.8	10
	Lower QF	33	2.8	16
	St. David's Gorge	24	1.3	4

Table 7: Rock Mass Strength & Stiffness Parameters

The following soil parameters have been determined in addition to the parameters listed in Table 7 (see Geotechnical Data Report [1] and the Geotechnical Baseline Report [4]):

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Formation		ϕ [°]	c [MPa]	E [GPa]
overburden layer		15	0.02	0.01
sedimentary layers within St' Davids Gorge	layer A above 120 m el.	27.5	0.03	0.10
	layer B below 120 m el.	37.5	0.02	0.55

Table 8: Additional Soil Strength & Stiffness Parameters

The strength parameters summarized in Tables 7 and 8 are considered as "peak-strength" data. According to the Owner's Mandatory Requirements [2] especially the Queenston shale exhibits a predominant "post-peak" behavior. The reduction from peak strength to post-peak strength is considered according to the Owner's Mandatory Requirements, chapter 8.3.4 [2]:

The following parameters shall be used in the analysis:

(iii) Hoek.Brown residual rock mass strength parameters: mr = 1.0, sr=0.001
(or equivalent)
(iv) plastic shear strain in rock for peak to post-peak: ranging from 0.5% to 2.0 %

Consequently the following "peak-" and "post-peak" strength parameters are applied to the Queenston formation (Table 9).

	Peak-Strength		Post-Peak-Stength	
Formation	ϕ_{peak} [°]	c_{peak} [MPa]	$\phi_{res.}$ [°]	$c_{res.}$ [MPa]
Upper Queenston (30m)	30	1.8	26	0.5
Lower Queenston	33	2.8	26	0.4

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Table 9: Strain Softening Strength Parameters for Queenston Shale

The decrease in strength due to strain softening is considered in the analysis with the mobilization of plastic shear strains during all calculation phases. As soon as a critical plastic shear strain will be reached in any zone, a post peak strength decrease to the residual strength will be executed. According to the Owner's Mandatory Requirements [2] the relevant plastic shear strain to reach a decrease to a residual strength is in the range of 0.5% to 2.0 %. Within the subsequent analysis, a best estimate value of 1.25 % is selected for the critical plastic shear strain. An elasto-brittle material model is used, i.e. a sudden decrease in post-peak strength is modeled as soon as the critical plastic shear strain is reached.

5.2.3 Bedding Plane Parameters

Sheared, weak bedding planes exist between many of the rock formations and within the Queenston Formation. Primary bedding planes are defined as major bedding planes between lithological units above the Queenston Formation and between subunits within the Queenston Formation. According to the geotechnical data available [1,4] six major stratigraphic divisions have been identified in the Queenston Formation, which are separated by fairly distinctive primary bedding planes.

It is expected that especially the primary bedding planes, which are present between the subunits of the Queenston Formation, affect the stresses and strains around the tunnel during and after excavation. In order to account for such discontinuous behaviour the following parameters based on test data given in the GDR [1] (Volume 2, Figure 12.1) are used for modelling the bedding planes (Table 10):

	Peak-Strength		Post-Peak-Stength	
Formation	ϕ_{peak} [°]	c_{peak} [MPa]	$\phi_{res.}$ [°]	$c_{res.}$ [MPa]
bedding planes between subunits of Queenston Shale	24	0.45	15	0.0

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Table 10: Strength Parameters for bedding planes between subunits of Queenston Shale

Since no particular information is available so far, the relevant displacement within the bedding plane to trigger the decrease to residual strength is selected on the basis of engineering judgement. Within the subsequent analysis a best estimate value of 10 mm is selected for this critical displacement. The elasto-brittle material model is used (see chapter 5.2.2).

5.2.4 Long-term Behaviour

As already outlined in chapter 4.5.9 time dependent deformation phenomenon is described in terms of processes, which are interrelated: "rock squeeze" and "swelling".

5.2.4.1 Time-dependent deformations observed during previous constructions

Vertical Shaft Wheel Pit:

During the construction of the vertical shaft Wheel Pit of the Canadian Niagara and Toronto Power Plants the 5.5 m wide and 50 m deep slots an inward movement of both walls was recognized (total maximum inward movement of both walls over a 68-yr period was approx. 7 cm) [4]. The data shows a general trend of decreasing rate of rock movement with time. According to an additional study evaluated by Yolles {14} in 1991 the rock squeeze is expected to continue at the presently established rate of approximately 0.15 - 0.48 mm per year.

12-m diameter Trial Enlargement

According to the GBR [4] within a 12-m diameter Trial Enlargement in the Queenston Formation a pattern of on-going, very small creep movements were measured in the first few months after excavation (maximum 5 mm measured from 7 to 70 days following excavation).

Diversion Tunnel No. 1 and 2

Measurements during and after excavation recorded horizontal inward movements of up to 60 mm over a 6-month period in Tunnel 1 (vertical

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movement of the crown was significantly smaller). Most of the movement occurred immediately after installation of the instrument. According to [4] the creep movement appears to be a logarithmic function of time.

Construction of the Queenston-Chippawa Canal 2

The canal was constructed in the early 1950s. The excavations extend about 18 m into the Lockport/DeCew Formations. According to [4] elastic deformation at the top of the rock cut amounted to about 1 to 1.3 cm on the first lift, with an additional 1.3 to 1.8 cm closure immediately following final excavation. Small creep movements of up to 0.33 cm/yr were noted for the 2 years that measurements were taken [4].

5.2.4.2 Back-Analyses of the Toronto Power Turbine Pit Excavation

Appendix 01 provides computer plots of a FE-back-analysis of the vertical shaft of the Toronto Power Plant. The measurements of this excavation have been used to estimate deformations with respect to the excavation work itself and to distinguish between additional swelling deformations and long-term rock squeeze deformations.

This calculation indicates:

- Sequenced excavation and installation of the shaft:
  maximum horizontal displacements ~ 6 mm
- Due to stress release and water ingress a swelling strain in the order of 0.5 % is expected in a limited area around the Shaft Wheel Pit:
  maximum additional horizontal displacements ~ 10 mm
- Rock Creep has been modeled in agreement with the model assumption given in the chapter hereafter. The maximum creep-value of 1.5 has been applied to the calculation resulting in:
  maximum additional horizontal displacements ~ 18 mm

The total horizontal displacements of 35 mm (each side-wall) are in good agreement with the observations as reported in the previous chapter.

5.2.4.3 Swelling Behaviour

The swelling behaviour initiated due to the tunnel excavation is correlated to the decrease of the first invariant of the stress state (mean effective normal stress) I_1 {15}.

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The primary stress state σ_p will change to the secondary stress state σ_s. Due to the excavation the tunnel lining will deform and a relaxation of the surrounding rock may appear. According to {15} swelling behaviour may occur as soon as the first invariant of the secondary stress state stress $I_{1,\sigma s}$, will be smaller then the first invariant of the primary stress state $I_{1,\sigma p}$:

$$I_{1,\sigma s} < I_{1,\sigma p}$$

with:

$$I_{1,\sigma s} = \sigma_{x,s} + \sigma_{y,s} + \sigma_{z,s} \quad \text{and} \quad I_{1,\sigma p} = \sigma_{x,p} + \sigma_{y,p} + \sigma_{z,p}$$

Due to such a stress release ($I_{1,\sigma s} < I_{1,\sigma p}$) swelling strains δ_{sw} will develop. Under the assumption that the swelling potential during primary stress state has been already vanished, it can be stated that the swelling potential equals the difference of the strain invariant of the primary and secondary state $\Delta I_{1,\varepsilon,sw}$

$$\Delta I_{1,\varepsilon,sw} = I_{1,\varepsilon p} - I_{1,\varepsilon s}$$

with

$$I_{1,\varepsilon,sw} = K_{sw} \frac{I_{1,\sigma}(1-\upsilon)}{\sigma_0(1-\upsilon)}$$

The subsequent FE-calculations indicate that the area with swelling potential according to the above mentioned criteria ($I_{1,\sigma s} < I_{1,\sigma p}$) is small. The reason in this regard is based on the advantages of the proposed lining system.

In addition a suppression pressure of > 5 MPa exists due to the high in-situ stresses - especially in horizontal direction. The sedimentary rock has anisotropic stress and strain behaviour. It has to be mentioned, that according to test results reported in [4] application of stress in one direction not only suppresses the swelling in that direction but also reduces the swelling in the orthogonal direction.

It can be concluded that the swelling potential is negligible on the one hand due to the expected secondary stress state and on the other hand due to the proposed excavation method and double shell lining system.

5.2.4.4 Rock Squeeze Behaviour

A time related approach to estimate "rock squeeze" or "rock creep" phenomena as described in Chapter 4.5.9 is used to estimate potential long-term stress-increase on the tunnel lining:

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$$E_{rock}(t) = \frac{E_{rock}(t=0)}{1+\varphi(t)}$$

The long-term rockmass behaviour is taken into account by calculating a reduced stiffness modulus $E_{rock}(t)$ for the time t, $\varphi(t)$ represents the so-called creep-value. The long-term rock squeeze behaviour is simulated using a creep-value in the range of 0.5 to 1.5 for the time t = 90 years. The range for φ (t = 90 years) is selected on the basis of conservative engineering judgement. The maximum creep rate φ_{max} =1.5 has been evaluated on the basis of measurements of an existing structure (Wheel Pit back-analysis).

5.2.5 Interface Grouting Properties

The objective of the interface grouting is to lock into the lining a compressive strain greater than the tensile strain expected after filling the tunnel with water. This will prevent the development of tensile stresses in the lining and therefore avoid cracking during operation.

Prior to filling the tunnel and after grouting, the lining is highly compressed. These short-term grouting pressure will consequently decrease due to creep and shrinkage before filling the tunnel. Together with temperature decrease (cooling of concrete) these effects add up to the long-term grouting pressures to be applied.

Calculations are carried out:

- to estimate required long-term grouting pressures in order to avoid final tensile stresses in the tunnel final lining,
- to estimate compressive strain losses due to creep, shrinkage and temperature changes,
- to finally define the required short-term grouting pressures (without exceeding the allowable compressive strength of concrete).

The grouting pressure is assumed to be uniformly distributed within the grouting interface. Local deviations from this are largely unpredictable, but can be controlled during the carefully monitored Interface Grouting Operation.

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5.2.6 Water Pressure

The applicable "Internal water pressure" is shown in the geotechnical longitudinal section (2) and will be treated as basis for subsequent analysis.

The high pressure interface grouting is designed to prestress the final concrete lining and the surrounding rock in such a way, that

- internal water pressure does not cause cracking of the lining concrete and
- water seepage along the outside surface of the tunnel is prevented.

Therefore an "external water pressure" will be taken as the measured groundwater levels indicated in section 5.1.3 a regular load case.

5.2.7 Lining Properties and Lining Dimensions

Initial Lining:

Immediately after excavation "young" shotcrete properties ($E = 7500\ MN/m^2$) are applied in the analysis. For subsequent design stages properties for "old" shotcrete ($E = 15000\ MN/m^2$) are taken into account after the shotcrete has hardened sufficiently.

The lining shotcrete is initially subjected to radial and tangential stresses as a result of the interlocking mechanism with the ground. The transfer of tangential stresses is limited in case shear failure occurs. Either the failure of rock or the failure of shotcrete is theoretically possible, therefore the strength parameter associated with the weaker material is used as failure criterion for the interface.

The lining thickness and geometrical parameters are presented in the drawings (5), (6) and (7) for each Rock Support Type.

Final Lining:

The Concrete properties used for analysis are presented in chapter 4.4.5. The geometry of the typical cross section is presented in (3). Different thicknesses of final lining (600 mm and 700 mm) are proposed in (3), which depend on the stress level, the lining has to resist.

5.2.8 Discontinuity Orientation and Additional Parameters for Wedge Analysis

Discontinuity Orientation

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Five major discontinuity sets are identified along the tunnel alignment including bedding planes and 4 joint sets. The table 11 lists the major discontinuity sets provided in the GBR A [3].

Major Discontinuity Sets			
No.	Type	Strikedirection	Dip
		[°]	[°]
1	bedding	E-W	0,3
2	J1	5	80-90
3	J2	45	80-90
4	J3	85	80-90
5	J4	135	80-90

Table 11: Major Discontinuity sets for the Niagara Tunnel Facility Project

The software used for Key Block Analysis enables to compute all possible discontinuity combinations and the resulting wedges. A total of 10 combinations are obtained from the combination of the 5 major discontinuity sets.

Discontinuity Set Combinations			
Combination	Joint_A	Joint_B	Joint_C
1	2	4	5
2	1	4	5
3	1	3	5
4	1	2	5
5	1	2	4
6	3	4	5
7	2	3	4
8	2	3	5
9	1	2	3
10	1	3	4

Table 12: Discontinuity combinations resulting from the major discontinuity sets

Size, Shape and Orientation of the Tunnel

The shape of the bored Diversion Tunnel is circular with a diameter of 14.44 m. Along the proposed tunnel alignment, the tunnel changes its orientation several times significantly. The trend of the tunnel axis represents the orientation with respect to North: The plunge of the tunnel axis represents the grade with respect to a horizontal plane. Both parameters are evaluated resulting in 6 tunnel sections with varying trend and plunge. The relevant tunnel sections are summarised in table 13.

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Alignment Trend/Plunge			
Section		Plunge	Trend
from	to	[°]	[°]
0+000	2+168	0	100
2+168	2+868	0	178
2+868	6+944	1	178
6+944	8+415	1	195
8+415	8+865	1	235
8+865	10+364	-4	235

Table 13: Variation of trend and plunge of the tunnel axis along the alignment

The 10 possible discontinuity combinations are analysed for the six above listed tunnel sections separately, resulting in 60 individual computations.

Discontinuity Properties

The discontinuity properties are defined applying the Mohr-Coulomb parameters (friction angle ϕ and cohesion c). The following discontinuity properties are applied in the analysis (see GBR [4]):

Discontinuity Type	ϕ [°]	c [MPa]
Bedding Plane	24	0,45
Joint	30	0,0

Table 14: Discontinuity properties

5.3 Analysis Models

5.3.1 FE-Model

General:

The Finite Element (FE) Method is applied to consider the surrounding ground as a load carrying element and to take nonlinear ground parameters into account. The dimensions of the Finite Element mesh are selected in a way that effects of the excavation on the boundaries of the system can be excluded. The boundary conditions of the FE mesh are as follows: The ground surface is free to displace, the side surfaces have roller boundaries and the base is fixed.

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The Finite Element Code PLAXIS is used for the computations. Verification of the selected elements, materials and methods are given in {3,4}.

In general, the ground is modelled using the isotropic constitutive model of Mohr Coulomb with linear elasticity and perfect plasticity. The Mohr-Coulomb model requires a total of five parameters:

E	-	Young's modulus
ν	-	Poisson's ratio
ϕ	-	friction angle
c	-	cohesion
ψ	-	dilatancy angle

Details of the constitutive model used are presented in {3}.

Stress Release ahead of face:

The excavation of a tunnel is a three dimensional problem. As a result of excavation, deformations occur in the ground ahead the tunnel face. After excavation and initial lining application further deformations occur causing stresses in the shotcrete.

The stress release ahead of tunnel face is evaluated using preliminary 3D-FE analysis. The portion of forces acting on the ground ahead of excavation and the portion acting on the combined system of ground and lining depend on:

- Size of excavation
- Stiffness of ground
- Stiffness of the lining
- Unsupported length of excavation.

The stress analyses for the selected analysis sections are performed with 2D-FE models (i.e. plane strain analysis). In the 2D-analysis it is necessary to consider deformations of the ground, ahead of excavation (i.e. to approximate the load sharing effect). To evaluate the stress release of the ground in front of the tunnel face, the so-called β-method is used in the numerical analysis. The initial stress p_i acting around the tunnel excavation is divided into a part $\beta_1\ p_i$, that is applied to the unsupported tunnel ahead of the face and a part $(1-\beta_i)\ p_i$, that is applied to the supported tunnel (see Figure 3). The factor β_1 represents the stress release factor.

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When simulating the excavation sequence of a tunnel, the finite elements within the excavation area are deactivated and equivalent lining forces (nodal forces) are analyzed to find a comparable initial stress state p_i. Equivalent nodal forces (F_i) act on the boundaries of the excavation and equilibrium conditions are not disturbed. In the first calculation phase, the equivalent pressure is reduced stepwise to the stress release value $\beta_1 F_i$ (see Figure 2, Section B-B). In a second calculation phase, the remaining out-of-balance stress $(1-\beta_1) F_i$ is applied (lining installation) to the tunnel support (see Figure 2, Section A-A).

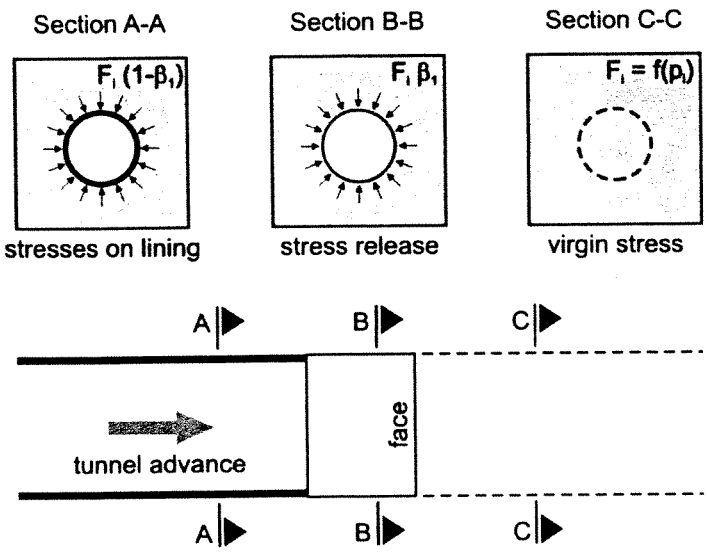

Figure 2: Calculation phases simulating stress release

The stress release in front of the tunnel face is determined on the basis of comparison with preliminary 3D-FE calculations. In addition information of literature {2} is used.

5.3.2 Beam-Spring Model

An elastic beam-spring model is used for certain aspects of the design of the final lining. As indicated in the analysis assumptions for the Diversion Tunnel (see flow-chart, Fig. 1), the influence of:

- maximum short-term grouting pressure,
- shrinkage and creep,
- temperature change on the final lining concrete,

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is analysed. Ultimate limit state and serviceability limit state analysis is carried out.

Linear elastic beam elements are used to model the lining. The subgrade reaction is represented by radial springs are following the tension cut-off criterion. Due to a waterproofing membrane between the initial lining and the final lining, tangential springs can be ignored.

Also the analysis of a "loosened slab of a thickness not less than 3 m" as rock load for the initial lining is analysed using a Beam Spring Model.

5.3.3 Key Block Theory

The potential influence of discontinuities on the excavation of the Diversion Tunnel is analysed by the program code "Unwedge".

Unwedge {6} is a 3D stability analysis and visualization program for underground excavation in rock containing intersecting structural discontinuities using block theory {5}. Safety factors are calculated for potentially unstable wedges and support requirements can be modeled using pattern bolting or spot bolting and shotcrete. *Unwedge* determines all possible wedges that can be formed by the intersection of 3 joint planes and the excavation. A maximum of 8 wedges is formed around the opening, but less than 8 wedges may be formed depending on the joint orientation and the shape and orientation of the excavation. *Unwedge* also determines the wedges that can be formed at both "ends" of the excavation.

The following failure modes can occur:

1. Falling or lifting
2. Sliding on a single plane
3. Sliding on two planes, along the line of intersection

The analysis is based on the assumption, that the wedges, defined by three intersecting discontinuities, are subjected to gravitational loading only. Stresses in the rock mass result in a confinement of rock blocks for which reason the chosen assumption is conservative. This means that the stresses on the joint planes are a result of self-weight of each wedge (as well as support forces, water pressure, seismic forces etc). While this assumption leads to some inaccuracy in the analysis, the error is generally conservative, leading to a reduced factor of

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safety. However, the 3.005 version of the software enables to include the effect of in-situ stress on the wedges. But the inclusion of the Field Stress can only increase the factor of safety, it cannot reduced the factor of safety. Field stress is therefore not considered for the analysis.

Water pressure is not considered for the analysis too.

The following important limitations and assumptions have to be kept in mind for interpretation of the analysis results:

- Unwedge is used to analyze wedge failure around excavations constructed in hard rock, where discontinuities are persistent, and where stress induced failure does not occur. It is assumed that displacements take place at the discontinuities, and that the wedges move as rigid bodies with no internal deformation or cracking.
- All of the discontinuity surfaces are assumed to be perfectly plane.
- Discontinuity surfaces are assumed to be persistent and extend through the volume of interest, therefore the discontinuities defining the wedge do not terminate in the region where the wedges are formed. The implication is, that no new cracks are formed in the analysis to allow wedge movement.
- The discontinuities are considered to be ubiquitous: in other words, they can occur at any location in the rock mass.
- The underground excavation is assumed to have a constant cross section along its axis.
- A maximum of three structural planes can be analyzed at one time. If more than three major planes are identified for the analysis of the structural data, then all combinations of these planes should be considered.

5.3.4 Convergence-Confinement Method

The convergence-confinement method is based on a concept that involves analysis of the ground structure interaction by an independent study of the behaviour of the ground and of the tunnel support. The ground behaviour is represented by a ground-reaction curve and the tunnel support is represented by a support reaction curve. The support pressure is evaluated from

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canputations of the initial lining characteristics including shotcrete, steel ribs and anchors.

This method allows to estimate the load imposed on the support installed in the tunnel. When a section of support is installed in the immediate vicinity of the tunnel face, it does not carry the full load as a part of the load that is redistributed around the excavation is carried by the rock forming tunnel face. With great distance to the tunnel face, this so-called face-effect decreases and the support carries a greater proportion of the ground load. When the excavation face has moved well away from the section considered, the initial support carries the full design load.

The method applied in the convergence confinement calculations is based on literature {8,9} and is particularly used for:

1) preliminary tunnel support design
2) time-dependent load distribution of ground load to the initial support (short-term)
3) time-dependent load distribution of ground load to the final lining (long-term)

(1) is used before starting decisive stress analysis, (2) is applied to analyse load assumptions for FE-calculations as indicated in table 15 and (3) is applied to estimate the long-term stress increase due to rock-squeeze on the final lining.

Time-dependent behaviour is incorporated into the convergence-confinement method based on the literature {10, 11}.

5.4 Load Assumptions

Ground loads are defined depending on the following structural models:

5.4.1 Finite Element Model:

The initial lining is stressed as a result of tunnel excavation and it is deformed depending on the primary stress state, the strength and the stiffness of the rock mass. The continuum finite element model is used for the design of the tunnel initial support and the design of the final support. The following load cases are considered within the 2D calculations (Table 15):

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Load Case	Description		Detail of Load Case	Remarks
Standard Load Cases (see Figure 3)				
1	In-situ Stress State			
2	Stress Release		Stress release factor β_1 in front of excavation face	β_1 based on preliminary 3D calculations
3	Excavation and Installation Temporary Support	a	Excavation and installation of steel ribs close to excavation face	load transfer factor β_2
		b	Young shotcrete at working platform	load transfer factor β_3
		c	Hardened shotcrete	remaining load β_4 (ground load)
4	Final Lining Installation		self weight	
5	Grouting Pressure		Long-term grouting pressure	
6	Internal Water Pressure			
Additional Load Cases (see Figure 4)				
7	External Water Pressure		Groundwater and internal water pressure	Worst case scenario
8	Dewatering of Tunnel		Groundwater pressure	Temporary service state
9	Long-term Rock Squeeze	a	assumption 1: long-term stress increase	
		b	assumption 2: horizontal stress increase	
10	Discontinuity Analysis		Shear Zone within tunnel section	Worst case scenario

Table 15: Relevant Load Cases for the FE-Calculations

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The loads presented in the individual load cases are subsequently added up

Only the loads "a" and "b" of load case 9 are calculated separately.

Load case 10 covers in fact the loads of load case 1 to 6, which are applied on a system model including a shear zone within the tunnel section and added up. In this calculation the loads of load cases 7 to 9 are not applied, since those loads are not decisive as shown by the load combinations of the standard case.

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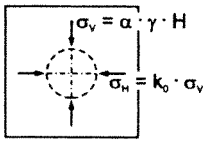
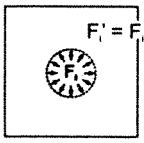
Standard Load Cases

1) insitu stress state



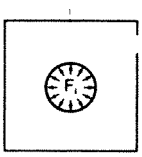
α ... overconsolidation factor

2) stress release in front of excavation face



β_1 ... stress release factor
(determined from preliminary 3D-calculation)

3) excavation, lining installation



$E'_{initial\ support} = f(t, E_{lining}, E_{girder})$

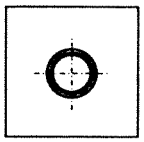
a) girder 4m behind face $F_i' = F_i (1 - \beta_1) \beta_2$

b) young shotcrete 20m behind face $F_i' = F_i (1 - \beta_1) \beta_3$

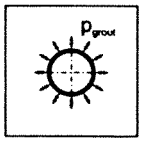
c) old shotcrete $F_i' = F_i (1 - \beta_1) \beta_4$

$\beta_{2,3}$ ... load transfer factors
(determined from convergence-confinement analyses)

4) final lining installation

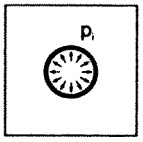


5) grouting pressure



- long term grouting pressure
(short-term grouting pressure ckecked by beam-spring model)

6) internal water pressure



- internal water pressure p_i

Figure 3: Calculation Phases "Standard Load Cases"

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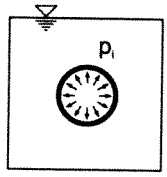
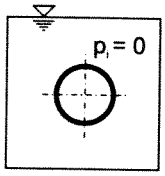
Additional Load Scenarios

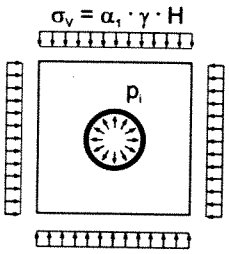
7) external water pressure on lining



8) dewatering of tunnel

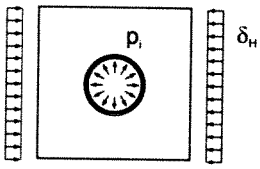


9a) "rock squeeze" assumption 1



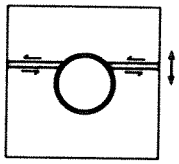
- additional radial stresses due to rock squeeze phenomina (constant stress ratio)

9b) "rock squeeze" assumption 2



- additional horizontal stresses due tectonical movement (increasing stress ratio)

10) discontinuity analysis



"strong discontinuity" within tunnel section

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Figure 4: Calculation Phases "Additional Load Cases"

5.4.2 Beam-Spring Model

The following loads have been determined for the subsequent calculations:

Rock loads:

A loosened rock slab of 3 m thickness up to the full width of the tunnel and shear deformations along bedding plane is analysed.

Grouting Pressure:

Short-term grouting pressures according to the assumptions indicated in Chapter 5.2.5 are analysed.

Temperature

With respect to temperature changes during and after filling of the tunnel with water, thermal strains are activated in the final lining. The applied maximum temperature gradients within the final lining are summarized in Table 2. To facilitate analysis the temperature changes are split in two parts:

- constant temperature change T_{const}
- temperature gradient ΔT

	before watering up °C	after watering up °C
constant temperature change T_{const}	+5	-3
temperature gradient ΔT	+10	-6

Table 16: Thermal Forces

In the analysis it is assumed that an initial constant temperature of 10°C.

Concrete Shrinkage

A concrete shrinkage strain of ε_s = -15.7 x 10-5 is applied to the analysis (see Chapter 4.5.7).

Concrete Creep

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A reduction of young's Modulus for concrete of 50% is assumed for the analysis (see Chapter 4.5.8).

5.4.3 Wedge Analysis:

The rock loads are determined by the geometry of rock blocks, which are formed by sets of discontinuities.

5.4.4 Convergence-Confinement Method

In-Situ Stress Field:

The stress field assumed for analysis is in accordance with the vertical stresses for full overburden and with the high horizontal stresses, which are anticipated (see Chapter 5.2.1).

Long-term Stress Field:

The long-term stress increase on the final lining due to rock-squeeze is considered in accordance with the assumptions given in Chapter 5.3.4.

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6 DESIGN ANALYSIS RESULTS

6.1 General

[Results in this section were developed for the proposal design and are included for information only. Appendices referenced in this section have been intentionally removed. The analyses in this section will be updated in detail design.]

6.2 FE-Analysis

6.2.1 General

The FE-calculations were performed using the following units:

Length : m
Force: kN
Deformations: mm

The main input and output data are given in the Appendices. In all of the results, compressive stresses and forces were taken to be negative, whereas tensile stresses and forces were taken to be positive.

6.2.2 3D FE-Calculations

The stress release ahead of tunnel face is determined on the basis of preliminary 3D-FE calculations.

Two calculations have been carried out:

Calculation	Horizon Model	Geological Formation	Support Class	Advance Length	steel - profile	shotcrete
2	deep	Queenston	VI	4 m	> 4m	>20m
3	shallow	Rochester	IV	4 m	> 4m	>20m

Table 17: Model Assumptions for 3D-FE Calculations

Following excavation steps have been applied:

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- In-situ stress state
- Excavation (advance length 4 m)
- Installation of lattice girders 4 m behind tunnel face
- Young shotcrete 20 m behind tunnel face

Equivalent 2D model have been created in order to fit pre-convergence (i.e. stress release) and load factors for loading of temporary support. The results are summarized in following Table 18:

3D Calculatio	Horizon model	Geological Formation	Stress Release	Load Factor β_2	Load Factor β_3	Load Factor β_4
1	deep	Queenston	0.8	0.85	0.9	1.0
2	shallow	Rochester	0.8	0.85	0.9	1.0

Table 18: Results of 3D-FE Calculations

The computer plots are attached to Appendix 02 and 03. The plots consist of:

1) Model Geometry - 3D Model
2) Cross section in tunnel axis
3) Convergence and Pre-Convergence Displacements in tunnel axis
4) Model Geometry - 2D Model
5) Evaluation of appropriate Stress Release Factor β_1
6) Evaluation of appropriate Load Factor β_2
7) Evaluation of appropriate Load Factor β_3

6.2.3 2D FE-Calculations

5 2D-FE calculations have been performed along the Diversion Tunnel alignment. The main input features are summarized in the Table 19 below:

section	station	elevation tunnel axis	rock mass type	initial support	final lining thickness	long-term grouting pressure	internal water pressure	elevation ground water
-	[m]	[el. m]	-	-	[mm]	[MPa]	[MPa]	[el. m]

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B/0	0+080	133.0	Lockport	II	0.6	0.15	0.5	168.0
C/0	1+800	52.5	Upper Queenston	V	0.7	0.65	1.3	160.0
D/0	not specific	82.5	Queenston Q8/Q9	V	0.7	0.65	1.3	165.0
E/0	8+660	45.7	Queenston	VI	0.7	0.77	1.4	150.0
F/0	8+920	45.5	Queenston	VI	0.7	0.77	1.4	150.0

Table 19: Model Assumptions for 2D-FE Calculations - Proposed Alignment

The computer plots are attached to the Appendices 11 to 15.

The typical plots consist of:

1) Model Geometry
2) Longitudinal Section
3) Virgin Stress Field
4) Stress Release
5) Secondary Stress State - Initial Lining Installation
6) Long - Term Grouting Pressure (Distribution)
7) Grouting Chart (Grouting Design)

Additional calculations were performed to check:

8) Internal Water Pressure (Distribution)
9) Initialisation Ground Water Pressure
10) Tunnel Dewatering

For calculation sections close to existing structures additional plots are provided in order to check changes in stress state:

11) Comparison of stress state before / after excavation of the new Diversion Tunnel

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Within 2 calculations (Section C/1 and F) the rock-squeeze effect has been analysed additionally:

12)"Rock Squeeze Effect" - Ground Reaction Curves
13)Rock Squeeze - Calculation Assumption 1
14)Rock Squeeze - Calculation Assumption 2

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Results for the Proposed Alignment (Table 20 to 24)

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Table 20. Results for

Calculation Phases	Design Feature	Influence on Tunnel Lining and Surrounding Rock	Influence on Existing Structures
		Excavation and Initial Support	
Virgin Stress Field	vertical stresses	full overburden load (α = 1)	-
	horizontal stresses	stress ratio of 11.3 for Lockport and DeCew formations	-
Existing Structures	-	-	-
Initial Support	support measures	support category II	-
	stress state	stress redistribution around tunnel	-
	design check	ok (f_{NM}>1.0)	-
	deformation behaviour	lining deformation <3mm; max. shear strain <0.52%; no mobilization of peak strength around new tunnel; no significant failure zones;	-
		Final Lining Installation	
Final Lining	support measures	60 cm cast-in-place concrete, pre-stress pressure (long-term) = 0.15 MPa	-
Long-Term Grouting Pressure	stress state	effective stresses on tunnel interface ≈0.23 MPa; advanced stress redistribution around tunnel	-
	design check	ok (f_{NM}>1.0)	-
	deformation behaviour	radial deformation final lining <0.5mm; no significant failure zones;	-
	short-term Grouting Pressure	1.59 MPa short-term grouting pressure needed	-
Internal Water Pressure	water pressure	0.5 MPa	-
	stress state	effective stresses on tunnel interface ≈0.65 MPa; advanced stress redistribution around tunnel	-
	design check	ok (f_{NM}>1.0)	-
	deformation behaviour	radial deformation final lining <0.5mm; no significant failure zones;	-

Stress Analysis Calculation Section B0 "Section close to the Intake", Station 0+230

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Calculation Phases	Design Feature	Influence on Tunnel Lining and Surrounding Rock	Influence on Existing Structures
		Excavation and Initial Support	
Virgin Stress Field	vertical stresses	full overburden load ($\alpha = 1$)	-
	horizontal stresses	stress ratio of 12.0 for Thorold and 4.1 for Neahga and Reynales have been taken into account; due to widespread plastic zones during initial stress state, stress ratio has been reduced for Power Glen (4.8), Grimsby (10.2) and Rochester (9.2)	-
Existing Structures	-	-	modelling construction of Existing Tunnels 1 and 2
Initial Support	support measures	support category V	-
	stress state	well defined stress redistribution around tunnel	no significant increase of stresses around existing structures
	design check	ok (f_{NM}>1.0)	-
	deformation behaviour	lining deformation <19 mm; marginal shear strains (< 0.5%);	-
		Final Lining Installation	
Final Lining	support measures	70 cm cast-in-place concrete, pre-stress pressure (long-term) = 0.65 MPa	-
Long-Term Grouting Pressure	stress state	effective stresses on tunnel interface ≈0.71 MPa; advanced stress redistribution around tunnel	no significant increase of stresses around existing structures
	design check	ok (f_{NM}>1.0)	-
	deformation behaviour	radial deformation final lining <2 mm;	-
	short-term Grouting Pressure	1.9 MPa short-term grouting pressure needed	-
Internal Water Pressure	water pressure	1.3 MPa	-
	stress state	effective stresses on tunnel interface ≈1.0 MPa; advanced stress redistribution around tunnel	no significant increase of stresses around existing structures
	design check	ok (f_{NM}>1.0)	-
	deformation behaviour	radial deformation final lining <1mm;	-
Ground Water Pressure	stress state	effective stresses on tunnel interface <0.15 MPa; advanced stress redistribution around tunnel	no significant increase of stresses around existing structures
	design check	ok (f_{NM}>1.0); (compressive strength of concrete f_c = 35 MN/m² required)	-
	deformation behaviour	radial deformation final lining <6 mm;	-
Dewatering of Tunnel	stress state	increase of effective stresses;	no significant increase of stresses around existing structures
	design check	ok (f_{NM}>1.0); (compressive strength of concrete f_c = 35 MN/m² required)	-
	deformation behaviour	radial deformation final lining <5mm; calculation results in small failure zones below the invert;	-

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Table 21: Results for Stress Analysis Calculation Section C/0 "Below Existing Tunnels No. 1 and 2", Station 1+800

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Calculation Phases	Design Feature	Influence on Tunnel Lining and Surrounding Rock
		Excavation and Initial Support
Virgin Stress Field	vertical stresses	full overburden load ($\alpha = 1$)
	horizontal stresses	stress ratio of 4.5 for Queenston
Variation Bedding Plane Level	-	3 bedding plane levels were considered: (a) 2 m above tunnel heading, (b) within tunnel - 3 m below heading, (c) in the centre of the tunnel opening A sensitivity analysis indicated that the bedding plane above the tunnel top heading (a) is most severe with respect to sectional forces within the tunnel lining; therefore this analysis is represented hereafter.
Stress Release	stress state	well defined stress redistribution around tunnel
	deformation behaviour	calculation results in widespread failure zones below the invert and atop the tunnel heading; shear displacement within bedding plane exceeds peak strength - therefore strain softening was introduced as soon as 10 mm shear displacement was reached in any point
Initial Support	support measures	support category VI
	stress state	continued stress redistribution around tunnel
	design check	ok (f_{NM}>1.0)
	deformation behaviour	lining deformation <10 mm; shear displacement within bedding plane reach approx. 20 mm
		Final Lining Installation
Final Lining	support measures	70 cm cast-in-place concrete, pre-stress pressure (long-term) = 0.5 MPa
Long-Term Grouting Pressure	stress state	advanced stress redistribution around tunnel
	design check	ok (f_{NM}>1.0)
	deformation behaviour	radial deformation final lining <5 mm;
	short-term Grouting Pressure	1.6 MPa short-term grouting pressure needed
Internal Water Pressure	water pressure	0.7 MPa
	stress state	advanced stress redistribution around tunnel
	design check	ok (f_{NM}>1.0)
	deformation behaviour	marginal increase of shear displacements within bedding plane (approx. 21 mm)
Ground Water Pressure on Bedding Plane; Tunnel Dewatered	method	water pressure to act on bedding plane
	stress state	Stresses within lining increase considerably.
	design check	ok (f_{NM}>1.0)
	deformation behaviour	marginal increase of shear displacements within bedding plane (approx. 21 mm)

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Calculation Phases	Design Feature	Influence on Tunnel Lining and Surrounding Rock	Influence on Existing Structures
		Excavation and Initial Support	
Virgin Stress Field	vertical stresses	full overburden load (α = 1.0)	-
	horizontal stresses	stress ratio of 2 for Queenston below St. Davids Gorge;	-
Existing Structures	-	-	-
Initial Support	support measures	support category VI	-
	stress state	well defined stress redistribution around tunnel	-
	design check	ok (f_{NM}>1.0)	-
	deformation behaviour	lining deformation <5 mm; Failure along shear zones has not been observed - max. shear strains < 0.15 %;	-
		Final Lining Installation	
Final Lining	support measures	70 cm cast-in-place concrete, pre-stress pressure (long-term) = 0.79 MPa	-
Long-Term Grouting Pressure	stress state	effective stresses on tunnel interface ≈0.76 MPa; advanced stress redistribution around tunnel	-
	design check	ok (f_{NM}>1.0); (compressive strength of concrete f_c = 35 MN/m² required)	-
	deformation behaviour	radial deformation final lining <2.5 mm;	-
	short-term Grouting Pressure	2.15 MPa short-term grouting pressure needed; during grouting, the failure zones reach further into the rock mass.	-

Table 22: Results for Stress Analysis Calculation Section D/0 "Bedding Plane Q8/Q9"

Table 23: Results for Stress Analysis Calculation Section E/0 "Under Gorge", Station 8+660

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Calculation Phases	Design Feature	Influence on Tunnel Lining and Surrounding Rock	Influence on Existing Structures
		Excavation and Initial Support	
Virgin Stress Field	vertical stresses	1.2 x full overburden load (α = 1.2)	-
	horizontal stresses	stress ratio of 4.5 for Queenston; due to widespread plastic zones during initial stress state, stress ratio has been reduced for Grimsby (5.0) and Rochester (12.6)	-
Existing Structures	-	-	-
Initial Support	support measures	support category V	-
	stress state	well defined stress redistribution around tunnel	-
	design check	ok (f_{NM}>1.0)	-
	deformation behaviour	lining deformation <5 mm; Failure along shear zones has not been observed - max. shear strains < 0.4 %;	-
		Final Lining Installation	
Final Lining	support measures	70 cm cast-in-place concrete, pre-stress pressure (long-term) = 0.6 MPa	-
Long-Term Grouting Pressure	stress state	effective stresses on tunnel interface ≈0.76 MPa; advanced stress redistribution around tunnel	-
	design check	ok (f_{NM}>1.0)	-
	deformation behaviour	radial deformation final lining <2 mm;	-
	short-term Grouting Pressure	2.05 MPa short-term grouting pressure needed; during grouting, the failure zones reach further into the rock mass.	-
Internal Water Pressure	water pressure	1.4 MPa	-
	stress state	effective stresses on tunnel interface ≈2.0 MPa;	-
	design check	ok (f_{NM}>1.0)	-
	deformation behaviour	radial deformation final lining <0.8mm;	-
Ground Water Pressure	stress state	effective stresses on tunnel interface ≈1.0 MPa; advanced stress redistribution around tunnel	-
	design check	ok (f_{NM}>1.0)	-
	deformation behaviour	deformation final lining ≈7 mm; calculation results in widespread areas of failure zones at the shoulders as well as underneath the invert.	-
Dewatering of Tunnel	stress state	increase of effective stresses;	-
	design check	ok (f_{NM}>1.0)	-
	deformation behaviour	radial deformation final lining <0.3mm;	-

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Table 24: Results for Stress Analysis Calculation Section F/0 "Deepest Section", Station 8+920

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6.3 Beam-Spring Model

Linear elastic analyses are adequate for static loading of the tunnel lining from self weight, geo- hydrostatic, temperature, shrinkage, and live loads. The calculations result from a radial, elastic beam element method.

6.3.1 Geometry

The cross section of the tunnel is illustrated in (4). The outer diameter is 14.44 m, the shotcrete lining has a thickness up to 30 cm and the final lining thickness is 60 - 70 cm. For the subsequent calculations a representative tunnel diameter for the beam elements of 13.1 m has been assumed for modelling the final lining and respectively a tunnel diameter of 14 m for the initial support.

6.3.2 Performed Calculations and Calculation Parameters

The calculation parameters for the surrounding rock are in accordance with Chapter 5.2.2.

The ground reaction is taken into account by using an elastic-plastic subgrade reaction K (radial springs with tension cut-off criterion). Due to a waterproofing system between the initial support and final lining, tangential springs can be ignored.

The modulus of subgrade reaction K_R is calculated using the following formula:

$$K_R = \frac{E}{R}$$

For the following calculations short term grouting pressure is considered.

Calculation	short-term grouting pressure [MPa]	final lining thickness [m]	E-modulus rock [GPa]
1	1.70	0.70	16*)
2	1.70	0.70	4*)
3	1.35	0.60	11*)
4	1.25	0.60	24*)

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5	1.4	0.60	11*)

Table 25: Final Lining Calculation: short-term grouting

*) .... no influence on the results because of tension cut off.

For the subsequent calculation short term grouting pressure, thermal forces, shrinkage and creep as described in chapter 4.5 are considered.

Calculation	shortterm grouting pressure [MPa]	final lining thickness [m]	E-modulus rock [GPa]
6	1.25	0.70	24*)

Table 26: Final Lining Calculation: "Constrained Forces"

*) .... no influence on the results because of tension cut off.

Also the analysis of a "lossened slab of a thickness not less than 3 m" as a rock loading on the initial support will be considered using a Beam Spring Model.

Calculation	rock load	initial support	E-modulus rock [GPa]
7	from 3m slab	to be evaluated	24

Table 27: Initial Support Calculation: "3 m slab"

6.3.3 Results

Short-Term Grouting Pressure

The detailed results, plots and listings, are shown in the Appendix 04. The most important results are summarized hereafter. The safety factor for the short-term grouting pressure has been adopted as indicated in Chapter 4.7.3 (load factor α_L = 1.0 and resistance factor concrete Φ_c = 0.7). The design check requires a design factor $f_{NM} \geq 1.0$.

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Calculation	radial deformation [mm]	factor of safety f_{NM} [ ]
1	4.4	1.0
2	4.4	1.0
3	4.1	1.08
4	3.8	1.17
5	4.2	1.0

Table 28: Results for short-term grouting

The calculation results indicate that the maximum short-term grouting pressure on a 60 cm final lining has to be restricted with 1.4 MPa. Increasing the thickness to 70 cm allows a maximum short-term grouting pressure of 1.7 MPa. The required maximum grouting pressure of 2.15 MPa for the calculation section below St. David Gorge) can be reached assuming a higher compressive strength f_c' of the concrete. The above results consider a conservative compressive strength $f_c' =$ 27.5 MPa (see Chapter 4.4.5). Assuming a compressive strength f_c' of 35 MPa (incorporating an E-modulus of 27 GPa) allows to pre-stress the 70 cm thick final lining with maximum 2.2 MPa grouting pressure.

Constrained Forces

The detailed results, plots and listings, are shown in the Appendix 05. Short term grouting pressure (1.25 MPa assumed) in combination with thermal forces, shrinkage and creep as described in chapter 4.5 result in:

Calculation	radial deformation [mm]	factor of safety f_{NM} [ ]
6	7.5	1.7

Table 29: Results for Constrained Forces

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The evaluation of the ratio between applied short-term grouting pressure and resulting long-term grouting pressure depends mainly on the influence of creep, shrinkage and temperature (see Chapter 5.2.5). Compressive strain losses due to these factors are summarized in the Table 30 below:

calculation 6	relative radial shortening [mm]	relative radial shortening [‰]
temperatur e	0.197	0.03
shrinkage	1.028	0.157
creep	3.109	0.47

Table 30: Expected Radial shortening due to Shrinkage, Creep and Temperature

The design of required short-term grouting pressure is attached to the Appendices of the FE-calculations. These grouting charts consider a loss due to creep and temperature of maximum 0.5 ‰ (radial shortening). Herein it is assumed that the influence due to shrinkage, i.e. migration of excessive water from the interior of the concrete mass, has been taken place before grouting.

"3m slab" on initial support

The calculations proof that a rock load due to a "3m slab" as defined in Chapter 5.4.2 can be supported by one of the subsequent initial support elements (The detailed results see below and in Appendix 06):

:

calculation 7	location	dimensions
steel profile	fullround	IPB 260, e = 1.2 HEB 160, e= 1.8
shotcrete	fullround	>20cm
rock dowels	crown, 0.9x2.0,	240 kN

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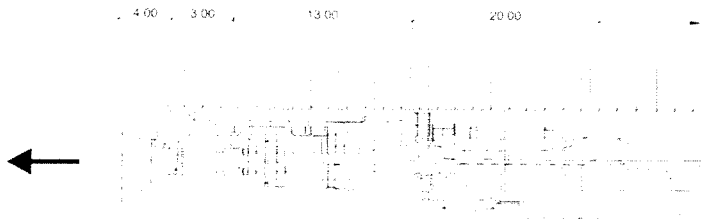
	l=6m	

Table 31: Dimensioning Initial Support for Rock Load of a "3 m Slab"

List of action items from Meeting Tuesday, July 5, 2005
Ad. 4.2) Review capacity of Type 5 support
Summary of calculations performed for Type 5 support



3 m slab analysis 4 m

a) rock dowels, raster 0.9 m x 2.0 m, l = 6 m, F_{all} = 240 kN
b) IPB 160 (see page 06.1.5, document PR-00-4001)
c) shotcrete >20 cm
d) calculations of rock support elements (a), (b) or (c)
(see structural design analysis, document PR-00-4001)

ADDITIONAL CALCULATIONS WITH RESPECT TO
„3m SLAB ANALYSIS" IN PR-00-4001
APPENDIX 06

ad a) raster 0.9 m x 2.0 m, l = 6 m, F_{all} = 240 kN

$F = 0.9 \times 2 \times 3 \times 26 = 140$ kN / anchor raster

$\Rightarrow \gamma = \frac{240}{140} = 1.7$ ✓

ad b) see design check page 06.1.5, app 06, PR-00-4001 ✓

ad c) member forces see appendix 06.2.1, app 06, PR-00-4001
$\phi_c = 0.6$, $\alpha_c = 1.0$ for temporary state
f_c (2 days) = 9.5 MPa $\Rightarrow f_{cm,min} = 1.0$ ✓

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6.4 Wedge Analysis

For the analysis of the results the following simplifications was adopted:

Combinations of the four major joint sets resulted in unrealistic high and narrow wedges due to their steep dip angle. Downsizing them to a realistic height of a few meters resulted in unrealistic thin, needle like wedges. Truncation of the wedges by a forth plane (bedding plane) a few meters above the wedge base is not supported by the software. Therefore it is assumed that wedges formed by discontinuity combinations including the bedding plane also cover those truncated wedges in size, weight and position.

The analysis of the 60 possible combinations considering all major discontinuity sets and the change of the tunnel orientation along the alignment resulted in 87 potentially unstable wedges (not considering unrealistic high wedges). Table 32 shows one example for the block stability analysis carried out for the tunnel section below St. David's Gorge.

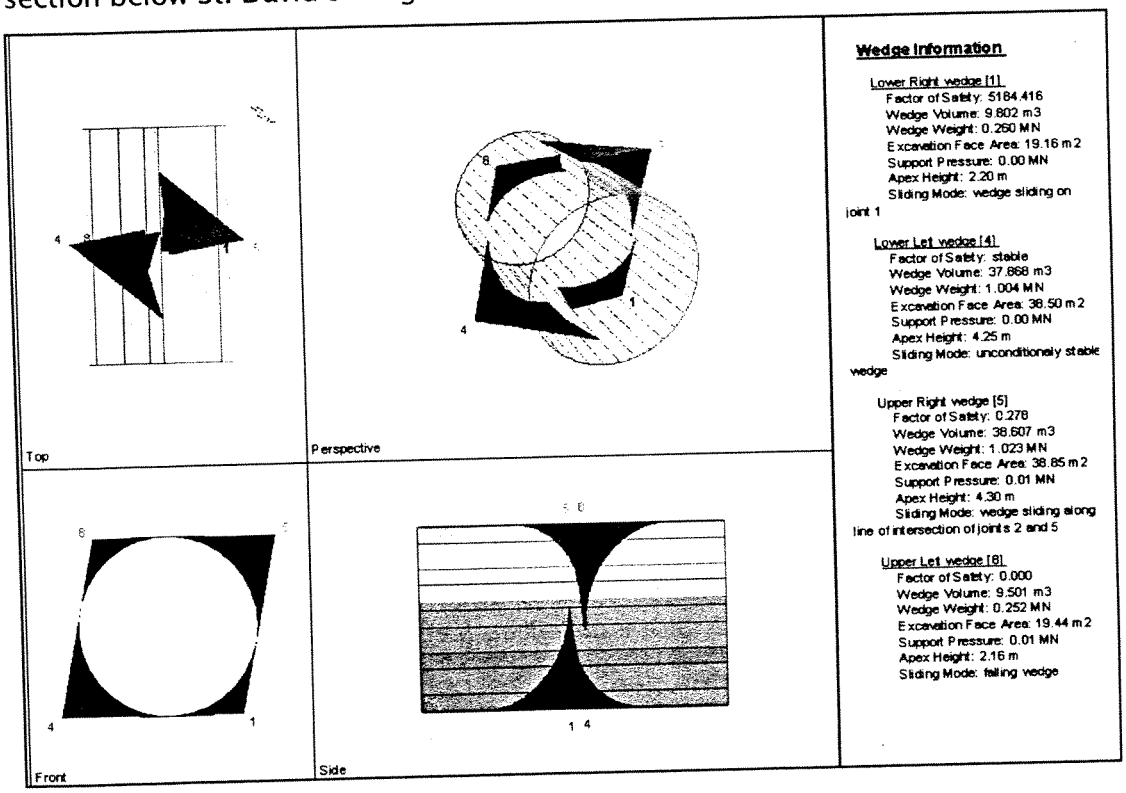

Table 32: Example for wedge analysis

The below table 33 lists all potentially unstable wedges identified for the Niagara Tunnel Facility Project.

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No.	Trend/ Plunge	Discont. Comb.	Wedge	Factor of Safety	Wedge Volume [m³]	Wedge Weight [MN]	Excavation Face Area [m²]	Apex Height [m]	Support Pressure [MN/m²]	Mode	Formation	Support Categories
Inlet Section: 0+000 to 2+168												
1	100/0	145	Far End wedge [10]	0,05	0,15	0,00	1,80	0,25	0,01	sliding on joint 5	Lockport De Cew	1, 2, 3, 5
2		125	Upper Left wedge [5]	0,28	50,90	1,35	61,26	4,21	0,01	sliding on joints 2 and 5		
3		125	Upper Right wedge [8]	0,00	14,51	0,39	28,39	2,28	0,02	falling wedge		
4		135	Upper Right wedge [8]	0,00	27,76	0,74	49,47	2,51	0,02	falling wedge		
5		145	Upper Right wedge [8]	0,00	72,54	1,92	123,11	2,61	0,02	falling wedge		
6		134	Upper Right wedge [6]	0,05	46,43	1,23	76,18	2,71	0,02	sliding on joint 3		
7		124	Upper Right wedge [6]	0,05	60,69	1,61	97,70	2,76	0,02	sliding on joint 2		
8		123	Upper Right wedge [6]	0,05	14,70	0,39	22,22	2,96	0,02	sliding on joint 2		
9		123	Upper Left wedge [7]	0,05	17,82	0,47	28,16	3,28	0,02	sliding on joint 3		
10		124	Upper Left wedge [7]	0,05	98,38	2,61	140,10	3,51	0,02	sliding on joint 4		
11		134	Upper Left wedge [7]	0,05	81,26	2,15	114,66	3,57	0,02	sliding on joint 4		
12		145	Upper Left wedge [5]	0,06	146,54	3,88	194,86	3,68	0,02	sliding on joints 4 and 5		
13		135	Upper Left wedge [5]	0,10	67,29	1,78	88,10	3,86	0,02	sliding on joints 3 and 5		
Central Section I: 2+168 to 2+868												
14	178/0	123	Upper Left wedge [7]	0,05	103,89	2,75	154,66	2,72	0,02	sliding on joint 3	Lockport De Cew, Rochester	2, 3, 4
15		124	Upper Left wedge [7]	0,05	115,35	3,06	170,03	2,73	0,02	sliding on joint 4		
16		125	Upper Left wedge [7]	0,05	132,93	3,52	191,30	2,77	0,02	sliding on joint 5		
17		134	Upper Left wedge [7]	0,05	15,75	0,42	26,59	2,93	0,02	sliding on joint 4		
18		145	Upper Right wedge [6]	0,05	20,09	0,53	30,09	2,93	0,02	sliding on joint 4		
19		135	Upper Right wedge [6]	0,05	39,04	1,04	55,32	3,06	0,02	sliding on joint 3		
20		135	Upper Left wedge [7]	0,05	39,23	1,04	57,59	3,10	0,02	sliding on joint 5		
21		125	Upper Right wedge [6]	0,05	183,28	4,86	225,82	3,22	0,02	sliding on joint 2		
22		134	Upper Right wedge [6]	0,05	19,98	0,53	26,99	3,27	0,02	sliding on joint 3		
23		145	Upper Left wedge [7]	0,05	25,16	0,67	37,07	3,29	0,02	sliding on joint 5		
24		124	Upper Right wedge [6]	0,05	170,10	4,51	207,11	3,29	0,02	sliding on joint 2		
25		123	Upper Right wedge [6]	0,05	155,44	4,12	189,51	3,32	0,02	sliding on joint 2		
Central Section II: 2+868 to 6+944												
26	178/1	123	Roof wedge [8]	0,00	0,02	0,00	1,79	0,03	0,00	falling wedge	Rochester to Queenston Q8	2, 3, 4, 5, 6
27		124	Roof wedge [8]	0,00	0,02	0,00	2,07	0,04	0,00	falling wedge		
28		125	Roof wedge [8]	0,00	0,03	0,00	2,35	0,04	0,00	falling wedge		
29		123	Upper Left wedge [7]	0,05	65,15	1,73	107,63	2,29	0,02	sliding on joint 3		
30		124	Upper Left wedge [7]	0,05	73,09	1,94	118,77	2,31	0,02	sliding on joint 4		
31		125	Upper Left wedge [7]	0,05	85,56	2,27	134,61	2,36	0,02	sliding on joint 5		
32		145	Upper Right wedge [6]	0,05	18,93	0,50	28,65	2,86	0,02	sliding on joint 4		
33		134	Upper Left wedge [7]	0,05	14,78	0,39	23,22	2,87	0,02	sliding on joint 4		
34		135	Upper Right wedge [6]	0,05	36,83	0,98	50,94	3,02	0,02	sliding on joint 3		
35		135	Upper Left wedge [7]	0,05	37,17	0,99	50,73	3,07	0,02	sliding on joint 5		
36		134	Upper Right wedge [6]	0,05	20,02	0,53	26,14	3,30	0,02	sliding on joint 3		
37		145	Upper Left wedge [7]	0,05	25,17	0,67	33,63	3,32	0,02	sliding on joint 5		
38		125	Upper Right wedge [6]	0,05	183,60	4,87	200,74	3,37	0,02	sliding on joint 2		
39		124	Upper Right wedge [6]	0,05	179,61	4,76	189,22	3,53	0,02	sliding on joint 2		
40		123	Upper Right wedge [6]	0,05	171,01	4,53	176,66	3,62	0,02	sliding on joint 2		
Central Section III 6+944 to 8+415												
41	195/1	123	Upper Left wedge [8]	0,00	83,16	2,20	121,99	2,55	0,02	falling wedge	Queenston Q8 to Q6	4, 5, 6
42		125	Upper Left wedge [8]	0,00	61,12	1,62	93,05	2,55	0,02	falling wedge		
43		124	Upper Left wedge [8]	0,00	72,81	1,93	107,54	2,60	0,02	falling wedge		
44		134	Upper Left wedge [7]	0,05	19,96	0,53	31,43	2,70	0,02	sliding on joint 4		
45		135	Upper Left wedge [7]	0,05	35,96	0,95	52,19	2,83	0,02	sliding on joint 5		
46		145	Upper Right wedge [6]	0,05	18,01	0,48	25,65	3,04	0,02	sliding on joint 4		
47		145	Upper Left wedge [7]	0,05	18,66	0,50	26,85	3,12	0,02	sliding on joint 5		
48		123	Upper Right wedge [5]	0,06	135,37	3,59	158,94	3,23	0,02	sliding on joints 2 and 3		
49		135	Upper Right wedge [6]	0,05	48,73	1,29	61,60	3,24	0,02	sliding on joint 3		
50		124	Upper Right wedge [5]	0,09	116,18	3,08	137,18	3,27	0,02	sliding on joints 2 and 4		
51		125	Upper Right wedge [5]	0,28	107,91	2,86	124,68	3,40	0,02	sliding on joints 2 and 5		
52		134	Upper Right wedge [6]	0,05	33,63	0,89	40,98	3,46	0,02	sliding on joint 3		
Central Section IV 8+415 to 8+865												
53	235/1	124	Far End wedge [10]	0,05	0,01	0,00	0,47	0,04	0,00	sliding on joint 2	Queenston Q7 and Q6	4, 5, 6
54		123	Far End wedge [10]	0,05	0,47	0,01	3,27	0,43	0,01	sliding on joint 2		
55		125	Upper Left wedge [8]	0,00	9,50	0,25	19,44	2,16	0,01	falling wedge		
56		125	Upper Right wedge [5]	0,28	38,61	1,02	38,85	4,30	0,01	sliding on joints 2 and 5		
57		124	Upper Left wedge [8]	0,00	28,92	0,77	47,58	2,43	0,02	falling wedge		
58		134	Upper Left wedge [8]	0,00	79,01	2,09	115,58	2,53	0,02	falling wedge		
59		135	Upper Left wedge [8]	0,00	68,51	1,82	100,68	2,58	0,02	falling wedge		
60		145	Upper Left wedge [7]	0,05	22,12	0,59	34,07	2,69	0,02	sliding on joint 5		
61		123	Upper Left wedge [6]	0,05	66,16	1,75	93,13	2,75	0,02	sliding on joint 2		
62		123	Upper Right wedge [7]	0,05	85,40	2,26	106,06	3,13	0,02	sliding on joint 3		
63		134	Upper Right wedge [5]	0,06	128,10	3,40	150,51	3,18	0,02	sliding on joints 3 and 4		
64		135	Upper Right wedge [5]	0,10	108,32	2,87	127,84	3,24	0,02	sliding on joints 3 and 5		
65		145	Upper Right wedge [6]	0,05	37,32	0,99	45,00	3,44	0,02	sliding on joint 4		
66		124	Upper Right wedge [5]	0,09	68,89	1,83	74,87	3,70	0,02	sliding on joints 2 and 4		
Outlet Section 8+865 to 10+364												
67	235/-4	124	Roof wedge [7]	0,05	0,00	0,00	0,22	0,02	0,00	sliding on joint 4	Queenston Q6 to Lockport	2, 3, 4, 5, 6
68		125	Roof wedge [7]	0,05	0,00	0,00	0,19	0,02	0,00	sliding on joint 5		
69		123	Roof wedge [8]	0,00	0,05	0,00	1,22	0,12	0,00	falling wedge		
70		135	Roof wedge [7]	0,05	0,14	0,00	2,75	0,17	0,00	sliding on joint 5		
71		125	Far End wedge [10]	0,05	0,95	0,03	11,96	0,24	0,00	sliding on joint 2		
72		134	Roof wedge [7]	0,05	0,38	0,01	4,79	0,24	0,00	sliding on joint 4		
73		135	Upper Left wedge [8]	0,00	9,95	0,26	27,50	1,24	0,02	falling wedge		
74		134	Upper Left wedge [8]	0,00	12,01	0,32	32,30	1,27	0,02	falling wedge		
75		123	Upper Left wedge [6]	0,05	9,63	0,26	25,73	1,30	0,02	sliding on joint 2		
76		124	Far End wedge [10]	0,05	7,36	0,20	16,93	1,31	0,02	sliding on joint 2		
77		123	Far End wedge [10]	0,05	7,12	0,19	12,61	1,69	0,02	sliding on joint 2		
78		125	Upper Left wedge [8]	0,00	6,60	0,18	12,76	1,92	0,02	falling wedge		
79		124	Upper Left wedge [8]	0,00	19,97	0,53	31,07	2,29	0,02	falling wedge		
80		145	Upper Right wedge [6]	0,05	19,87	0,53	26,41	2,78	0,02	sliding on joint 4		
81		134	Upper Right wedge [5]	0,06	71,80	1,90	82,68	2,95	0,02	sliding on joints 3 and 4		
82		124	Upper Right wedge [5]	0,09	36,66	0,97	42,86	3,06	0,02	sliding on joints 2 and 4		
83		135	Upper Right wedge [5]	0,10	96,86	2,57	91,26	3,61	0,02	sliding on joints 3 and 5		
84		125	Upper Right wedge [5]	0,28	34,61	0,92	30,93	4,29	0,02	sliding on joints 2 and 5		
85		145	Upper Left wedge [7]	0,05	21,69	0,58	28,02	2,88	0,03	sliding on joint 5		
86		123	Upper Right wedge [7]	0,05	102,42	2,71	89,01	3,94	0,03	sliding on joint 3		
87		134	Far End wedge [10]	0,05	1,19	0,03	4,48	0,80	0,04	sliding on joint 3		

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Table 33: Results of the wedge analysis

In order to evaluate the support requirements for each tunnel section concerning block failure the proposed support classes were applied on all blocks of each section. Support was increased till a factor of safety >1 was reached. The analyses were carried for support categories 2 to 4, which are applicable for support of block failure. For the analyses only rock bolts were considered since it is planed that shotcrete is going to be applied some distance behind the TBM. Therefore the bolts have to be able to take the full load of the blocks. Face blocks were not considered in the analyses.

The results show that in general support categories 2 to 4 are sufficient to support all rock loads produced by block failure. Restrictively it has to be mentioned that few blocks could no be adequately supported by pattern bolting due to their elongated shape and/or small size. Those few blocks will require additional spot bolting.

The following table 34 summarizes the results of the support analyses considering block failure.

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No.	Trend/ Plunge	Discont. Comb.	Wedge	Factor of Safety	Factor of Safety resulting from Support Category 2	Factor of Safety resulting from Support Category 3	Factor of Safety resulting from Support Category 4
Inlet Section: 0+000 to 2+168							
2		125	Upper Left wedge [5]	0,28	1,19	-	-
3		125	Upper Right wedge [8]	0,00	1,01	-	-
4		135	Upper Right wedge [8]	0,00	0,94	0,94	1,40
5		145	Upper Right wedge [8]	0,00	0,94	0,94	1,27
6		134	Upper Right wedge [6]	0,05	0,85	0,85	1,20
7		124	Upper Right wedge [6]	0,05	0,93	0,93	1,27
8		123	Upper Right wedge [6]	0,05	0,91	0,91	1,17
9		123	Upper Left wedge [7]	0,05	1,05	-	-
10		124	Upper Left wedge [7]	0,05	0,96	1,15	-
11		134	Upper Left wedge [7]	0,05	0,97	1,34	-
12		145	Upper Left wedge [5]	0,06	0,99	1,15	-
13		135	Upper Left wedge [5]	0,10	0,98	1,21	-
Central Section I: 2+168 to 2+868							
14		123	Upper Left wedge [7]	0,05	0,83	0,88	1,18
15		124	Upper Left wedge [7]	0,05	0,82	0,88	1,21
16		125	Upper Left wedge [7]	0,05	1,08	-	-
17		134	Upper Left wedge [7]	0,05	0,73	0,75	1,10
18		145	Upper Right wedge [6]	0,05	0,89	0,89	1,15
19	178/0	135	Upper Right wedge [6]	0,05	1,02	-	-
20		135	Upper Left wedge [7]	0,05	1,04	-	-
21		125	Upper Right wedge [6]	0,05	1,07	-	-
22		134	Upper Right wedge [6]	0,05	0,92	1,04	-
23		145	Upper Left wedge [7]	0,05	0,90	1,12	-
24		124	Upper Right wedge [6]	0,05	1,02	-	-
25		123	Upper Right wedge [6]	0,05	1,03	-	-
Central Section II: 2+868 to 6+944							
26		123	Roof wedge [8]	0,00	4,88	-	-
27		124	Roof wedge [8]	0,00	2,48	-	-
28		125	Roof wedge [8]	0,00	1,39	-	-
29		123	Upper Left wedge [7]	0,05	0,69	0,74	1,05
30		124	Upper Left wedge [7]	0,05	0,67	0,72	1,07
31		125	Upper Left wedge [7]	0,05	0,85	1,03	-
32		145	Upper Right wedge [6]	0,05	0,88	0,88	1,15
33	178/1	134	Upper Left wedge [7]	0,05	0,71	0,77	1,13
34		135	Upper Right wedge [6]	0,05	0,89	1,04	-
35		135	Upper Left wedge [7]	0,05	0,71	1,14	-
36		134	Upper Right wedge [6]	0,05	0,89	1,01	-
37		145	Upper Left wedge [7]	0,05	0,89	1,10	-
38		125	Upper Right wedge [6]	0,05	1,05	-	-
39		124	Upper Right wedge [6]	0,05	0,97	1,07	-
40		123	Upper Right wedge [6]	0,05	0,96	1,03	-
Central Section III: 6+944 to 8+415							
41		123	Upper Left wedge [8]	0,00	0,78	0,85	1,19
42		125	Upper Left wedge [8]	0,00	0,89	0,92	1,29
43		124	Upper Left wedge [8]	0,00	0,83	0,90	1,23
44		134	Upper Left wedge [7]	0,05	0,80	0,86	1,24
45		135	Upper Left wedge [7]	0,05	0,91	1,04	-
46	195/1	145	Upper Right wedge [6]	0,05	1,04	-	-
47		145	Upper Left wedge [7]	0,05	0,87	1,00	-
48		123	Upper Right wedge [5]	0,06	1,09	-	-
49		135	Upper Right wedge [6]	0,05	1,03	-	-
50		124	Upper Right wedge [5]	0,09	1,10	-	-
51		125	Upper Right wedge [5]	0,28	1,20	-	-
52		134	Upper Right wedge [6]	0,05	0,96	0,99	1,44
Central Section IV: 8+415 to 8+865							
55		125	Upper Left wedge [8]	0,00	1,02	-	-
56		125	Upper Right wedge [5]	0,28	1,21	-	-
57		124	Upper Left wedge [8]	0,00	0,91	0,98	1,34
58		134	Upper Left wedge [8]	0,00	0,75	0,82	1,17
59		135	Upper Left wedge [8]	0,00	0,83	0,89	1,22
60	235/1	145	Upper Left wedge [7]	0,05	0,80	0,85	1,26
61		123	Upper Left wedge [6]	0,05	0,81	0,84	1,16
62		123	Upper Right wedge [7]	0,05	1,12	-	-
63		134	Upper Right wedge [5]	0,06	1,09	-	-
64		135	Upper Right wedge [5]	0,10	1,10	-	-
65		145	Upper Right wedge [6]	0,05	0,99	0,99	
66		124	Upper Right wedge [5]	0,09	1,02	-	-
Outlet Section 8+865 to 10+364							
67		124	Roof wedge [7]	0,05	0,05	0,05	0,05
68		125	Roof wedge [7]	0,05	0,05	0,05	0,05
69		123	Roof wedge [8]	0,00	0,00	0,00	7,01
70		135	Roof wedge [7]	0,05	0,05	0,05	1,77
72		134	Roof wedge [7]	0,05	2,79	-	-
73		135	Upper Left wedge [8]	0,00	0,57	0,57	0,77
74		134	Upper Left wedge [8]	0,00	0,50	0,50	0,69
75		123	Upper Left wedge [6]	0,05	0,50	0,50	1,08
78	235/-4	125	Upper Left wedge [8]	0,00	0,99	1,04	-
79		124	Upper Left wedge [8]	0,00	0,65	0,72	1,08
80		145	Upper Right wedge [6]	0,05	1,05	-	-
81		134	Upper Right wedge [5]	0,06	0,74	0,99	1,36
82		124	Upper Right wedge [5]	0,09	0,95	1,13	-
83		135	Upper Right wedge [5]	0,10	0,79	0,98	1,43
84		125	Upper Right wedge [5]	0,28	1,27	-	-
85		145	Upper Left wedge [7]	0,05	0,74	2,79	-
86		123	Upper Right wedge [7]	0,05	0,82	0,89	1,14

Table 34: Analyses of the support requirements for block failure

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7 CONCLUSIONS

A double shell lining system consisting of an initial support and a final lining (cast in place) separated by a waterproofing system has been investigated. The waterproofing membrane system prevents seepage between inside and outside of the Diversion Tunnel and acts as a suitable corrosion protection for the final lining. The final lining will be installed once tunnel excavation is completed. High pressure interface grouting prevents tensile stresses mobilized through internal water pressure. Thus cracking of the lining concrete is avoided and water seepage along the outside surface of the tunnel is prevented.

Using a comprehensive stress analysis it has been proven that the proposed tunnel lining system is capable of adequately supporting all loads including those imparted on the lining from long-term effects.

* * *

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ONTARIO POWER GENERATION
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NIAGARA TUNNEL FACILITY PROJECT

STRUCTURAL DESIGN ANALYSIS FOR THE DEWATERING SHAFTS

April 2005

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REVISION

0					
Rev.	Date	Issue, Modification	Prepared	Checked	Approved

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1 INTRODUCTION

This report provides a stability analysis for the proposed Dewatering Shafts for the Diversion Tunnel.

2 REFERENCES

2.1 Documents

[1] Ontario Power Generation (2005): Niagara Tunnel Facility Project, Geotechnical Data Report, Volume 1 to 12.

[2] Ontario Power Generation (2005), Niagara Tunnel Facility Project, Owner's Mandatory Requirements, Invitation to Submit Design/Building Proposals, App. 1.1.

[3] Ontario Power Generation (2005), Niagara Tunnel Facility Project, Geotechnical Baseline Report, part of: Invitation to Submit Design/Building Proposals, App. 5.4.

[4] STRABAG/ILF (2005): Niagara Tunnel Facility Project, Geotechnical Baseline Report, GBR-B.

[5] STRABAG/ILF (2005): Niagara Tunnel Facility Project, Design Basis and Method Statements.

[6] STRABAG/ILF (2005): Niagara Tunnel Facility Project, Structural Design Analysis for the Diversion Tunnel

2.2 Drawings

(1) STRABAG/ILF (2005): Niagara Tunnel Facility Project - Diversion Tunnel, Plan and Longitudinal Section (PD-01-1001, PA-01-1001)

(2) STRABAG/ILF (2005): Niagara Tunnel Facility Project – Diversion Tunnel, Geotechnical Longitudinal Section (PD-01-1002, PA-01-1002)

(3) STRABAG/ILF (2005): Niagara Tunnel Facility Project – Diversion Tunnel, Dewatering System, Plan, Sections and Details (PD-01-1022, PA-01-1022)

2.3 Codes and Standards

[a] Canadian Standard Association, S16-01: Limit States Design of Steel Structures, December 2001

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[b] Canadian Standard Association, A23.3-94: Design of Concrete Structures, December 1994 (reaffirmed December 2000).

[c] National Building Code of Canada (1995)

[d] The Building Code of Ontario (1997)

3 DEWATERING SHAFT SYSTEM

5 dewatering shafts will be located on the centreline of the tunnel at approx. km 8.9 measured from the intake of the Diversion Tunnel such, that the Owner's pumping equipment can be lowered into the tunnel. Each shaft is circular and drilled with a minimum diameter of 1.05 m in overburden and 0.915 m in rock to accommodate a min. 750 mm steel pipe as shown on the Proposal Drawings. The annulus around the pipe is grouted to prevent water seepage between different geological formations along the outside of the pipe.

4 GEOLOGY

Twelve stratigraphic formations are identified in the project area. They consist of sequences of sedimentary rock of Ordovician to Devonian age. These are namely the Guelph, Lockport, De Cew, Rochester, Irondequoit, Reynales, Neahga, Grimsby, Power Glen, Whirlpool and Queenston formations. Some of these formations are only a few meters thick. The shafts intersect eleven of the geological formations. The uppermost Guelph formation will not be affected by the construction of dewatering shafts. The lithological spectrum of the encountered formation covers limestone, dolostone, sandstone and shale (see chapter 3 of [5] for details).

5 GEOTECHNICAL INPUT PARAMETERS

The input parameters used in the analysis are in accordance with the evaluated calculation parameters included in the "Structural Design Analysis for the Diversion Tunnel" [6].

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6 GROUNDWATER

Three major groundwater flow regimes are encountered in the rock formations of the project area. The uppermost occurs in the Lockport and De Cew formations. This aquifer is connected to the surface water and shows the highest permeability of the entire sequence. A second flow regime is associated with the low permeability strata of the Rochester, Neahga, Power Glen and Queenston formations, forming a system of aquitards. A third flow regime is associated with the deeper permeable strata of the Irondequoit, Reynales, Thorold, Grimsby, Whirlpool and upper Queenston formations. These strata form deep lying aquifers. Groundwater elevations are reported to vary significantly from stratum to stratum and from location to location. Some groundwater heads encountered showed artesic behaviour with pressure heads above ground elevation.

7 EXCAVATION METHOD AND SUPPORT MEASURES

The dewatering shafts are drilled by raiseboring technique. In the overburden soil, large diameter holes are bored and supported by steel casing. For each shaft a pilot bore is lowered through the rock formations into the Diversion Tunnel. There a cutter head of suitable size is mounted on the drill rod and lifted to enlarge the pilot hole in upwards direction. The borehole section through the rock formations is considered to be stable without support until raiseboring is finished, the steel pipe installed for permanent support and the annulus filled with mortar grout.

8 CALCULATION MODEL

8.1 Design Loads

8.1.1 Structural and Dead Loads

Dead load of structural and non-structural elements is based on unit weight and computed volume of the materials. The following unit weights are used.

Unreinforced Concrete	24.0 kN/m³
Structural Steel	78.5 kN/m³
Rock / Soil	see [6]
Water	10.0 kN/m³

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8.1.2 Hydrostatic Pressure

It has to be distinguished between the internal hydrostatic pressure and the external ground water pressure.

The applicable "internal water pressure" and "external water pressure" are shown in the geotechnical longitudinal section (2) and will be treated as basis for subsequent analysis

8.1.3 Seismic Loads

Underground structures are generally less sensitive to seismic effects than surface structures, therefore no seismic loads are considered for preliminary design. At detail design stage a seismic analysis based on actual data will be carried out.

8.1.4 Long-term Rock Squeeze

8.1.4.1 Time Dependent Deformation Behaviour

It has to be emphasized that a time dependent deformation phenomenon is assumed for the Niagara area and described as **"rock squeeze"** and **"swelling"** It is well recognized that these processes are interrelated, and the individual effects of each are difficult to distinguish. Both effects can continue for many years [4]

Squeeze is usually associated with the long-term creep behaviour of rock, initiated by the relief of high in situ horizontal stresses. There is a well documented history of rock 'squeeze' affecting surface excavations in the upper dolostones and dolomitic limestones This squeeze, however, may include the effects of swelling of the shale interbeds in these rock units [4].

8.1.4.2 Swelling Behaviour

Swelling to be assumed for design purposes in the Queenston Formation is given in the Owner's Mandatory Requirements [2]. There is no available data regarding suppression of swell potential for the other formations

Generally swelling involves a volume increase and is initiated by the relief of the high in situ stresses. However, swelling also requires the presence of fresh water. The process is associated with ionic diffusion of salts from the connate pore water in the rock The swelling phenomenon can be suppressed under applied stresses

For swelling to occur, the necessary conditions are:

- the relief of initial stresses, which serves as an initiating mechanism,
- the accessibility to fresh water.

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- an outward salt concentration gradient from the pore fluid of the rock to the ambient fluid.

According to the Owner's Mandatory Requirements [2] a maximum swelling pressure of 5 MPa has to be applied to the calculations.

8.1.4.3 Rock Squeeze Behaviour

The rock expansion upon unloading observed in previous constructions [4] is not necessarily associated with the swelling of clay minerals, although in the presence of swelling clay minerals the time dependent deformation is generally greater.

Rock squeeze is defined as substantial time-dependent deformation in the vicinity of the tunnel as a result of load introduced by redistribution of stresses adjacent to the excavated tunnel.

8.1.5 Load Combinations

For load combinations not including earthquake, factored loads are determined in accordance with CSA S16-01 [a]. Herein the effect due to specified loads is multiplied by a load factor α. A load combination factor ψ and an importance factor γ is also considered:

$$\alpha_D D + \gamma \psi (\alpha_L L + \alpha_T T)$$

where:

- Load factors α for:

  - Dead loads: $\alpha_D = 1.25$
  - Live loads: $\alpha_L = 1.5$
  - Temperature loads: $\alpha_T = 1.25$

- Load combination factor ψ:

  - $\psi = 1.00$ when L or T is considered
  - $\psi = 0.7$ when a combination of L and T is considered.

- The importance factor is equal to 1.0 for all load combinations

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8.2 Shaft Design

8.2.1 Steel Design

Steel is designed according to CSA S16-01 [a]:

- stress analysis with $\phi f = (\alpha_c N) / A$
- max. allowable unfactored radial pressure:

$$p_k = \frac{E}{4(1-\nu^2)} \frac{s^3}{r^3}$$

where
- s... required wall thickness [mm]
- r... radius of pipe [mm]
- E... modulus of elasticity [N/mm²]
- ν... Poisson's ratio

- allowable factored radial pressure: $p_r = p_k / \Phi_E$

8.2.2 Design of Annular Grout

For loads not associated with water pressure, the annular grout ring is considered to contribute to the load bearing capacity of the shaft structures in addition to the steel pipes. Similar to unreinforced concrete the safety factor f_{AV} is used for the assessment of load bearing contribution of the annular grouting mortar. f_{AV} is the ratio of the design normal force N_{Ed} and the resisting normal force N_{Rd} considering the calculated eccentricity $e = M_{Ed} / N_{Ed}$ of load reaction forces in the grouting mortar.

The minimum safety factors f_{AV} are listed as calculation results in chapter 5.

The following formula is used for the design.

$$N_{Rd} = \phi_c \cdot f_c \, d \left(1 - 2\frac{e}{d}\right).$$

N_{Rd} is the resisting normal force with
- b = 1 m
- d ... thickness of annular grout
- e ... eccentricity (e = M/N)

The resistance factor of concrete Φ is assumed to be 0.60 according to CSA A23.3-94 [b]. The required design factor $f_{AV} = N_{Rd} / N_{Ed}$ for design check of the lining is:

$f_{AV} \geq 1.$

Herein the computed structural forces N will be multiplied by a factor $\alpha_c = 1.5$ according to CSA A16-01 [a] in order to get the design structural forces N.

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In addition the maximum eccentricity is controlled by

$e / h_{\alpha} \leq 0.33$.

h_{α} represents the structural height of the annular ring.

8.2.3 Safety factors

The following factors of material resistance are selected:

concrete $\Phi_c = 0.6$
steel $\Phi_s = 0.9$
buckling $\Phi_B = 2.5$

The load factors are generally $\alpha_L = 1.5$ according to CSA A16-01 [a]. Reduced factors are applied solely for following extraordinary load case:

a) worst-case scenarios of a groundwater pressure or a swelling pressure on the lining in combination with an unfrequent temporary operation state "Dewatering of Tunnel". Factors for such a load-combination "worst case – temporary state" have been assumed to be:
load factor $\alpha_L = 1.0$

9 DESIGN ANALYSIS RESULTS

Linear elastic analyses are adequate for static loading of the tunnel lining from self weight, geo- hydrostatic, temperature, shrinkage, and live loads.

9.1.1 Geometry

The cross section of the shaft is illustrated in (4). The inner diameter is 0.75 m.

9.1.2 Performed Calculations and Results

The following load cases are considered. The detailed results, plots and listings, are shown in the Appendices.

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	Load Case		Required Steel Wall Thickness [mm]
1	Swelling in Queenston without Internal Water Pressure	Worst Case	23
2	Swelling in Queenston & Internal Water Pressure	Standard Load Case	23
3	Swelling in Lockport without Internal Water Pressure	Worst Case	18
4	Swelling in Lockport & Internal Water Pressure	Standard Load Case	19
5	Internal Water Pressure	Standard Load Case	2.5
6	Rock Squeeze Queenston	Worst Case	29

Table 1: Results of Calculations

The Steel Lining of the shaft has to be constructed with a thickness of minimum 20 mm in the upper Geological Formations (Overburden and Lockport). Within the Queenston Formation the wall thickness has to be increased to 30 mm.

10 CONCLUSIONS

The structural design analysis has proven that the proposed shaft lining system is capable of adequately supporting all loads including those imparted on the lining from long term effects.

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1 APPENDICES

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Appendix 1: Calculations

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Oj I 921 OPG - Diversion Tunnel
at Dewatering Shafts

Steel pipe dia 750 mm

$f = 420\ N/mm^2$

$\phi = 0.9$

1) Swelling in Queenston - Worst case scenario : $5\ N/mm^2$; $\alpha_L = 1.0$

Axial force : $N = P \cdot r = 5000\ kN/m^2 \cdot 0.375\ m = 1875\ kN$

$\phi f \geq \frac{N \times \alpha_L}{A}$ $\qquad A = l \cdot t$; $l = 1000\ mm$

$t_{min} \geq \frac{N \cdot \alpha_L}{\phi \times f \times 1000} = \frac{1875 \times 10^3 \times 1.0}{0.9 \times 420 \times 1000} = 4.96\ mm \doteq \underline{5\ mm}$

2) Swelling in Queenston + Internal water pressure

$P_{sw} = 5\ N/mm^2$; $P_{IWP} = 1.4\ N/mm^2$; $\alpha_L = 1.5$

Axial force : $N = (P_{sw} + P_{IWP}) \cdot r = (5 - 1.4) \times 0.375 = 1350\ kN$

$\phi f \geq \frac{N \times \alpha_L}{A}$

$t_{min} \geq \frac{N \times \alpha_L}{\phi \times f \times 1000} = \frac{1350 \times 10^3 \times 1.5}{0.9 \times 420 \times 1000} = 5.35\ mm = \underline{5.5\ mm}$

3) Swelling in Lock Point - worst case scenario :

$P_{sw} = 2.5\ N/mm^2$; $\alpha_L = 1.0$

Axial force : $N = P_{sw} \times r = 2500\ kN/m^2 \times 0.375 = 937.5\ kN$.

$t_{min} = \frac{N \times \alpha_L}{\phi \times f \times 1000} = \frac{937.5 \times 10^3 \times 1.0}{0.9 \times 420 \times 1000} = 2.48\ mm = \underline{2.5\ mm}$

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CONSULTING ENGINEERS
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4) Swelling in Lock Port + Internal water pressure:

$P_{sw} = 2.5\ N/mm^2$, $P_{IWP} = -0.5\ N/mm^2$; $\alpha_L = 1.5$

Axial force: $N = (P_{sw} + P_{IWP}) \times r = (2500 - 500) \times 0.375 = 750\ kN$

$$\sigma_f \geq \frac{N \times \alpha_L}{A} \qquad A = l \times t \ ; \ l = 1000\ mm$$

$$t_{min} \geq \frac{N \times \alpha_L}{\sigma_f \times 1000} = \frac{750 \times 10^3 \times 1.5}{0.9 \times 420 \times 1000} = 2.98\ mm \doteq \underline{3.0\ mm}$$

5) Internal water pressure (pipes beding is neglected)

$P_{IWP} = 1.4\ N/mm^2$ $\alpha_L = 1.5$

Axial force: $N = P_{IWP} \times r = 1400 \times 0.375 = 525\ kN$

$$\sigma_f \geq \frac{N \times \alpha_L}{A} \qquad A = l \times t \ ; \ l = 1000\ mm$$

$$t_{min} \geq \frac{N \times \alpha_L}{\sigma_f \times 1000} = \frac{525 \times 1.5}{0.9 \times 420 \times 1000} = 2.08\ mm \doteq 2.5\ mm$$

6) In situ stress, σ_H Queenston

$\sigma_H = \sigma_V \cdot k_0$ $\qquad \sigma_V = h \times \gamma = 128\ m \times 26\ kN/m^3 = 3328\ kN/m^2$

$k_0 = 4.5$

$\sigma_H = 3328 \times 4.5 = 14\,976\ kN/m^2$

Load split factor:

Steel pipe: Wall thickness $\approx 25\ mm$

$E = 200\ GPa$

Grout: thickness $\approx 57\ mm$

$E = 25\ GPa$

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Dewatering Shafts

Load split factor: $\frac{25 \times 100}{57 \times 25} \approx 3.5$

Load carried out by grout: $\frac{14979}{3.5} = 4279\ kN/m^2$

Load on the steel pipe: $14979 - 4279 = 10\,697\ kN/m^2$

Axial force: $N = 10\,697 \times 0.375 = 4\,011\ kN$

$\sigma_f \geq \frac{N \cdot \alpha_u}{A}$ $\qquad A = l \cdot t$; $l = 1000\ mm$

$t_{min} \geq \frac{N \cdot \alpha_u}{\sigma_f \cdot 1000} = \frac{4011 \times 10^3 \times 1.0}{0.9 \times 420 \times 1000} = 10.6\ mm \doteq \underline{\underline{11\ mm}}$

BLF CONSULTING ENGINEERS	Project:	OPG - Diversion Tunnel	Pre.: Jiricny
	Object:	Dewatering Shafts	Checked: Marcher
	Title:	Load case 1; $\alpha_L = 1.0$	Datum: Apr.05

BUCKLING OF CIRCULAR SHAPED MEMBERS:

$$p_K = \frac{E}{4 \times (1 - \nu^2)} \times \frac{s^3}{r^3}$$

Diameter:	D =	760	mm
Elastic modulus:	E =	200000	N/mm^2
Poison constant :	n =	0.3	
Required Wall Thickness:	s =	**23**	**mm**
Radius:	r =	368.7	mm
Safety Factor	α_B =	2.5	

Unfactored Radial Pressure:	p_k =	12.50	N/mm^2
Factored Radial Pressure:	p_{all} =	**5.00**	**N/mm^2**

CONSULTING ENGINEERS	Project:	OPG - Diversion Tunnel	Pre.: Jiricny
	Object:	Dewatering Shafts	Checked: Marcher
	Title:	Load case 2; α_L = 1.5	Datum: Apr.05

BUCKLING OF CIRCULAR SHAPED MEMBERS:

$$p_K = \frac{E}{4 \times (1 - \nu^2)} \times \frac{s^3}{r^3}$$

Diameter:	D =	760 mm
Elastic modulus:	E =	200000 N/mm^2
Poison constant :	n =	0.3
Required Wall Thickness:	s =	**23 mm**
Radius:	r =	368.5 mm
Safety Factor	α_B =	2.5

Unfactored Radial Pressure:	p_k =	13.50 N/mm^2
Factored Radial Pressure:	p_{all} =	**5.40 N/mm^2**

ALP CONSULTING ENGINEERS	Project: OPG - Diversion Tunnel	Pre.:	Jiricny
	Object: Dewatering Shafts	Checked	Marcher
	Title: Load case 3; $\alpha_L = 1.0$	Datum	Apr.05

BUCKLING OF CIRCULAR SHAPED MEMBERS:

$$p_K = \frac{E}{4 \times (1 - \nu^2)} \times \frac{s^3}{r^3}$$

Diameter:	D =	760 mm
Elastic modulus:	E =	200000 N/mm^2
Poison constant :	n =	0.3
Required Wall Thickness:	s =	**18 mm**
Radius:	r =	371.0 mm
Safety Factor	α_B =	2.5

Unfactored Radial Pressure:	p_r =	6.25 N/mm^2
Factored Radial Pressure:	p_{al} =	**2.50 N/mm^2**

CONSULTING ENGINEERS	Project:	OPG - Diversion Tunnel	Pre.: Jiricny
	Object:	Dewatering Shafts	Checked: Marcher
	Title:	Load case 4; α_L = 1.5	Datum: Apr.05

BUCKLING OF CIRCULAR SHAPED MEMBERS:

$$p_K = \frac{E}{4 \times (1 - \nu^2)} \times \frac{s^3}{r^3}$$

Diameter:	D =	760	mm
Elastic modulus:	E =	200000	N/mm^2
Poison constant :	n =	0.3	
Required Wall Thickness:	s =	**19**	**mm**
Radius:	r =	370.5	mm
Safety Factor	α_B =	2.5	

Unfactored Radial Pressure:	p_k =	7.50	N/mm^2
Factored Radial Pressure:	p_{all} =	**3.00**	**N/mm^2**

ILF CONSULTING ENGINEERS	Project:	OPG - Diversion Tunnel	Pre: Jiricny
	Object:	Dewatering Shafts	Checked: Marcher
	Title:	Load case 6; α_L = 1.0	Datum: Apr.05

BUCKLING OF CIRCULAR SHAPED MEMBERS:

$$p_K = \frac{E}{4 \times (1 - \nu^2)} \times \frac{s^3}{r^3}$$

Diameter:	D =	760	mm
Elastic modulus:	E =	200000	N/mm^2
Poison constant :	n =	0.3	
Required Wall Thickness:	s =	**29**	**mm**
Radius:	r =	365.6	mm
Safety Factor	α_B =	2.5	

Unfactored Radial Pressure:	p_k =	26.74	N/mm^2
Factored Radial Pressure:	p_{all} =	**10.70**	**N/mm^2**

ONTARIO POWER GENERATION
OPG

NIAGARA TUNNEL FACILITY PROJECT

SLOPE STABILITY ANALYSIS FOR EXCAVATIONS

April 2005

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REVISION

0					
Rev.	Date	Issue, Modification	Prepared	Checked	Approved

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1 INTRODUCTION

This report provides the stability analysis for excavations including intake channel, outlet canal and the excavation for intake and outlet structure. Since all excavations are situated in the Lockport- DeCew- Rochester geological formations and identical parameters are therefore applicable, only the deepest excavation located at the outlet is analysed in detail.

2 REFERENCES

2.1 Documents

[1] Ontario Power Generation (2005): Niagara Tunnel Facility Project, Geotechnical Data Report, Volume 1 to 12.

[2] Ontario Power Generation (2005), Niagara Tunnel Facility Project, Owner s Mandatory Requirements, Invitation to Submit Design/Building Proposals, App. 1.1.

[3] Ontario Power Generation (2005), Niagara Tunnel Facility Project, Geotechnical Baseline Report, part of: Invitation to Submit Design/Building Proposals, App. 5.4.

[4] STRABAG/ILF (2005): Niagara Tunnel Facility Project, Geotechnical Baseline Report, GBR-B.

[5] STRABAG/ILF (2005): Niagara Tunnel Facility Project, Design Basis and Method Statements.

2.2 Drawings

(1) STRABAG/ILF (2005) Niagara Tunnel Facility Project – Diversion Tunnel, Outlet Canal TBM Launch – Plan and Longitudinal Section (PD-03-1013, PA-03-1013)

(2) STRABAG/ILF (2005). Niagara Tunnel Facility Project – Diversion Tunnel, Outlet Structure – Plan and Longitudinal Section(PD-03-1011, PA-03-1011)

2.3 Codes and Standards

[a] National Building Code of Canada (1995)

[b] The Building Code of Ontario (1997)

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3 CALCULATION SECTION

The deepest section close to the Diversion Tunnel is the excavation for the Outlet Structure The slope has a total height of approx. 40 m. The excavation boundary for the outlet structure consists of a vertical wall of maximum 32 m height. This vertical wall ends with a berm at el.176 m followed by an inclined slope with approx. 8 m height

4 GEOLOGY

The excavation for the Outlet Structure will be within four stratigraphic formations. They consist of overburden material and the sequences of sedimentary rock: Lockport, De Cew and Rochester.

5 GEOTECHNICAL INPUT PARAMETERS

5.1 Overburden Material

Following geotechnical parameters are applied for the overburden material (based on data presented in [4]):

γ = 20 kN/m³

c = 20 kN/m²

φ = 15°

5.2 Rock Units

The rock mass parameters are based on the Geotechnical Baseline Report [4]. The strength properties to be expected are summarized in Table 1.

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Formation	φ [°]	c [MPa]
Lockport	34	7.9
DeCew	34	8.0
Rochester	32	2.5

Table 1: Rock Mass Strength Parameters

The following Rock Properties are selected for the slope stability analysis:

γ = 24 kN/m³

c = 500 kN/m²

φ = 34°

5.3 Bedding Planes and Joints between Rock Formations

Sheared, weak bedding planes exist between rock formations.

The following parameters based on test data presented in the GDR [1] and GBR [4] are used for modelling the planes:

Formation	φ [°]	c [MPa]	Orientation with respect to outlet canal
Joints	30	0.0	approx. vertical
Bedding Planes	24	0.45	approx. horizontal

Table 2: Geotechnical Parameters for Bedding Planes and Joints.

During excavation of the canal, wedges may slide into the canal where joints and bedding planes act as sliding planes. The resisting forces on the sliding planes are calculated using friction angle and cohesion of the bedding planes. Full separation of the joints will not be considered. Assuming A_{total} as the total area of the slide plane at the face and A_{real} as the real joint plane area which takes into account the persistency of joints, the degree of separation κ of the sliding wedge is described by:

$$\kappa = A_{real} / A_{total}$$

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Hence the resisting forces of a possible sliding wedge can be analysed using:

$$\kappa \times \text{strength}_{\text{joints}} + (1 - \kappa) \times \text{strength}_{\text{rock}}$$

As a conservative approach $\kappa = 0.7$ is selected (i.e. a persistency of 70 % has been assumed for the subsequent calculations). This results in an equivalent joint strength of:

$c = 150\ kN/m^2$

$\varphi = 31.5°$

6 GROUNDWATER

Three major groundwater flow regimes are encountered in the rock formations of the project area. The uppermost occurs in the Guelph, Lockport and De Cew formations. This aquifer is connected to the surface water and shows the highest permeability of the entire sequence of geological formations

7 EXCAVATION METHOD AND SUPPORT MEASURES

Smooth blasting techniques will be employed to excavate the sides of the outlet canal. Any exposed shaly rocks (e.g. the Rochester Formation) or shale layers which are susceptible to deterioration upon exposure to wetting and drying cycles and large temperature differences will be protected by sealing shotcrete.

The vertical walls to be constructed in the rock units generally will not be supported.

The overburden soils will have a slope inclination of 1:2.

A grouting curtain behind the excavation walls is installed prior to excavation in order to avoid excessive water inflow during construction.

The analysis of slope stability is carried out without modelling any rock support measures.

8 CALCULATION MODEL

The calculations are carried out using the EDP program LARIX-4S.

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8.1 Slope stability analysis according BISHOP/KREY

The used method by Krey is an iteration method, in the course of which the slip circles are varied until the smallest safety is determined. Starting from an inclination of the slip lines to the horizontal of 45 + $\varphi/2$, a tangential gradient will be considered in the calculation.

8.2 Slope stability analysis according JANBU

The occurrence of discrete slip surfaces are analyzed using the method according to Janbu. This slip surfaces are determined by the horizontal bedding planes and joints that are almost perpendicular to the bedding plane. For the calculation model, the analytical solution for the sliding of a rigid body on an inclined surface is taken as a basis.

The thickness of ground layers, the distance between the joint planes and the lengths of the slip surfaces are presently not known. The calculations are carried out for the worst case when the slip surface cuts through the base of the slope and start developing behind the grout curtain.

8.3 Load assumptions

Dead loads of structural and non-structural elements are based on unit weight and computed volume of the materials.

Live load is assumed to consist of a mobile crane of total weight of 25 tons loaded on a plane of approx. 2 x 3 m. In the calculations the crane load is modelled as a uniform distributed load of approx. 42 kN/m² (placed 2 m from the existing berm).

The Water table is assumed to be at el.178.2 m (based on NF – 42). Due to the grout curtain installed around the outlet canal a lowest ground water elevation of 174.0 m is considered.

The analysis is performed without water pressure inside the Outlet Canal (dewatered).

8.4 Safety Factors

Ultimate Limit State is considered for the Slope Stability Analyses. Due to uncertainties with respect to appropriate strength parameters a conservative approach for the partial safety factors is chosen.

- Active Load factors α for

- Dead loads: $\alpha_G = 1.1$
- Live loads: $\alpha_Q = 1.5$

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- Resistance factor γ:

- γ_cohesion = 1.6
- γ_friction = 1.25

A model factor γ_mod is introduced in addition:

γ_mod = 1.1 and therefore $R_k / S_k \geq 1.1$ has to be fulfilled.

9 ANALYSIS RESULTS

The following calculations were performed for the slope stability of the overburden material.

Calculation	Slope Inclination	Safety $R_k / S_k \geq 1.1$	Appendix
1	1:1.5	1.25	1.1
2	1:1.5	1.10	1.2
3	1:2	1.35	1.3
4	1:2	1.29	1.4

Table 3: Results of Slope Stability Analysis for the Overburden Material (Bishop/Krey).

Additional calculations are provided for the slope stability of the vertical wall within the rock units:

Calculation	Method	Safety $R_k / S_k \geq 1.1$	Appendix
5	Slip circle (Bishop/Krey)	2.01	2.1
6	Slip circle (Bishop/Krey)	2.12	2.2
7	Slip Planes (Janbu)	1.26	2.3
8	Slip Planes (Janbu)	1.31	2.4
9	Slip Planes (Janbu)	3.07	2.5
10	Slip Planes (Janbu)	2.93	2.6

Table 4: Results of Slope Stability Analysis for the Vertical Rock Wall

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10 CONCLUSIONS

The analysis proves, that the stability of excavations is guaranteed without installation of support measures, when the proposed geotechnical parameters are applied.

It is recommended to use slope inclinations of maximum 1:2 within the overburden material.

Adopting conservative calculation parameters it can be concluded, that the vertical walls within the rock units are stable. Care has to be taken to ensure, that the rock beyond the excavation limits is not damaged or destabilized by blasting. Any damaged rock has to be removed to ensure stability of the excavation.

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11 APPENDICES

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Appendix 1: Slope Stability Analysis for the Overburden Material

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Appendix 2: Slope Stability Analysis for the Rock Formations

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11 APPENDICES

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Appendix 1: Calculations for the Overburden Material

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Appendix 1.1
20.04.05, 15:25
FJ

Lanx-4, Version 2.21
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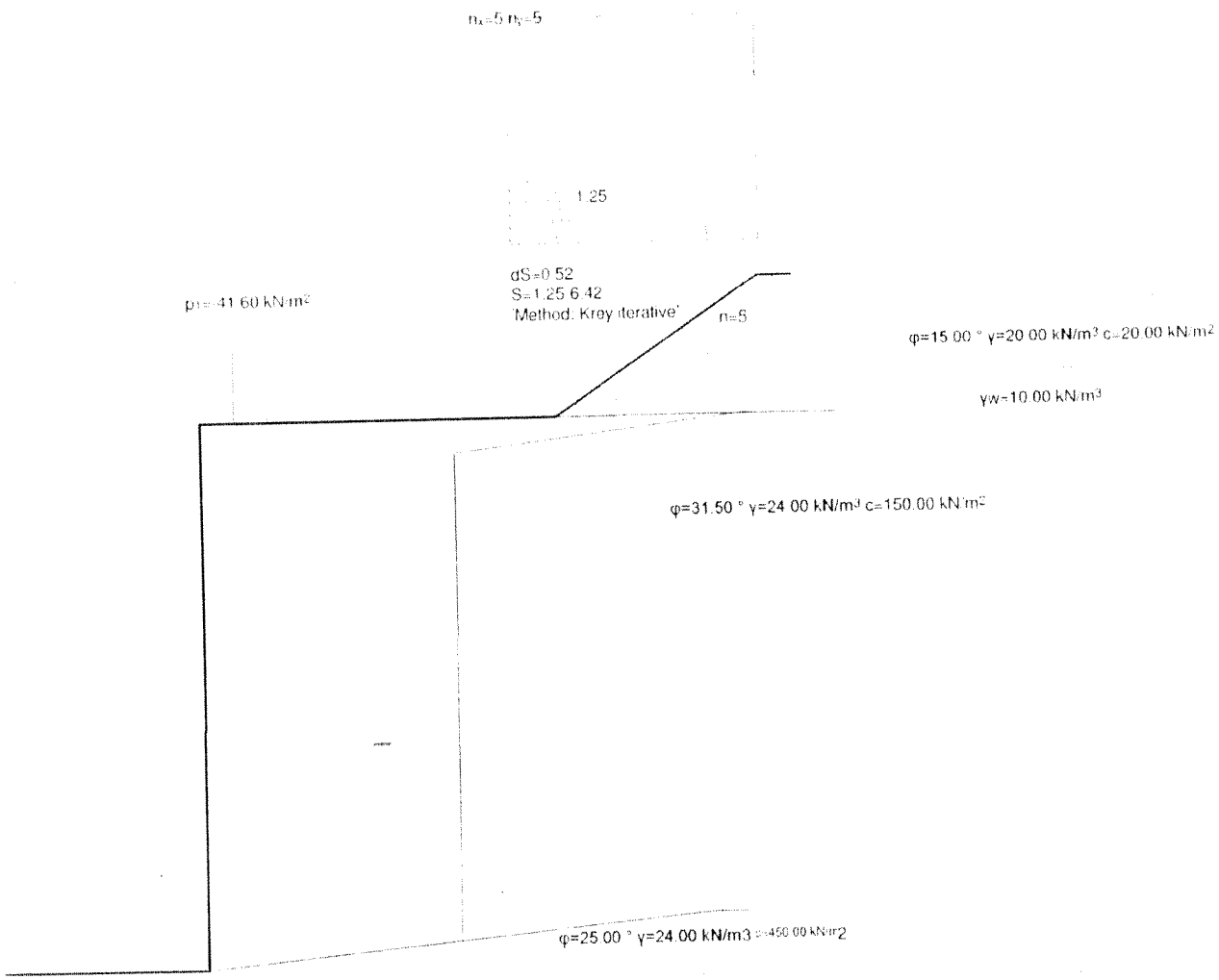
Section:Outlet Structure

Scale 1 :404.0 (-5.38,136.94..78.58,201.03)

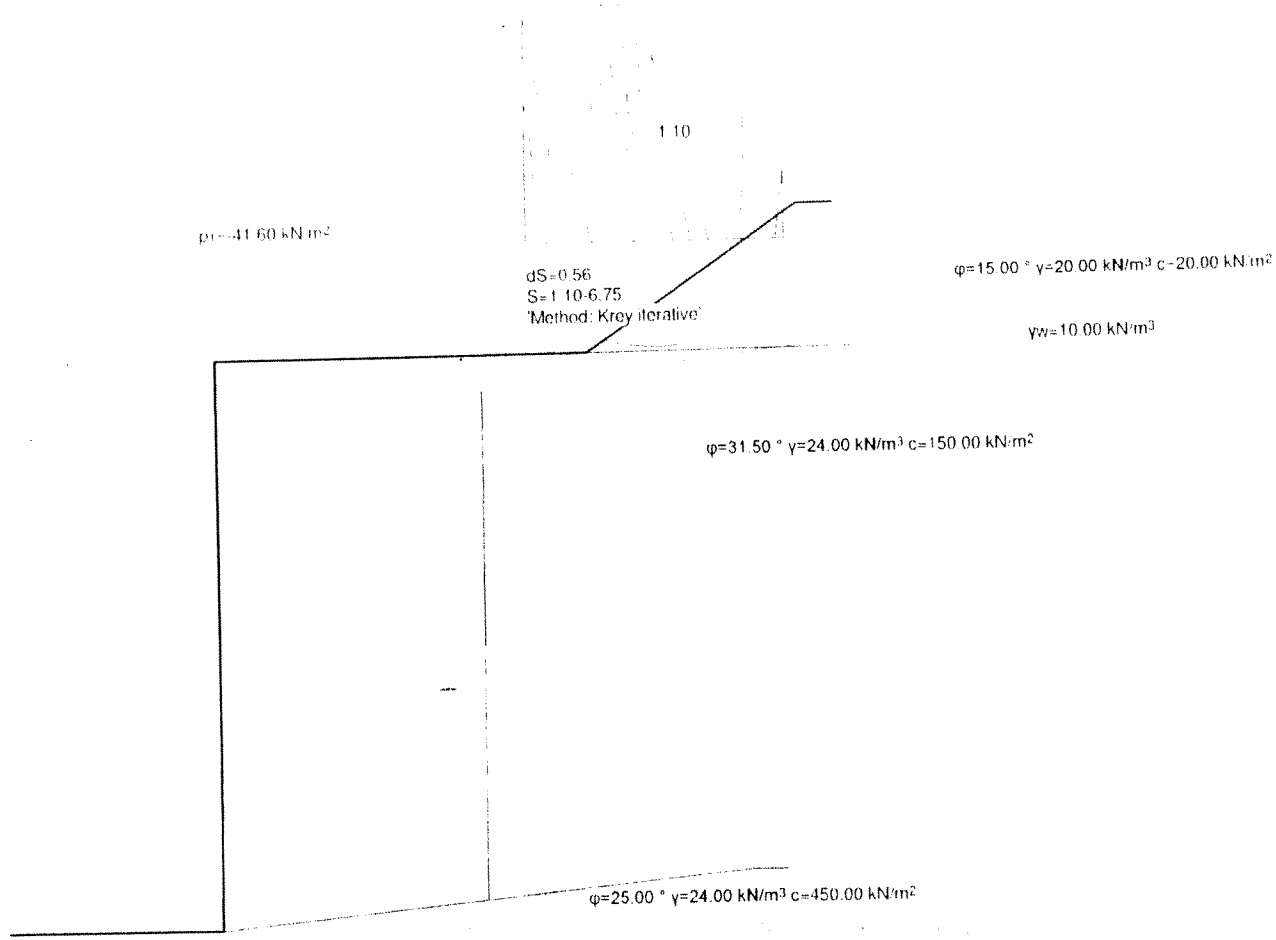
Critical slip surface



Section:Outlet Structure

Scale 1 :403.0 (-2.94,1 30.08,201.32)

ip surface



Appendix 1.3
20.04.05, 15:20
FJ

Lanix-4, Version 2.21
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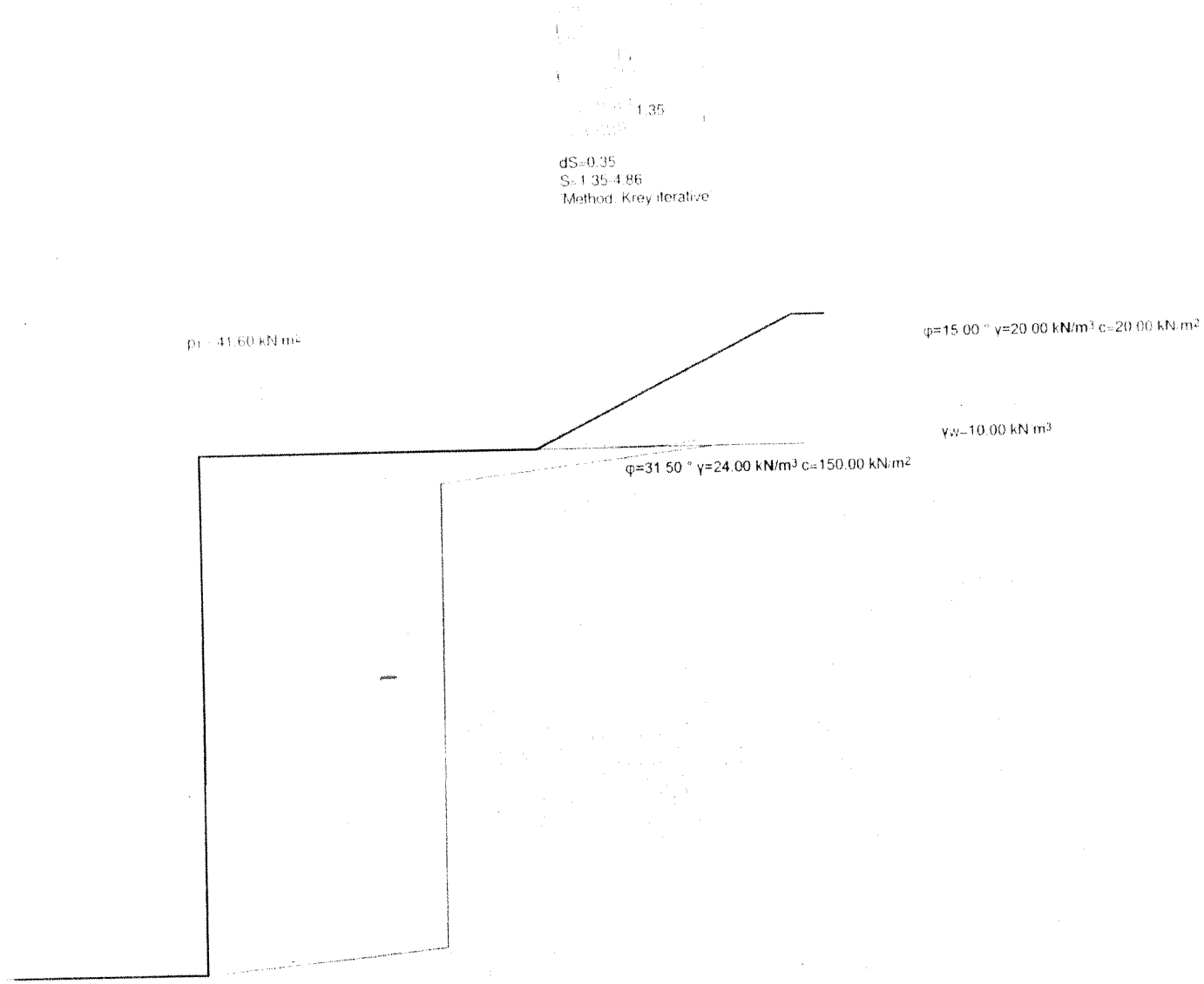
OPG Niagara Tunnel Facility Project
Section:Outlet Structure

Scale 1 :385.9 (-3.11,142.79,-83.64,204.00)

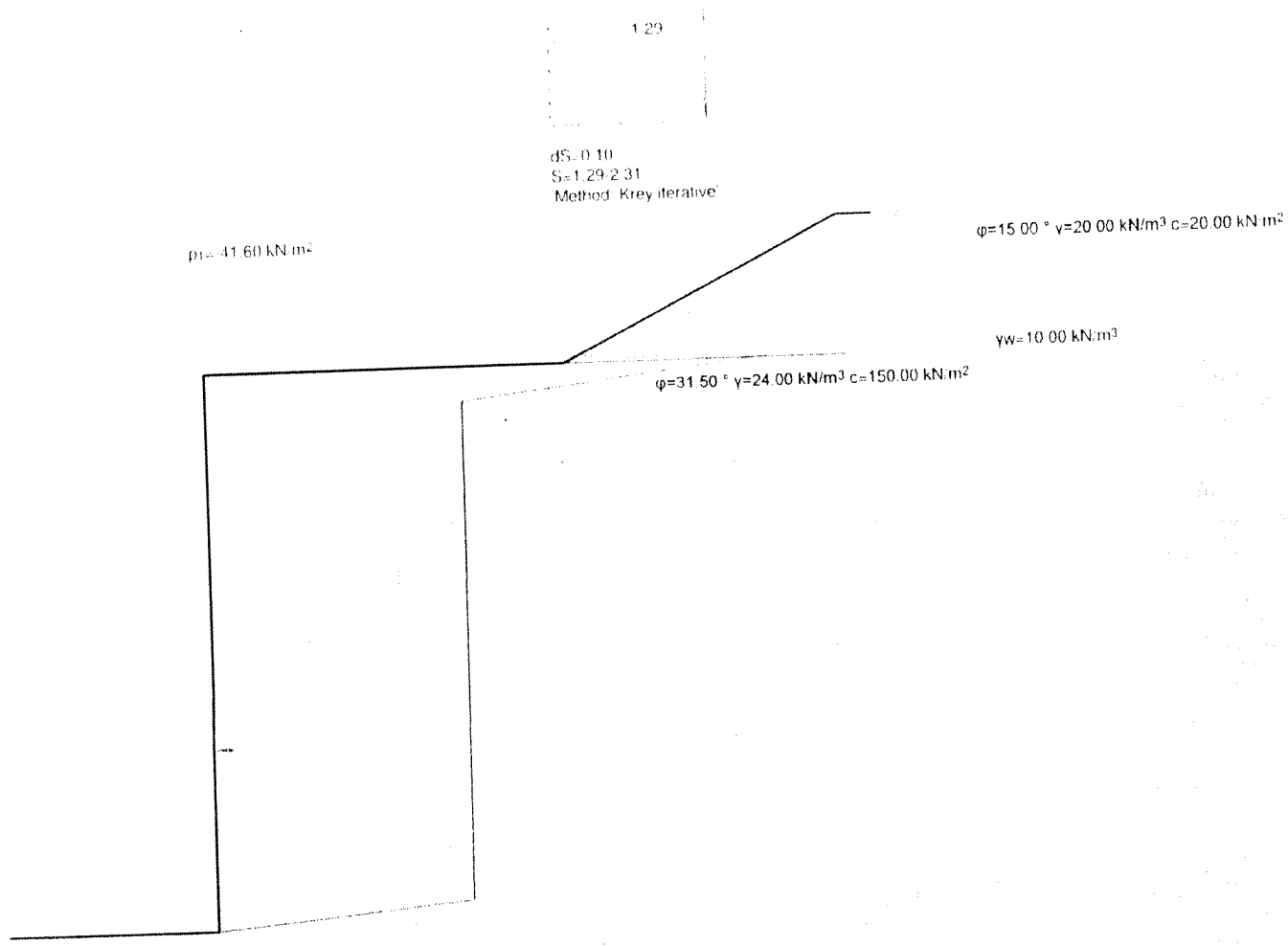
Critical slip surface



Section:Outlet Structure

cale 1 :396.0

ip surface



Appendix 2: Calculations for the Rock Units

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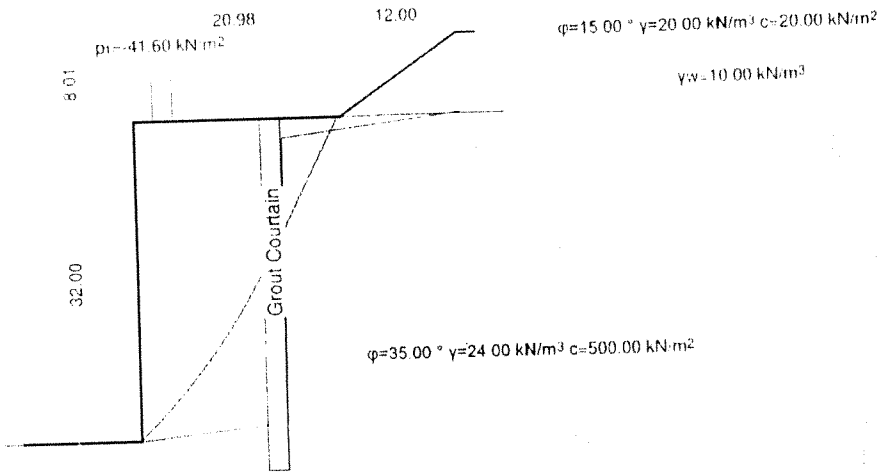
Section Outlet Structure

Scale 1 :723.8 (-69.87,120 5.95,231.32)

2.01

dS=0.75
S=2.01 9.53
Method: Krey iterative



Larix-4, Version 2.21
ILF Consulting Engineers
OPG Niagara Tunnel Facility Project
Section:Outlet Structure

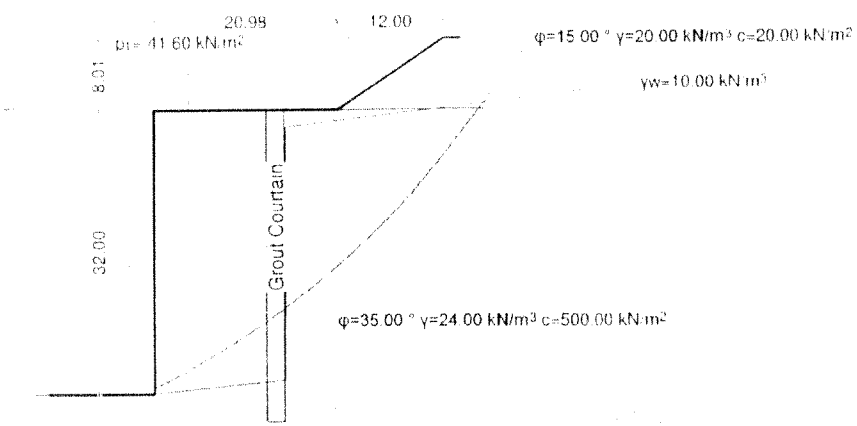
Appendix 2.2
20.04.05, 15:14
FJ

Critical slip surface

Scale 1 :811.5 (-58.80,135.67..105.24,264.41)

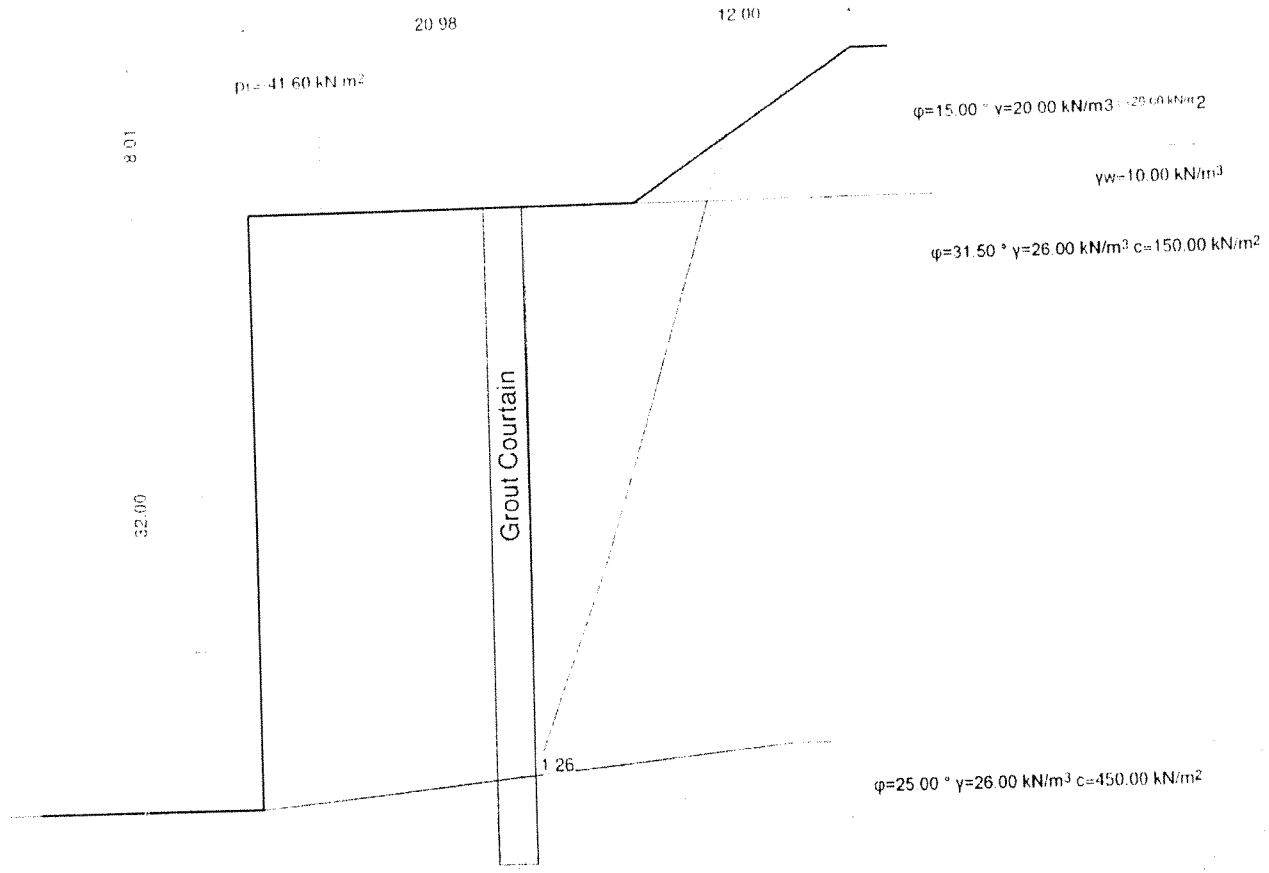
2.12

dS=0.51
S=2.12/7.26
Method: Krey iterative



Section:Outlet Structure

Scale 1 :387.9 (-18.18,13 1.40,194.78)

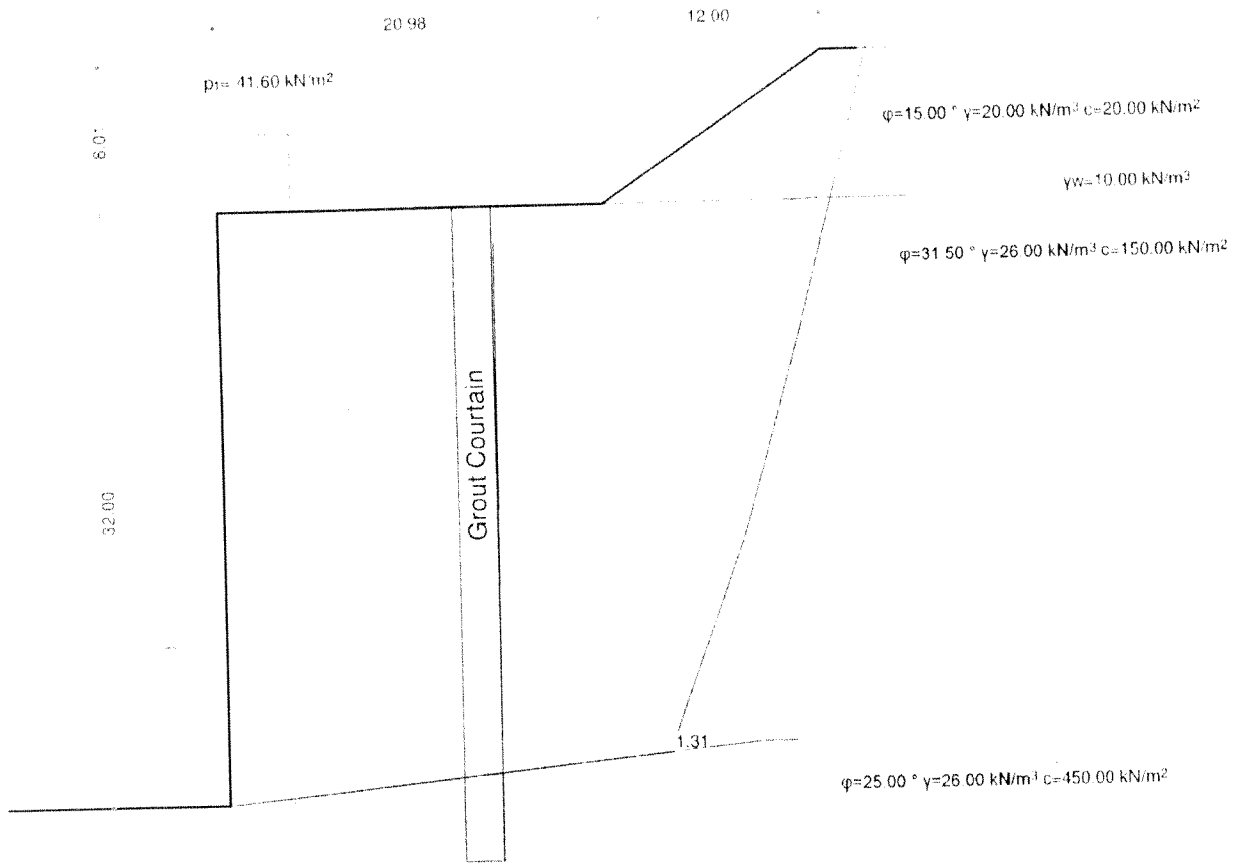


Appendix 2.4
20.04.05, 14:37
FJ

Lanx-4, Version 2.21
ILF Consulting Engineers
OPG Niagara Tunnel Facility Project
Section:Outlet Structure

Scale 1 :387.9 (-18.18,135.32..81.40,194.78)

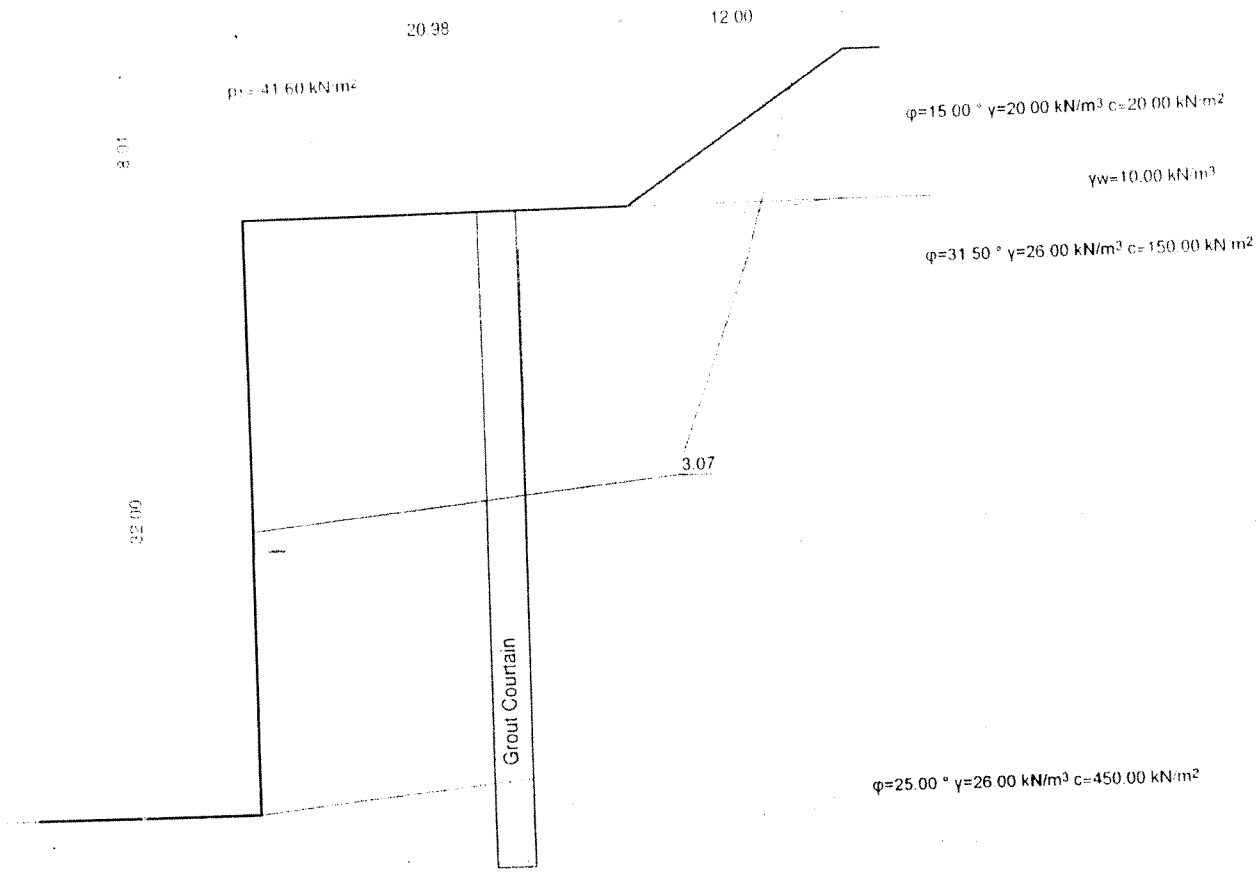
Critical slip surface



Section:Outlet Structure

Scale 1 :387.9 (13.65,13 1.95,200.33)

surface, hazard scenario Standard Gefährdungsbild



Appendix 2.6
20.04.05, 14:37
FJ

Limix-4, Version 2.21
ILF Consulting Engineers
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Section:Outlet Structure

Scale 1:318.7 (-7.21,138.92,-69.48,189.48)

Circular slip surface

ONTARIO POWER GENERATION
OPG

NIAGARA TUNNEL FACILITY PROJECT

PRELIMINARY STRUCTURAL DESIGN ANALYSIS FOR THE INTAKE AND OUTLET STRUCTURE

May 2005

ILF CONSULTING ENGINEERS

BERATENDE INGENIEURE
CONSULTING ENGINEERS
INGENIEURS CONSEILS

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REVISION

0					
Rev.	Date	Issue, Modification	Prepared	Checked	Approved

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9.3.4 Preliminary Design of Channel Side Wall 10
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1 INTRODUCTION

This report provides a preliminary stability analysis for the proposed Intake and Outlet Structure of the Niagara Tunnel Facility Project..

2 REFERENCES

2.1 Documents

[1] Ontario Power Generation (2005): Niagara Tunnel Facility Project, Geotechnical Data Report, Volume 1 to 12.

[2] Ontario Power Generation (2005), Niagara Tunnel Facility Project, Owner´s Mandatory Requirements, Invitation to Submit Design/Building Proposals, App. 1.1.

[3] Ontario Power Generation (2005), Niagara Tunnel Facility Project, Geotechnical Baseline Report, part of: Invitation to Submit Design/Building Proposals, App. 5.4.

[4] STRABAG/ILF (2005): Niagara Tunnel Facility Project, Geotechnical Baseline Report, GBR-B.

[5] STRABAG/ILF (2005): Niagara Tunnel Facility Project, Design Basis and Method Statements. (Doc. PR 00 3001)

[6] STRABAG/ILF (2005): Niagara Tunnel Facility Project, Structural Design Analysis for the Diversion Tunnel (Doc. PR 00 4001)

[7] STRABAG/ILF (2005): Niagara Tunnel Facility Project, Outline Specification - Concrete for the final structure of Intake / Outlet (Doc. PR 00 5010)

2.2 Drawings

(1) STRABAG/ILF (2005): Niagara Tunnel Facility Project - Diversion Tunnel, Plan and Longitudinal Section (PD-01-1001, PA-01-1001)

(2) STRABAG/ILF (2005): Niagara Tunnel Facility Project - Diversion Tunnel, Geotechnical Longitudinal Section (PD-01-1002, PA-01-1002)

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(3) STRABAG/ILF (2005): Niagara Tunnel Facility Project - Outlet Structure, Plan, Sections and Details (PD-01-1011)

(4) STRABAG/ILF (2005): Niagara Tunnel Facility Project - Outlet Structure, Cross Sections (PD-01-1012)

(5) STRABAG/ILF (2005): Niagara Tunnel Facility Project - Intake Structure, Plan, Sections and Details (PD-01-1015)

(6) STRABAG/ILF (2005): Niagara Tunnel Facility Project - Outlet Structure, Cross Sections (PD-01-1016)

2.3 Codes and Standards

[a] Canadian Standard Association, S16-01: Limit States Design of Steel Structures, December 2001.

[b] Canadian Standard Association, A23.3-94: Design of Concrete Structures, December 1994 (reaffirmed December 2000).

[c] National Building Code of Canada (1995)

[d] The Building Code of Ontario (1997)

[e] German Standard DIN 1045-1

3 OUTLET STRCUTRE

The outlet structure is a rectangular shaft building between the end of the diversion tunnel and the outlet canal. The outlet structure is 26 m long, 19.3 m wide and approx. 32 m high. The walls on the tunnel side and on channel side has square openings with dimensions of approx. 6.4 m clearance width and height for water flow.

The outlet structure is built of reinforced concrete. The thickness of the floor is 3 m, the thickness of the walls ranges between 2 m at the channel side, 3.9 m at the tunnel side and 3.26 m at the sidewall. To prevent loadings caused by underground pressure from the structure during structure design lifetime a

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flexible layer with a thickness of 10 cm is arranged at the sidewalls between the structure's backside and the excavated face of the ground.

Behind the outlet structure the diversion tunnel cross section changes from a square cross section to a circular cross section within a length of 20 m. This transition zone is an individual structure with changing cross section and changing dimensions of its wall thickness. It will be preliminary analysed within this document.

4 INTAKE STRUCTURE

The intake structure is a similar building as the outlet structure. The dimensions of the structure are:

Length:	8 m
Width:	approx. 19 m
Height:	approx. 36 m

Thickness wall Channel side:	2.50 m
Thickness wall Tunnel side:	2.03 m
Thickness Sidewalls:	1.49 m

5 GEOLOGY

Twelve stratigraphic formations are identified in the project area. They consist of sequences of sedimentary rock of Ordovician to Devonian age. These are namely the Guelph, Lockport, De Cew, Rochester, Irondequoit, Reynales, Neahga, Grimsby, Power Glen, Whirlpool and Queenston formations. Some of these formations are only a few meters thick.

The intake structure is mainly located in the Lockport formations, while the outlet structure is laying in the Rochester and the Lockport formation. The lithological spectrum of the encountered formation covers limestone, dolostone, sandstone and shale (see chapter 3 of [5] for details).

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6 GEOTECHNICAL INPUT PARAMETERS

The input parameters used in the analysis are in accordance with the evaluated calculation parameters included in the "Structural Design Analysis for the Diversion Tunnel" [6].

7 GROUNDWATER

Because of the neighbourhood of the regarded structures to the Niagara River and other water bearing structures the groundwater level close to the structure is assumed at the underground surface level (on the safe side).

8 EXECUTION MEASURES

The pits for the outlet and intake structure are excavated by drilling and blasting. The rock mass is assumed as stable enough, that generally no support of the excavated surface is necessary. In individual cases a shotcrete sealing of the excavation surface against weathering might be approbriate.

The structures are concreted in different steps. Details are given in the corresponding outline specification [7]. The walls will be concreted in adequate segments. The segments are designed in that way, that generally no additional design loads has to be considered on the structure, caused by the construction procedure.

9 CALCULATION MODEL

9.1 Design Loads

9.1.1 Structural and Dead Loads

Dead load (D) of structural and non-structural elements is based on unit weight and computed volume of the materials. The following unit weights are used:

Reinforced Concrete 25.0 kN/m^3

Rock / Soil see [6]

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Water 10.0 kN/m³

9.1.2 Hydrostatic Pressure

Hydrostatic pressure is considered as a life load (L). It has to be distinguished between the internal hydrostatic pressure and the external ground water pressure.

The applicable "internal water pressure" and "external water pressure" are shown in the geotechnical longitudinal section (2) and will be treated as basis for subsequent analysis.

9.1.3 Seismic Loads

Underground structures are generally less sensitive to seismic effects than surface structures, therefore no seismic loads are considered for preliminary design. At detail design stage a seismic analysis based on actual data will be carried out.

9.1.4 Underground pressures

The structures will be protected against any kind underground pressures by a flexible layer, arranged between the structure's backside and the excavation surface. Details about the layer are given in the corresponding outline specification [6].

9.1.5 Load Combinations

For load combinations not including earthquake, factored loads are determined in accordance with CSA A23.3-94 [a]. Herein the effect due to specified loads is multiplied by a load factor α. A load combination factor ψ and an importance factor γ is also considered:

$$\alpha_D D + \gamma \psi (\alpha_L L + \alpha_T T)$$

where:

- Load factors α for:
  - Dead loads : $\alpha_D = 1.0$; (0,85 if dead load resists uplift)

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- Live loads: $\alpha_L = 1.5$
- Temperature loads: $\alpha_T = 1.25$

– Load combination factor ψ:

- $\psi = 1.00$ when L or T is considered
- $\psi = 0.7$ when a combination of L and T is considered.

– The importance factor γ is equal to 1.0 for all load combinations.

9.2 Outlet Structure Design

Structural data

Length:	26 m
Width:	19.3 m
Height:	32 m

Thickness wall Channel side:	2.00 m
Thickness wall Tunnel side:	3.9 m
Thickness Sidewalls:	3.26 m
Thickness Floor	3.00 m

For the preliminary design of all structural elements it is assumed that the gates are closed and the tunnel is pumped out for maintenance. Therefore the uplift and water pressure, caused by the outside water level and the weight of the structure are active.

9.2.1 Uplift

For design 85 % of the structure weight (dead load) has to be equal the maximum possible water pressure beneath the structure floor.

Maximum possible uplift force:
$A = 32 \times 26 \times 19{,}3\ [m] \times 10.0\ kN/m^3 = 160{,}576\ kN$

Structure Weight.
$D = (26 \times 19{,}3 \times 3\ [m^3] + 2 \times (26 \times 29 \times 3.26\ [m^3]) + 12.8 \times 29 \times (2{,}0+3.9)\ [m^3] - 6.39^2\ (3{,}9+2{,}0)\ [m^3]) \times 25.0\ kN/m^3 = 209{,}266\ kN$

$0{,}85 \times D = 177{,}876\ kN > 160{,}576\ kN = A$ ✓

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9.2.2 Preliminary Design of Bottom Plate

Loads: $D = 3\ m \times 25.0\ kN/m^3 = 75\ kPa$
$W = 32 \times 10\ kN/m^3 = 320\ kPa$

Combination: $C = 1.0 \times 1.0 \times (1.25 \times 320 - 1.0 \times 75) = 325\ kPa$

Assumption: plate, flexible supported on four sides; $L_x / L_y = 26 / 19{,}3 \approx 1{,}3$

Bending Moment (max.) $M = 325 \times 26^2 / 30{,}9 = 7{,}110\ kNm / m$

Design (acc. to DIN 1045-1), Concrete strength = 35 MPa:

$k_d = 300 / 7{,}110^{1/2} = 3{,}55$; req. $a_s = 2{,}27 \times 7{,}110 / 300 \approx 54\ cm^2 / m$

Minimum required reinforcement (acc. to CSA 23.3.-94):

req. $a_s = 0{,}2 \times 35^{1/2} / 500 \times 300 \times 100 \approx 46\ cm^2 / m < 54\ cm^2 / m$

9.2.3 Preliminary Design of Side Walls

Loads: $W = 32 \times 10\ kN/m^3 = 320\ kPa$

Combination: $C = 1.0 \times 1.0 \times 1.25 \times 320\ kPa = 400\ kPa$

Assumption: plate, flexible supported on four sides; $L_x / L_y = 29 / 25 \approx 1{,}2$

Bending Moment (max.) $M = 400 \times 29^2 / 29{,}1 = 11{,}560\ kNm / m$

Corresponding Normal Force (pressure):
$N = -3.26\ m \times 29\ m \times 25.0\ kN/m^3 = -2{,}364\ kN / m$

Design (acc. to DIN 1045-1), Concrete strength = 35 MPa:

$M_{dEs} = 11{,}560 + 2{,}364 \times 1.58 = 15{,}295$; $k_d = 326 / 15{,}295^{1/2} = 2{,}63$;
req. $a_s = 2{,}32 \times 15{,}295 / 326 - 2{,}364 / 45 \approx 56\ cm^2 / m$

Minimum required reinforcement (acc. to CSA 23.3.-94):

req. $a_s = 0{,}2 \times 35^{1/2} / 500 \times 326 \times 100 \approx 77\ cm^2 / m > 56\ cm^2 / m$

9.2.4 Preliminary Design of Channel Side Wall

The load bearing is assumed in the wide side direction. The edges of the wall are assumed to be rigid connected to the sidewalls.

Loads: $W = 12{,}5 \times 10\ kN/m^3 = 125\ kPa$

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Combination: $C = 1.0 \times 1.0 \times 1.25 \times 125$ kPa = 156 kPa

Bending Moment (Edge): $M = 156 \times 16^2 / 12 = 3{,}328$ kNm / m
(Field): $M = 156 \times 16^2 / 24 = 1{,}664$ kNm / m

Design (acc. to DIN 1045-1), Concrete strength = 35 MPa:

$k_d = 200 / 3{,}328^{1/2} = 3{,}46$; req. $a_s = 2{,}27 \times 3{,}328 / 200 \approx 38$ cm² / m

Minimum required reinforcement (acc. to CSA 23.3.-94):

req. $a_s = 0{,}2 \times 35^{1/2} / 500 \times 200 \times 100 \approx 47$ cm² / m > 38 cm² / m

9.2.5 Preliminary Design of Tunnel Side Wall

The loads on the tunnel side wall are lower than on the above mentioned sidewalls, but the wall is thicker than these. Therefore it is assumed, that the minimum reinforcement are valid for design.

Minimum required reinforcement (acc. to CSA 23.3.-94):

req. $a_s = 0{,}2 \times 35^{1/2} / 500 \times 390 \times 100 \approx 92$ cm² / m

9.3 Intake Structure Design

Structural data

Length:	8 m
Width:	18,9 m
Height:	36 m

Thickness wall Channel side:	2.50 m
Thickness wall Tunnel side:	2.03 m
Thickness Sidewalls:	3.00 m
Thickness Floor	3.00 m

For the preliminary design of all structural elements it is assumed that the gates are closed and the tunnel is pumped out for maintenance. Therefore the uplift and water pressure, caused by the outside water level and the weight of the structure are active.

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9.3.1 Uplift

For design 85 % of the structure weight (dead load) has to be equal the maximum possible water pressure beneath the structure floor.

Maximum possible uplift force:
$A = 36 \times 8 \times 18{,}9\ [m] \times 10.0\ kN/m^3 = 54{,}432\ kPa$

Structure Weight.
$D = (8 \times 18{,}9 \times 3.0\ [m^3] + 2 \times (8 \times 33 \times 3{,}0\ [m^3]) + 12.9 \times 33 \times (2.5+2.03)\ [m^3] - 6.39^2\ (2.5+2.03)\ [m^3]) \times 25.0\ kN/m^3 = 94{,}526\ kPa$

$0{,}85 \times D = 80{,}347\ kPa > 54{,}432\ kPa = A$ ✓

9.3.2 Preliminary Design of Bottom Plate

Loads: $D = 3\ m \times 25.0\ kN/m^3 = 75\ kPa$
$W = 36 \times 10\ kN/m^3 = 360\ kPa$

Combination: $C = 1.0 \times 1.0 \times (1.25 \times 360 - 1.0 \times 75) = 375\ kPa$

Assumption: plate, flexible supported on four sides; $L_x / L_y = 15{,}9 / 8 \approx 2{,}0$

Bending Moment (max.) $M = 375 \times 15{,}9^2 / 40{,}3 = 2{,}352\ kNm / m$

Design (acc. to DIN 1045-1), Concrete strength = 35 MPa:

$k_d = 300 / 2{,}352^{1/2} = 6{,}18$; req. $a_s = 2{,}22 \times 2{,}352 / 300 \approx 17\ cm^2 / m$

Minimum required reinforcement (acc. to CSA 23.3.-94):

req. $a_s = 0{,}2 \times 35^{1/2} / 500 \times 300 \times 100 \approx 46\ cm^2 / m > 17\ cm^2 / m$

9.3.3 Preliminary Design of Side Walls

Loads: $W = 33 \times 10\ kN/m^3 = 330\ kPa$

Combination: $C = 1.0 \times 1.0 \times 1.25 \times 330\ kPa = 413\ kPa$

Assumption: plate, flexible supported on four sides; $L_x / L_y = 33 / 8 \approx 4{,}1$

Bending Moment (max.) $M = 413 \times 33^2 / 40{,}3 = 11{,}160\ kNm / m$

Corresponding Normal Force (pressure):
$N = -3.00\ m \times 33\ m \times 25.0\ kN/m^3 = -2{,}475\ kN / m$

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Design (acc. to DIN 1045-1), Concrete strength = 35 MPa:

M_{dEs} = 11,160 + 2,475 x 1.40 = 14,625; k_d = 300 / $14625^{½}$ = 2,48;
req. a_s = 2,29 x 14,625 / 300 - 2,475 / 45 ≈ 57 cm² / m

Minimum required reinforcement (acc. to CSA 23.3.-94):

req. a_s = 0,2 x $35^{½}$ / 500 x 300 x 100 ≈ 71 cm² / m > 57 cm² / m

9.3.4 Preliminary Design of Channel Side Wall

The load bearing conditions are assumed to be similar than at the outlet structure. Therefore it is assumed, for the preliminary design that the minimum required reinforcement is valid for design.

Minimum required reinforcement (acc. to CSA 23.3.-94):

req. a_s = 0,2 x $35^{½}$ / 500 x 250 x 100 ≈ 59 cm² / m

9.3.5 Preliminary Design of Tunnel Side Wall

The load bearing conditions and the dimensions are similar to the Channel side wall. Therefore it is assumed, for the preliminary design that the minimum required reinforcement is valid for design.

Minimum required reinforcement (acc. to CSA 23.3.-94):

req. a_s = 0,2 x $35^{½}$ / 500 x 203 x 100 ≈ 48 cm² / m

9.4 Diversion Tunnel, Transition Area

As described above, the cross section within the Diversion Tunnel transition area changes from a square cross section to a circular cross section. Therefore the structure's contour changes from a frame to a ring.

For preliminary analysis the most unfavourable conditions are regarded. This is a frame contour at the entrance.

Similar to the intake and outlet structure the structure of the transition area is covered with a flexible material layer all around, to prevent stresses, caused by any kind of underground reactions. Therefore only the structural dead weight and the suitable water pressure are valid for the preliminary design. The

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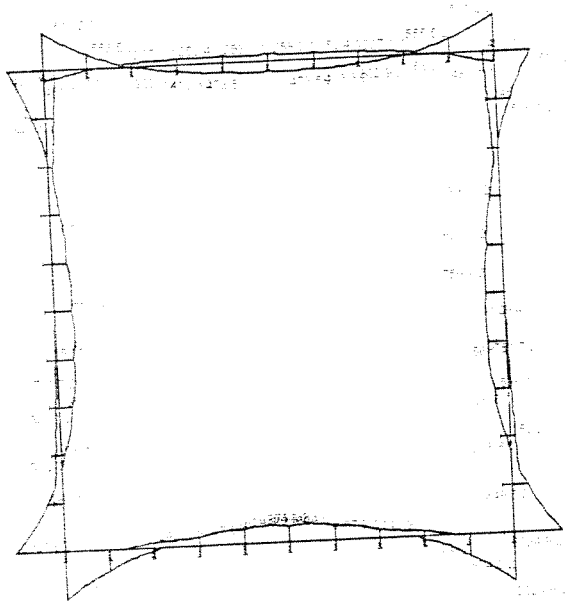
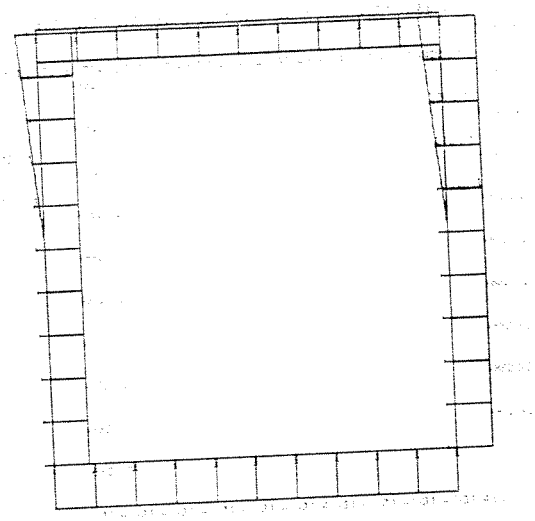
dimensions are given in the corresponding drawing (4), (6). With respect to this conditions, the structure is loaded as shown below:





Bending moments

Normal Forces

The required reinforcement are calculated as listed below.

Structural Segment	Crossbar	Bottom	Sidewall
Thickness	2.17 m	3.00 m	2.85 m
Design Bending Moment [kNm / m]	473 (inside) 1,511 (outside)	745 (inside) 2,024 (outside)	809 (inside) 2,024 (outside)
Corresponding Normal Force [kN / m]	-705 -705	-1,104 -1,104	-882 -882
Required reinforcement area [cm² / m]	1,6 (inside) 7,4 (outside)	< req. minimum reinforcement	< req. minimum reinforcement
Required minimum reinforcement [cm² / m]	51 (each side)	71(each side)	67(each side)

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NIAGARA TUNNEL FACILITY PROJECT

PRELIMINARY STRUCTURAL DESIGN ANALYSIS FOR Pipes, Culverts and Minor Items

May 2005

ILF CONSULTING ENGINEERS

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Rev.	Date	Issue, Modification	Prepared	Checked	Approved

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4	COLLECTION PIPE	2
5	DEWATERING OUTFALL	3

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1 INTRODUCTION

This report provides a preliminary stability analysis for the pipes, culverts and minor items of the Niagara Tunnel Facility Project.. In detail this will be

- The water collection sump at the top of the shafts of the dewatering system
- The collection pipe with an inside diameter of 1,000 mm
- The culvert at the outlet of the collection pipe

2 REFERENCES

2.1 Documents

[1] Ontario Power Generation (2005): Niagara Tunnel Facility Project, Geotechnical Data Report, Volume 1 to 12.

[2] Ontario Power Generation (2005), Niagara Tunnel Facility Project, Owner´s Mandatory Requirements, Invitation to Submit Design/Building Proposals, App. 1.1.

[3] Ontario Power Generation (2005), Niagara Tunnel Facility Project, Geotechnical Baseline Report, part of: Invitation to Submit Design/Building Proposals, App. 5.4.

[4] STRABAG/ILF (2005): Niagara Tunnel Facility Project, Geotechnical Baseline Report, GBR-B.

[5] STRABAG/ILF (2005): Niagara Tunnel Facility Project, Design Basis and Method Statements. (Doc. PR 00 3001)

[6] STRABAG/ILF (2005): Niagara Tunnel Facility Project, Structural Design Analysis for the Diversion Tunnel (Doc. PR 00 4001)

2.2 Drawings

(1) STRABAG/ILF (2005): Niagara Tunnel Facility Project - Diversion Tunnel, Plan and Longitudinal Section (PD-01-1001, PA-01-1001)

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(2) STRABAG/ILF (2005): Niagara Tunnel Facility Project - Diversion Tunnel, Geotechnical Longitudinal Section (PD-01-1002, PA-01-1002)

(3) STRABAG/ILF (2005): Niagara Tunnel Facility Project - Dewatering Outfall and Pipe, Plan, Sections and Details (PD-01-1023)

2.3 Codes and Standards

[a] Canadian Standard Association, A23.3-94: Design of Concrete Structures, December 1994 (reaffirmed December 2000).

[b] National Building Code of Canada (1995)

[c] The Building Code of Ontario (1997)

[d] German Standard DIN 1045-1

3 WATER COLLECTION SUMP

The water collection sump has a circular contour with a inside diameter of 3.05 m and is 3.75 m deep. It is made of concrete. Its wall is designed with a thickness of 45 cm. The water collection sump is installed in a pit and backfilled with granular filling material.

For design the parameters of the backfill material are assumed with $\gamma = 22$ kN/m³ (specific weight) and $\varphi = 30°$ (angle of friction). With that the earth pressure is given to approx. 20 kN / m². Considering a compaction pressure during backfill with 40 kPa, the pressure within the concrete will be about 176 kPa. Therefore the wall thickness is enough. Reinforcement is required for constructional tasks only.

4 COLLECTION PIPE

The collection pipe will have a inside diameter of 1,000 mm and will be approximately 227 m long. It will be laid in a ditch with a maximum depth of 4.0

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m. The pipe will be embedded in a 20 cm thick sand layer and backfilled. With the above mentioned assumptions the overburden weight pressure will be approximately 80 kPa and the force within the ring will be 40 kN / m.

5 DEWATERING OUTFALL

The dewatering outfall structure is installed at the end of the above mentioned collection pipe where the water is flowing in a concrete lined open ditch and from that to the Ontario Hydro Channel. The outfall structure consists of a concrete wing wall against the ground with foundation. The wall is approximately 10 m long and 3.3 m high. The wall thickness is 60 cm at the bottom and 45 cm at the crown. The foundation is limited to the centre of the structure, arranged in front and beneath of the wall, with a length of 3.3 m, a width of 3.45 m and a thickness of 90 cm. Reference is made to (3)

The underground will be regarded with $\gamma = 22$ kN/m³ (specific weight) and $\varphi = 30°$ (angle of friction). Considering this, the earth pressure will be approx. 23 kPa.

Regarding sliding of the construction, the active force (caused by earth pressure) shall be less than the ground resistance force in the joint beneath the foundation. This ground resistance force is caused by the dead weight of the construction.

Regarding only the weight of the foundation this will be 3.3 x 3.45 x 0.90 [m³] x 25 kN/m³ = 256 kN. The ground resistance force will be 256 kN x tan 30° = 148 KN

With respect to the construction the maximum earth pressure force is 130 kN

Therefore the safety against sliding is given to 1.14 under this assumptions, laying on the conservative side. Detailed analysis and the adequate validation of the underground behaviour is required while construction.

For the concrete structure design a Concrete with a strength of 35 MPa is assumed. With that the static required reinforcement will be approximately 8 cm² / m at the foundation / wall section and at the beginning of the wing walls. The minimum required reinforcement is given to 10 cm² / m.

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Niagara Tunnel Facility Project

Proposal No.: Tunnel Facility Project-001

Document: MH-4002-00

Preliminary Design for Temporary Facilities, Roads and Parking, Fencing, Gates Barriers, Stockpiles and Water Treatment Facilities

May 11, 2005
Project No.: 1051006.00

MORRISON HERSHFIELD

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1.0 SCOPE

The civil works included in this plan are primarily site facilities comprising:

1. Roads and Parking;
2. Fencing, Gates and Barriers; and
3. Stockpiles, disposal and water treatment facilities.

2.0 PRELIMINARY DESIGN

2.1 Preliminary Design Drawings

Preliminary design drawings, Nos. MH-6008 and MH-6009, were prepared to illustrate the result of the design, which will be finalized at the detailed design stage. The drawings are included in Chapter 6 of the Technical Proposal.

2.2 References and Design Methods

The preliminary design was conducted in accordance with document MH-3002: "Design Basis and Method Statements for Design and Construction Facilities at the Intake and Outlet Areas" prepared for this project and included in previous chapters.

The Contractor and the Specialist Subcontractors of the group have been and will continue to be contacted throughout the entire design and contract preparation process to provide valuable construction input to ensure that the design is useful, constructable and economical, without compromising the quality of the final work.

2.2.1 Temporary Facilities

- Intake Temporary Facilities:

  At the intake a construction laydown area will be placed to the south of Niagara Parkway. This facility will be used in conjunction with all associated works at the intake. This site will be approximately 182 m x 76 m. It will be fenced and a lockable gate provided for security. Their surface will be graded stone and maintained throughout the project life. The facing side to Niagara Parkway of the lay down area shall also have a screen wall erected to downplay the activity within the compound and the public activity along the parkway. For additional reference, refer to Drawing No. MH-6008-00.

- Outlet Temporary Facilities:

  At the outlet the construction offices will be located adjacent north south portion of the temporary access road. This area is fully fenced and will be approximately 400 m x 50 m. This site will be fully serviced by temporary utilities from Stanley Avenue. In addition Material Yards will be placed throughout the site and will be fully accessible and within the fenced construction area. Their surface will be graded stone and maintained throughout the project life. For additional reference, refer to Drawing No. MH-6009-00.

2.2.2 Roadways

- Intake Roadways:

  At the intake site a temporary roadway is being constructed to allow access to the site from Portage Road to the construction laydown area and across Niagara Parkway to the construction area at the intake. This will eliminate any need for construction traffic to utilize Niagara Parkway. Roadside ditches will be provided to carry any surface water generated from the roadway into the existing and natural drainage system. A temporary traffic signal will be installed at the intersection of the Access Road and Niagara Parkway to alleviate conflict with construction traffic crossing Niagara Parkway. For additional reference, refer to Drawing No. MH-6008-00.

  The existing recreation trail will be relocated to a new location as shown on the drawing to minimize interference of visitors to the area and the construction.

- Outlet Roadways:

  At the outlet site a new permanent paved access road is being constructed form Stanley Avenue to provide access to the work zones. However only a 180 m section of this road will be built, and beyond this section a temporary roadway is being constructed to provide access to the material stockpiling area and the outlet location. These roadways will be in place until the end of the project and then removed and the area restored to original conditions. Roadside ditches will be provided along these roadways to carry surface drainage from the roadway and other site locations to a detention/settling basin for eventual discharge into the canal system. For additional reference, refer to Drawing No. MH-6009-00.

  All roadway design, horizontal and vertical alignments, road widths, surface details, drainage, intersection details, and the like, will comply with highway design requirement appropriate to the class of the road as provided in the above-quoted references.

2.2.3 Fencing

Fencing providing boundary separation and security to the sites will be primarily chain link fences. This will help to eliminate any potential interference between the public and the construction activities. At the intake area, some of the work zones will be fenced off using full height hoardings to afford even better separation and minimize the impact on the appearance of this tourist area.

For additional reference and specific locations, refer to Drawing Nos. MH-6008 and MH 6009.

2.2.4 Stockpiles

During the excavation of the tunnel a large quantity of material primarily rock will be stockpiled between the two power canals as shown on MH-6009. These stockpiles will be between approximately 5 m to 6 m in height with proper and safe side slopes and with the top surface level and graded.

The stockpiles shall be piled in lifts of not more than 300 mm. The stockpile will be setback at a minimum 20 m from the canals and a perimeter trench will be implemented to gather any surface runoff from the stockpiles, collected in a settling basin and discharged through filter cloth into the canal. The ditch surface shall be protected by seeding, and strawbale flow-checks will be provided at 250 m intervals, and before every culvert and intersecting ditch. When the grade of the ditch is steeper than 10%, rockfill check dam will be installed. No stockpile is within 5 m from any part of the tower structures or the location in plan of the overhead transmission lines. A temporary construction pad will be provided for holding materials suspect of contamination. The runoff will be suitably treated prior to discharge. Excavated materials suitable for aggregate production or other uses will be stockpiled separately.

As stated previously, the specifications for stockpiles are located in the Draft Design/Build Agreement and Concept Drawings and also in OPG's "Management of Excavated Material" document dated December 2004 and OPG's "Management Plan for BTEX" dated December 2004. If the specifications in the Draft Design/Build Agreement and Concept Drawings prevail, then the following will be implemented. A temporary stockpile will be located between the canals and a runoff pond provide for runoff from the excavated materials. This will be used for specific contaminated materials from the tunnel excavation. The runoff will be pumped to the water treatment facility prior to final discharge. The runoff pond and the temporary stockpile will be lined with synthetic material or a minimum of an impervious material to eliminate ground contamination.

If the design is to meet the requirements in OPG's "Management of Excavated Material" and "Management Plan for BTEX", then certain rock formations have specific temporary and/or permanent storage requirements based on the information provided by the Reuse of Excavated Materials Committee. The limestones/dolomites above the Rochester Shale formation are to be segregated and stockpiled separately for reuse by the Project. The shales potentially containing BTEX (Rochester, Grimsby and Power Glen formations) are to be isolated permanently in the main disposal area with a perimeter drain leading to the retention pond. The Queenston Shale may be used by the clay/brick industry at a later date and therefore should be stored in the main disposal area separate from the other rock for easy access when required. All other rock types are to be placed in the main disposal area for permanent disposal separately from the other in this area.

The storage area for the excavated material potentially contaminated with BTEX will be approximately 400 m long by 100 m wide and will either have a compacted clay base or impermeable geotextile lining. Within this area, there will be a 10 m wide buffer area around the perimeter which will contain the drainage ditch/outside berm. The shale will be stockpiled in lifts less than 300 mm and the slope will be no greater than two horizontal to one vertical (2:1). The run-off will be directed towards the retention pond for treatment, if required.

3.2.5 Disposal

The disposal will be conducted in compliance with the Owner's Mandatory Requirements, section 3.

As stated above, the specifications for stockpiles are located in the Draft Design/Build Agreement and Concept Drawings and also in OPG's "Management of Excavated Material" dated December 2004 and OPG's "Management Plan for BTEX" dated December 2004. On-site permanent disposal of excavated material is required for rock from the Rochester, Grimsby and Power Glen formations and rock other than Queenston formation and limestones/dolomites. The Queenston shale will be temporarily stored at the main disposal area and the limestones/ dolomites will be reused. The section of the permanent disposal area storing the Rochester, Grimsby and Power Glen formations will be either lined with clay or geotextile to reduce potential soil and groundwater contamination. Runoff will be collected and discharged to the retention pond for sampling and treatment, if required, for final discharge.

Any excavated materials suitable for aggregate production will be stockpiled separately and used where applicable. Any surplus will be removed from the site at the end of the contract. No excavated material or discharge of water prior to treatment will be spilled or placed into any watercourse at the site.

3.0 DESIGN ANALYSIS

3.1 CODES, STANDARDS AND SPECIFICATIONS

The facilities will be designed in compliance with the codes, standards and specifications listed in Section 6 above.

3.2 DESIGN METHODS AND PROCEDURES

The civil works will be designed by using recognized methods and procedures, which include the established and industry standard software in performing in the installation of all work.

Ontario Power Corporation Inc.
(OPG)

Niagara Tunnel Facility Project

Proposal No.: Tunnel Facility Project-001

Document: MH-4003-00

Preliminary Design for Cofferdams and Temporary Dock

May 11, 2005
Project No.: 1051006.00

MORRISON HERSHFIELD

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2.0 COFFERDAM 1

3.0 TEMPORARY DOCK 1

1.0 SCOPE

This document provides information regarding the Strabag group's preliminary design layout and arrangements for the cofferdams and the temporary dock, both are to be used at the intake area.

The information was supplied by specialist contractors as described below.

2.0 COFFERDAM

Preliminary Design Drawings and Method Statement were designed by Bermingham Foundations in conjunction with Isherwood Geostructural Engineers, attached in the appendix of this document.

3.0 TEMPORARY DOCK

Layout of the Barge Unloading Dock at the Intake area as part of the approach wall system prepared by McNally Construction Inc. is also enclosed in the appendix of this document.

As discussed in document MH-3001, the additional loading imposed by the extraordinary construction loading on the approach wall at this location has been adequately accounted for.

APPENDIX TO MH-4003
from
MCNALLY CONSTRUCTION AND BERMINGHAM FOUNDATIONS

Ontario Power Corporation Inc.
(OPG)

Niagara Tunnel Facility Project

Proposal No.: Tunnel Facility Project-001

Document: MH-4004-00

Preliminary Design for Demolition and Disposal of Dewatering Structure and Relocation of Waterline

May 11, 2005
Project No.: 1051006.00

MORRISON HERSHFIELD

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1.0 GENERAL

The document will described preliminary design issues relating to:

1. Demolition and Disposal of Dewatering Structure at the PGS; and

2. Relocation of the Waterline as a result of item 1.

2.0 PRELIMINARY DESIGN PROCESS

The design will make reference to document no. MH-3002: "Design Basis and Method Statements for Temporary Construction Facilities at the Intake and Outlet Areas" included in Chapter 3 of this proposal. Due to nature of the work, and a number of available options for the work to be determined during the detailed design and construction, no drawing is considered required to illustrate the work at this stage.

Input from the Contractor and the Specialist Subcontractors have been and will continue to be sought to supplement the design to ensure that the solution selected will address all issues and will be efficient, constructable and economical.

Due to the many impact of these works on the operation of the PGS, as well as areas where the waterline is supplying, the input from related staff of OPG will also be sought as the design proceeds.

3.0 CODES AND STANDARDS

The design of these 2 components will be mainly based on the Owner's Mandatory Requirements and Questions and Answers issued related to the work. Other references will include:

1. OPSS (Ontario Provincial Standard Specifications)
2. CSA Standard Z107.0-00 (Standard for Certification of Noise Barriers February 2000)
3. CAN/CSA-S6-00 (Canadian Highway Bridge Code)
4. Other CAN standards, see applicable specifications included
5. Other CSA Standards, see applicable specifications included
6. Niagara Tunnel Facility Project - Invitation to submit Design/Build Proposals, Ontario Power Generation (Amendment 1, February 2005)
7. Ontario Provincial Standard Drawings (OPSD)

4.0 PRELIMINARY DESIGN DESCRIPTION

4.1 Demolition of the Dewatering Structure

The existing dewatering structure at the PGS Canal is a 45 m long, 6 span reinforced concrete structure, with a 6.7 m wide walking surface on the top. The 5 piers in the water are tall concrete piers with a wide base but tapering up towards the top but all are up to 17 m in height and are sitting on the rock surface of the bottom of the canal, including some embedment into the rock stratum. It is not known whether the structure is manufactured from precast units, but from the information provided, there is definitely a possibility of this and as such it may help to remove the component in convenient chunks instead of breaking into small debris using a concrete breaker.

The 6 span openings are actually gate openings used to close the canal from the main HEP canal for dewatering purposes, though according to information provided to the Proponent, the structure has not been used. OPG provided additional information on the condition of the structure through inspection reports, and suggested that there are damages to certain parts of the structure especially at the abutments and one of the piers (pier 1), and does not use the structure for vehicular traffic anymore.

The method of demolition will be such as to minimize impact on the operation of the PGS and coordination with the timing and duration, as well as the proposed method of removal, will be discussed with OPG and agreed prior to implementation. Sufficient advance notification will be provided to ensure all preparative work be made and all affected personnel informed of the impending work.

The entire superstructure will be removed and the remaining abutment and exposed rock surface stabilized where necessary and where confirmed by the engineer. The pier will be removed up except the last 300 mm which should be intact and firmly fixed into the rock.

It is expected that the deck will be sawcut or flame cut into large pieces that could be handled by a crane seated on the bank with sufficient reach and capacity. The piers and the abutment units designated for removal will then be cut out and removed in pieces. Some underwater work will be required to remove submerged portions of the piers up to 300mm above the canal bed. All loose abutment and rock slopes exposed will be stabilized using bolts, anchors or other appropriate techniques.

Debris catching device will be implemented together with use of barges, at the endorsement of OPG, to minimize concrete debris falling into the water. All sawcutting operations will be controlled and effluent removed using vacuum machine. Large cut reinforced concrete chunk will be removed by lifting from the banks and carting away in truck to designated disposal areas.

4.2 Waterline Relocation

During construction an existing waterline (apparently 8” diameter, as shown on the as-built drawings) will be relocated from the existing PGS dewatering structure prior to the demolition of the structure. The relocation can either be a surface laid/ buried waterline laid along the banks of

the PGS Canal, and cross the canal at the roadway located outside the PGS station, or on a new utility bridge over the canal at its existing location. Both alternatives will be evaluated, considering cost, timing, impact to other work, etc., and discussed with OPG staff prior to selecting the suitable approach.

The relocated waterline will be constructed to the same standards and details as the existing waterline.

4.3 Disposal

The disposal will be conducted in compliance with the Owner's Mandatory Requirements, section 3.

Concrete debris will not be subject to be reused, and will be removed off site to designated disposal areas.

5.0 CONSTRUCTION TECHNIQUES AND EQUIPMENT

The work will be completed primarily utilizing standard construction methods. The equipment used for the demolition of the PGS dewatering structure include the use of sawcutting or flame cutting equipment, barges, lifting equipment and debris collecting setup. When necessary, underwater work may be required to retrieve concrete components submerged in the water at the bottom of the canal.

Ontario Power Corporation Inc.
(OPG)

Niagara Tunnel Facility Project

Proposal No.: Tunnel Facility Project-001

Document: MH-4001-00

Preliminary Structural Design Analysis for Intake Approach and Accelerating Walls

May 11, 2005
Project No.: 1051006.00

MORRISON HERSHFIELD

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1.0 INTRODUCTION

1.1 GENERAL

The Intake Approach and Accelerating Walls, which form part of the Niagara Tunnel Facility Project, are located upstream of the INCW Structure. The layout, alignment, geometric dimensions, and top elevations of these walls follow the concept plan defined by OPG.

The purpose of the Intake Approach and Accelerating Walls is to direct a continuous supply of water to the Diversion Tunnel through the Intake Structure. In carrying out this function, specific hydraulic and environmental requirements must be met under all operating conditions.

1.2 SCOPE

This report provides a summary of the key results of structural analysis carried out for the preliminary design of the proposed Intake Approach and Accelerating Walls.

The preliminary design parameters, codes and standards and methods of analysis are presented to illustrate the design process used for developing the design as shown in the drawings contained in the Proposal submission (see Sub-section 2.2 below).

The preliminary structural design of other components of the Niagara Tunnel Project is addressed by other relevant documents elsewhere in the Proposal submission.

2.0 REFERENCES

2.1 DOCUMENTS

The following documents form the basis of the design of the Intake Approach and Accelerating Walls:

1. Ontario Power Generation (2005), Niagara Tunnel Facility Project, Owner's Mandatory Requirements, part of Invitation to Submit Design/Build Proposals, Appendix 1.1 (pp).
2. Ontario Power Generation (2005), Niagara Tunnel Facility Project, Geotechnical Baseline Report, part of Invitation to Submit Design/Build Proposals, Appendix 5.4.
3. Ontario Power Generation (2005), Niagara Tunnel Facility Project, Concept Drawings, part of Invitation to Submit Design/Build Proposals, Appendix 1.1 (h).
4. Morrison Hershfield (2005), Niagara Tunnel Facility Project, Draft Design Basis and Method Statements for Design and Construction of Intake Approach and Accelerating Walls.

2.2 DRAWINGS

The engineering design of the Intake Approach and Accelerating Walls is shown in the following drawings:

1. Morrison Hershfield (2005), Niagara Tunnel Facility Project, Intake Works – General Notes, document MH-6001
2. Morrison Hershfield (2005), Niagara Tunnel Facility Project, Intake Works – West Approach Wall, document MH-6002.
3. Morrison Hershfield (2005), Niagara Tunnel Facility Project, Intake Works – East Approach Wall, document MH-6003
4. Morrison Hershfield (2005), Niagara Tunnel Facility Project, Intake Works – New Accelerating Wall and Pier 5 Modification, document MH-6006.

2.3 CODES AND STANDARDS

The requirements of the codes, regulations and guidelines where applicable as follows:

1. National Building Code of Canada (1995)
2. The Building Code of Ontario (1997)
3. CSA Standard CAN3-A23.3-94: Design of Concrete Structures
4. Lakes and Rivers Improvement Act, Government of Ontario (1986)
5. Dam Safety Regulation under the Lakes and Rivers Improvement Act (Proposed Draft), Ministry of Natural Resources (November 2001)
6. Dam Safety Guidelines, Canadian Dam Association (January 1999)
7. Guidelines and Criteria for Approval under the Lakes and Rivers Improvement Act, Ministry of Natural Resources (Draft, May 1997)

The preliminary design was also carried out in accordance with the following standards and specifications:

1. Niagara Tunnel Facility Project - Invitation to submit Design/Build Proposals, Ontario Power Generation (2005)
2. CSA Standard CAN3-A23.1-94: Concrete Materials and Method of Concrete Construction
3. CSA Standard CAN3-A23.2-94: Methods of Test for Concrete
4. USACE EM1110-2-2000: Standard Practice for Concrete for Civil Works Structures, US Army Corps of Engineers (March 2001)
5. USACE EM1110-2-2104: Strength Design for Reinforced Concrete Hydraulic Structures, US Army Corps of Engineers (August 2003)
6. USACE EM1110-2-2200: Engineering and Design – Gravity Dam Design, US Army Corps of Engineers (June 1995)
7. USACE EM1110-2-2502: Engineering and Design – Retaining and Flood Walls, US Army Corps of Engineers (September 1989)

During detailed design, it is expected that the above-named references will continue to be used as bases for design and construction of the proposed work.

3.0 DESIGN DESCRIPTION

3.1 PRECAST CONCRETE MODULAR SYSTEM

The Intake Approach and Accelerating Walls have been developed based on the precast reinforced concrete modular design concept. Each wall is constructed with a series of structurally independent reinforced concrete modules, filled with rock-fill materials and capped with concrete cover slab over the full length of the wall.

The individual wall will be constructed by stacking up either two or three units high as required to form a continuous wall to direct the water flow.

4.0 DESIGN DATA

4.1 DESIGN LOADS – PRELIMINARY DESIGN

At the proposal stage, a preliminary design has been conducted on the structures based on available information and design references as given in this section. The design will obviously need development during the detailed design stage, when investigation and other design data will be made available to the designer.

The structures were designed to withstand all temporary, permanent, construction, environmental, normal, unusual and extreme loads, in all possible combinations.

All structural components were checked to provide adequate capacity to safely sustain the prescribed design loads. The types of loads for which the structures have been designed to withstand, and will continue to be addressed during the detailed design stage, include the following:

4.1.1 Structural and Dead Loads (D)

All permanent masses of the structural components and all permanent construction materials including the permanently located attachments and equipment systems.

The unit weights used for computing the dead loads are:

- Concrete 24.0 kN/m^3
- Back-fill 22.0 kN/m^3
- Rock-fill 20.0 kN/m^3
- Water 10.0 kN/m^3

4.1.2 Hydrostatic Pressures

Water surface elevations in the GIP given in Table 1 (based on NAD83 system) have been used to compute hydrostatic pressures on the wall structure. These values will be reviewed and continue to be used in the detailed design stage.

Hydrostatic loads are imposed under the following conditions:

(a) Operating Water Pressures (H)
The external water pressure exerted by water above ground is governed by the specified maximum water levels. When used as stabilizing force acting on the structure in a stability analysis, these forces must be conservatively estimated. See Table 1 for appropriate design water elevations.

(b) Design Flood (F)
The water level under inflow flood scenario varies between the 200-year flood and the Probable Maximum Flood (PMF) as prescribed in the OPG Invitation document. See Table 1 for appropriate design flood elevations.

TABLE 1: DESIGN WATER LEVELS AT GIP

Conditions	Descriptions	Elevation (m)
Normal Operating	Normal Maximum	171.65
	Normal Minimum	170.74
Flood	200-Yr. Flood	172.11
	PMF	173.17

4.1.3 Soil Pressures (S)

Earth pressures due to soil or rock back-fill will be imposed against the Intake Approach Wall structure.

For preliminary design purpose, a granular back-fill with the following properties is assumed for the design analysis:

- Moist Unit Weight 22.0 kN/m^3
- Submerged Unit Weight 12.0 kN/m^3
- Angle of Internal Friction $\Phi = 35^0$
- Cohesion C = 0

Since the wall modules are not bonded to the foundation, active pressure is likely to mobilize rather than pressure at "rest". In such case, Coulomb's equation may be used for the determination of earth pressure coefficients which are then used for determining pressures and forces acting on the retaining wall.

For preliminary design purpose, a conservative value of $K_a = 0.4$ is assumed for analysis.

The pressure and forces below the water table will take into account the submerged unit weight of the same material.

Soil data and any other pertinent parameters used in the design analysis shall be evaluated in consultation with the geotechnical engineer before being adopted for the final design.

4.1.4 Ice Load (I)

The structure has also been designed to withstand the forces generated by ice movement against it. Ice forces may include dynamic loads generated by ice floes striking the structure, and static loads generated by thermal expansion or contraction of the ice and by fluctuations in the water levels.

The magnitude of thermal ice load is governed by a number of controlling factors such as ice thickness, shoreline confinement, water velocity, water level fluctuation, rate of temperature rise, etc. Normally, thermal ice loads range from 37 kN/m to 146 kN/m. For the Niagara site, design ice load of 73 kN/m acting 0.3m below water level is taken for preliminary design purpose.

4.1.5 Seismic Loads (E)

The earthquake loadings used in the design of the structure are based on design earthquakes and associated ground motion parameters determined from seismological evaluation for the specific site. Where site specific study has not been conducted, seismic zone maps of the National Building Code proposed for the 2005 revision are to be used.

Two levels of seismic loads are usually considered for the design: (a) the Maximum Design Earthquake (MDE) having an extremely low probability of annual exceedence, and (b) the Operating Basis Earthquake (OBE) used in conjunction with ice loading and having a probability of annual exceedence of 1 in 200. See Table 2 for recommended design response spectra generated by a probabilistic seismic hazard analysis conducted for the Niagara region.

TABLE 2: DESIGN EARTHQUAKES – UNIFORM RESPONSE SPECTRA

Natural Frequencies	OBE (1: 200/yr) PSA (cm/s^2)	MDE (1: 2500/yr) PSA (cm/s^2)	NBCC Proposed 2005 Edition
0.5	1.4	7.6	21
1.0	4.0	21	70
2.0	11	66	196
5.0	36	202	402
10.0	66	373	
20.0	94	567	
PGA	38	246	294
PGV	0.68	3.8	13

Note:

PSA = Peak Spectral Acceleration
PGA = Peak Ground Acceleration in cm/s^2
PGV = Peak Ground Velocity in cm/s

4.1.6 Construction Loads (C)

Construction lifting loads included dead weights in air or under water plus 50% for impact allowance during handling, lowering, barging, launching and controlled sinking operations of the precast modules.

Construction loads due to a 40 Tonnes crane is also considered at a segment of the wall at a location near the Intake or temporary dock facility, as requested by the Contractor for storage and handling of precast units.

4.2 LOAD COMBINATIONS

During detailed design, all combinations of loads that may act simultaneously during construction, normal plant operation or abnormal environmental conditions shall be considered.

The loading conditions considered in concrete structure designs and overall structural stability analysis shall include but not limited to the following:

1. Loading Case No. 1 – normal loading condition – Construction
   Any combination of loads that may act simultaneously during the construction period, including lifting and handling loads, crane loads for construction activities, etc.

2. Loading Case No. 2 – normal loading condition – Summer Operating
   Any combination of loads that may act simultaneously during normal operation.

3. Loading Case No. 3 – normal loading condition – Ice Load
   Any combination of loads that may act simultaneously due to ice loading effects on the structural components.

4. Loading Case No. 4 – unusual loading condition – IDF[1]
   Any combination of loads that may act simultaneously during a 200-year flood.

5. Loading Case No. 5 - extreme loading condition – PMF[2]
   Any combination of loads that may act simultaneously during this extreme environmental event which has a low probability occurrence.

---

[1] IDF = Inflow Design Flood

[2] PMF = Probable Maximum Flood

6. Loading Case No. 6 – extreme loading condition – MDE[3]
   The Intake Approach and Accelerating Walls, being a conventional structure (i.e. not dam safety related), shall be designed to satisfy the requirements stipulated in the National Building Code of Canada.

5.0 STABILITY ANALYSIS

5.1 GRAVITY METHOD OF ANALYSIS

Stability of the wall structures has been verified by limit equilibrium method using un-factored loads. The computed factors of safety against sliding, and resulting stresses along any critical sections within the structure or at the base shall not exceed the minimum acceptable factors of safety and allowable working stresses specified for the normal, unusual and extreme load combinations.

5.1.1 Sliding

Factor of safety against sliding along any horizontal plane has been calculated based on the following:

- Factor of Safety (Sliding) = $\mu \sum V / \sum H$
  where μ = coefficient of friction at the plane considered
  $\sum V$ = total vertical load acting on the plane
  $\sum H$ = total net horizontal load acting on the plane

5.1.2 Location of Resultant

The factor of safety against overturning acting on the plane under consideration has been computed as follows:

- Factor of Safety (Overturning) = $\sum M_R / \sum M_O$

Alternately, the location of the resultant acting on the plane under consideration shall be calculated as follows:

- Distance from the toe = $(\sum M_R - \sum M_O) / \sum V$
  Where $\sum M_R$ = sum of restoring or stabilizing moments about toe
  $\sum M_O$ = sum of overturning moment about toe
  $\sum V$ = total vertical load acting on the plane

[3] MDE = Maximum Design Earthquake

5.1.3 Contact Stresses

It is expected that the stresses acting on the foundation under all the loading conditions are likely to be small. Since these walls will be founded on solid rock, the stresses are not critical either for the concrete or the foundation and therefore these are not a design concern.

In the final design stage, a geotechnical investigation based on field inspections and analysis will be carried out to the extent deemed necessary.

5.1.4 Acceptance Criteria

Most critical load cases have been developed and considered in computing the factors of safety against sliding, overturning, etc.

The Owner's Mandatory Requirements stipulated that the following conservative assumptions:

1. There is no cohesion at the concrete-rock interface.
2. Passive pressure due to back-fill shall not be considered.
3. Rock anchors to provide structural stability shall not be allowed.

The acceptance criteria for sliding stability of concrete gravity structures are given in Table 3.

TABLE 3: MINIMUM FACTORS OF SAFETY

Load Combination	Resultant Location at Base	Factor of Safety for Sliding and Stresses
Normal	Middle 1/3	1.5
Unusual	Middle 1/2	1.3
Extreme	Within base	1.0

Note:

Analysis shall be based on zero cohesion across the prospective failure plane as stipulated by OPG.

5.2 SEISMIC ANALYSIS

Unlike earth structures which often are susceptible to liquefaction and large deformation due to slip circle failure, well designed and constructed concrete gravity structures should be able to withstand even very strong earthquake motions. The experience data based on observations of historical earthquake damages demonstrated that indeed concrete gravity structures are generally safe.

This is mainly because explicitly earthquake forces are transient oscillatory in nature. These forces will vary with time and alternate between one directions to opposite direction. Furthermore, the inertia forces are usually not expected to be applied in the same direction for a

sufficiently long period of time to induce significant rotational or sliding displacements that are actually detrimental to the overall structural stability of the gravity structure.

Therefore, it is now well established that traditional static analysis which does not recognize the dynamic response of the structural system prescribed by previous codes and practices is meaningless. As a result, factors of safety against overturning and sliding are no longer required to be computed.

In fact, it has been verified by seismic studies that potential deformations of simple concrete gravity structures induced by earthquake ground motions are most likely to be small even under the most severe seismic event. Hence, it is concluded herein that further seismic analysis is not necessary at this design phase.

5.3 REINFORCED CONCRETE DESIGN

The reinforced concrete hydraulic structures have been designed in accordance with the Strength Design Method, and this shall continue be adopted during detailed design. The structural members will have a required strength to resist design loads and the factored load combinations specified in Sub-Section 4.1 and 4.2.

The load factors as prescribed in CSA A23.3 shall be applied and the total factored design load shall be increased by the hydraulic factor $H_f = 1.3$. The hydraulic factor is used to improve crack control for massive hydraulic structures which usually are lightly reinforced.

The hydraulic factor is not applicable for sliding or overturning stability analysis.

5.3.1 Design Strength

The strength of a structure or individual member must exceed the demand (required strength) for all foreseeable loads without failure or significant distress. The nominal strength must be reduced by a resistance factor to account for the variability in the strength. For this purpose, the resistance factors prescribed in CSA A23.3-94 have been applied and shall continue to apply during detailed design.

6.0 DESIGN ANALYSIS RESULTS

In the design of the Intake Approach and Accelerating Walls, various load combinations as specified in the Design Basis and Method Statement document are considered.

The critical load combinations for different segments of these walls differ from one another because of the individual wall location, width and height. The most critical load combinations which have been found governing the design of different segments in general terms are describe below. In each case, the design has been verified for performance under these critical load combinations. Table 4 summarizes the key results of these stability analyses.

TABLE 4-1: RESULTS OF STABILITY ANALYSIS – WEST INTAKE APPROACH WALL

Critical Load Combination	Computed Factor of Safety - Overturning	Computed Factor of Safety - Sliding
Construction Phase: (D + S)	2.3	1.8
Summer Normal Operating: (D + S + H)	2.2	1.7
Usual/Extreme Flood: (D + F)	3.2	2.3
Extreme Seismic: (D + S + H + E)	NA	NA

TABLE 4-2: RESULTS OF STABILITY ANALYSIS – EAST INTAKE APPROACH WALL

Critical Load Combination	Computed Factor of Safety - Overturning	Computed Factor of Safety - Sliding
Construction: (D + S + H + C)	2.8 – 3.8	1.7 – 2.2
Summer Normal Operating: (D + S + H)	4.6	2.3
Usual/Extreme Flood: (D + S + F)	4.6	2.3
Extreme Seismic: (D + S + H + E)	NA	NA

TABLE 4-3: RESULTS OF STABILITY ANALYSIS – ACCELERATING WALL

Critical Load Combination	Computed Factor of Safety - Overturning	Computed Factor of Safety - Sliding
Summer Normal Operating: (D + H)	10.0	8.3
Winter Normal Operating: (D + H + I)	1.7 - 3.2	1.5 - 2.7
Usual/Extreme Flood:	∞	∞

(D + F)		
Extreme Seismic: (D + H + E)	NA	NA

7.0 CONCRETE CONSTRUCTION

The concrete material to be used for the construction of these structures shall be in accordance with the appropriate specification, standards and manuals listed in Sub-Section 2.3.

7.2 OUTLINE SPECIFICATIONS

All concrete shall be normal density concrete and conforming to the following Table 5.

TABLE 5: OUTLINE SPECIFICATIONS - CONCRETE

Location	Exposure Class	Minimum Compressive Strength f'_C (MPa)	Cement Type	Maximum Aggregates Nominal Size (mm)
Precast Modules	F – 1	50	10 (SF)	32
Cover Slabs	F – 1	30	10	32
Reinforced Piers	F – 1	35	10	75
Concrete In-fill	F – 1	25	10	75
Tremie Concrete	N	25	10	20

8.0 CONCLUSIONS

The structural design analysis demonstrates that the Intake Approach and Accelerating Walls as designed and presented in this proposal submission are fully capable of withstanding the loadings under all operating conditions required for the project, based on the information provided in the proposal and relevant codes and practices.

More in-depth analysis during the detailed design stage will be required to finalize the design and to reflect new information obtained through investigations and research.

Appendix 1.1(s)

Appendix 1.1(s) - Draft Drawings

[See attached]

GENERAL NOTES

1.0 SCOPE OF WORK (INTAKE WORKS)

1.1 CONSTRUCT NEW ACCELERATING WALL
1.2 EXCAVATE INTAKE CHANNEL
1.3 EXTEND PIERS 1 AND 2 OF INCW STRUCTURE
1.4 CONSTRUCT INTAKE APPROACH WALL
1.5 REMOVE EXISTING ACCELERATING WALL

2.0 GENERAL

2.1 THESE DRAWINGS REPRESENT THE PRELIMINARY DESIGN OF THE WORK SCOPE WHICH MAY BE USED FOR BUDGETING PURPOSE. MORE ACCURATE DETAILED DESIGN DRAWINGS WILL BE PROVIDED IN DUE COURSE.

2.2 THE GENERAL NOTES ARE APPLICABLE TO ALL PARTS OF THE INTAKE WORKS OF THE PROJECT AND SHALL BE READ IN CONJUNCTION WITH THE DRAWINGS AND SPECIFICATIONS.

2.3 THE CONTRACTOR HAS THE RESPONSIBILITY TO VERIFY ALL DETAILS AND DIMENSIONS OF THE EXISTING SITE AND ADJACENT STRUCTURES, AND TO OBTAIN ALL SITE DIMENSIONS. IF DURING THE COURSE OF WORK, EXISTING CONDITIONS ARE FOUND TO BE DIFFERENT FROM THOSE SHOWN, NOTIFY THE ENGINEERING CONSULTANT IMMEDIATELY BEFORE PROCEEDING WITH THE WORK.

2.4 DETAILS ARE SHOWN TO SHOW THE END RESULT OF DESIGN. ANY MODIFICATIONS TO SUIT FIELD DIMENSIONS AND CONDITIONS SHALL BE SUBMITTED TO ENGINEERING CONSULTANT FOR REVIEW PRIOR TO WORK.

3.0 FOUNDATIONS

3.1 INFORMATION REGARDING SUBSURFACE CONDITIONS AND ELEVATIONS ARE PROVIDED IN CONCEPT DRAWING NO. NAW130-DDE-29310-0007 R3 PROVIDED BY ONTARIO POWER GENERATION.

3.2 FOUNDATION AREAS SHALL BE CLEARED OF LOOSE, SOFT COMPRESSIBLE MATERIALS BEFORE PLACING PRECAST CONCRETE CELLULAR MODULES.

3.3 PRECAST CONCRETE CELLULAR MODULES MUST BE ACCURATELY LEVELLED AND POSITIONED TO ENSURE PROPER ALIGNMENT.

3.4 DEVIATION OF FOUNDATION CONTOURS MUST BE BROUGHT TO THE ATTENTION OF ENGINEERING CONSULTANT FOR POSSIBLE ADJUSTMENT OF DESIGN.

4.0 EXCAVATION

4.1 THE SIDES OF THE INTAKE CHANNEL EXCAVATION SHALL BE LINE-DRILLED. AND CONTROLLED BLASTING SHALL BE EMPLOYED TO ENSURE THAT THE ROCK BEYOND THE EXCAVATION LIMITS IS NOT DAMAGED OR DESTABILIZED. ANY DAMAGED ROCK OUTSIDE THE REQUISITE EXCAVATION LINES SHALL BE REMOVED AND BACKFILLED WITH CONCRETE ADEQUATELY TIED BACK TO SOUND ROCK.

4.2 EXCAVATION OF THE INTAKE CHANNEL SHALL BE DONE IN TWO STAGES. THE FIRST STAGE CONSISTS OF EXCAVATION OF THE TWO SHALLOW APPROACH SECTIONS IN THE WET UP TO ELEVATION 162.20. THE SECOND STAGE WILL BE DONE IN THE DRY CONDITION PROVIDED BY THE COFFERDAM.

5.0 GROUTING

5.1 THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN OF MULTIPLE GROUT CURTAINS TO ENSURE DEEPER EXCAVATING AREA IS SUFFICIENTLY DRY THROUGHOUT THE PERIOD FOR THE INTAKE CHANNEL EXCAVATION AND CONSTRUCTION OF THE CONCRETE INTAKE STRUCTURE.

6.0 CONCRETE

6.1 CONFORM TO THE REQUIREMENTS OF CSA STANDARD A23.1-00.

6.2 ALL CONCRETE TO BE FIELD TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF A23.1-00 AND A23.2-00.

6.3 ALL CONCRETE IS TO HAVE THE SPECIFIED 28 DAY COMPRESSION STRENGTH, WATER CEMENTING MATERIAL RATIO, AND AIR CONTENT IN ACCORDANCE WITH THE REQUIREMENTS OF CSA STANDARD A23.1-00.

6.4 ALL CONCRETE SHALL BE NORMAL DENSITY CONCRETE AND CONFORMS TO THE FOLLOWING:

LOCATION	EXPOSURE CLASS	MIN. f'_c (MPa)	CEMENT TYPE	MAX. AGGR. NOMINAL SIZE (mm)
PRECAST MODULES △2	F-1	50	10 (SF)	32
REINFORCED PIERS	F-1	35	10	75
MASS CONCRETE & IN-FILL	F-1	25	10	75
COVER SLABS	F-1	30	10	32
TREMIE CONCRETE	N	25	10	20

7.0 REINFORCING STEEL

7.1 ALL REINFORCING STEEL BARS SHALL BE DEFORMED AND SHALL CONFORM TO CAN/CSA STANDARD G30.18M92 (R1998).

7.2 REINFORCING STEEL SHALL BE GRADE 400 UNLESS OTHERWISE SPECIFIED.

8.0 BACK-FILLING

8.1 NO BACKFILL SHALL BE PLACED BEHIND THE CONCRETE APPROACH WALL UNTIL ROCKFILL HAS BEEN PLACED UP TO THE DESIRED TOP LEVEL AND CAPPED WITH CONCRETE COVER SLAB.

8.2 BACKFILL MATERIALS ARE TO BE CLEAN, AND FREE-DRAINING.

9.0 ROCK FILL

9.1 ROCK FILL MATERIALS TO BE PLACED WITHIN THE PRECAST CONCRETE CELLULAR WALL MODULES SHALL CONSIST OF CLEAN ROCK FRAGMENTS AND SHALL BE FREE FROM ORGANIC MATERIAL.

9.2 ROCK FILL SHALL BE REASONABLY UNIFORMLY GRADED IN SIZE UP TO A MAXIMUM OF 500mm AND SUCH THAT NOT MORE THAN 10% BY WEIGHT SHALL BE LESS THAN 150mm AND MORE THAN 50% BY WEIGHT SHALL CONSIST OF PARTICLES 300mm OR LARGER IN SIZE.

10.0 SEQUENCES OF CONSTRUCTION △2

10.1 IT IS ESSENTIAL THAT AT LEAST ONE ACCELERATION WALL IS IN PLACE AT THE EXISTING OR NEW LOCATIONS DURING THE WINTER MONTHS TO SEPARATE THE FAST FLOW AT THE INCW AND THE LOW FLOW AREAS OUTSIDE THE WALL. THE CONTRACTOR SHALL ORGANIZE AND PLAN HIS WORK TO ENSURE THAT THIS IS COMPLIED WITH STRICTLY OR WILL BE RESPONSIBLE FOR ALL CONSEQUENCES RESULTING FROM HIS FAILURE TO DO SO.

10.2 REMOVAL OF EXISTING ACCELERATING WALL AND CONSTRUCTION OF THE NEW ACCELERATING WALL SHALL BE COMPLETED PRIOR TO INSTALLATION OF THE COFFERDAM AT THE INTAKE.

10.3 CONSTRUCTION OF THE EAST INTAKE APPROACH WALL CAN BE DONE INDEPENDENTLY AT ANY TIME PENDING ON OTHER CONSTRUCTION CONSIDERATIONS.

10.4 EXTENSION OF THE PIERS 1 AND 2 OF THE INCW STRUCTURE AND PART OF THE WEST APPROACH WALL SHALL BE DONE IN THE DRY.

10.5 REMOVAL AND DISPOSAL OF THE GROYNE SHALL BE COMPLETED PRIOR TO REMOVAL OF INTAKE AREA COFFERDAM.

10.6 THE TEMPORARY COFFERDAMS SHALL BE REMOVED AFTER THE SECTIONAL SERVICE GATES FOR THE INTAKE ARE IN PLACE AND WITH BALANCED WATER PRESSURE ON EACH SIDE OF THE COFFERDAMS.

10.7 COMPLETION OF THE WEST APPROACH WALL AND BACKFILL BEHIND THE WALL SHALL BE UNDERTAKEN AFTER THE REMOVAL OF THE ICE PROTECTION GROYNE AND COFFERDAM.

11.0 CONSTRUCTION NOTES

11.1 THE CONTRACTOR SHALL CARRY OUT SITE SURVEYS INCLUDING HYDROGRAPHIC SURVERYS TO DETERMINE THE EXISTING ELEVATIONS OF THE RIVER BED AT THE NEW ACCELERATING WALL LOCATION.

11.2 THE CONTRACTOR SHALL VERIFY ALL ELEVATIONS AND DIMENSIONS OF THE EXISTING WORK AND ALL DETAILS ON SITE AGAINST THE PROPOSED WORK AND REPORT ANY DISCREPANCIES TO THE ENGINEERING CONSULTANT BEFORE PROCEEDING WITH THE WORK.

11.3 THE CONTRACTOR SHALL REFER TO THE SET OF REFERENCE DRAWINGS PROVIDED BY OPG FOR DETAILS OF THE EXISTING STRUCTURES (INCW PIERS, EXISTING ACCELERATING WALL, EXISTING APPROACH WALL, ETC.)

11.4 FOR PERFORMANCE OF THE RELEVANT WORK IN THE INCW PART PROJECT SITE, CONSTRUCTION ACTIVITIES WILL BE CO-ORDINATED CLOSELY WITH ONTARIO POWER GENERATION REGARDING ACCESS, WATER CONTROL, PERIOD OF TIME, ETC FOR ANY IN-RIVER WORK.

11.5 THE CONTRACTOR IS RESPONSIBLE FOR DESIGN OF ANY TEMPORARY SHORING, AND THE STEEL CASING WITH ASSOCIATED STRUT SYSTEMS AS REQUIRED FOR THE BRIDGING COMPONENTS AND THE NOSE SECTION OF THE ACCELERATING WALL.

11.6 PRIOR TO THE PLACEMENT OF MASS CONCRETE IN-FILL, THE AREA SHALL BE CLEANED OF SILT AND DEBRIS.

11.7 WHEN THE MASS CONCRETE IN-FILL AREA CANNOT BE KEPT WATER FREE, PROCEDURES FOR UNDERWATER CONCRETING SHALL BE ESTABLISHED TO INCLUDE CONCRETE MIX DESIGN, APPROPRIATE ADMIXTURES, PLACEMENT SCHEMES, INSPECTION PLAN, AND CONCRETE SAMPLING PLAN TO ENSURE COMPETENT CONCRETE IS ACHIEVED. WHEN THE CONCRETE SURFACE HAS BEEN BROUGHT ABOVE THE WATER LINE, REGULAR CONCRETE SHALL BE PLACED IN THE DRY AFTER ALL THE LAITANCE HAS BEEN REMOVED FROM THE SURFACE OF THE CONCRETE.

11.8 FOR EXTENDING THE PIERS, DEMOLISHED CONCRETE SURFACES SHALL BE THOROUGHLY SCALED. AND, PRIOR TO THE PLACEMENT OF NEW CONCRETE, THE ENTIRE SURFACE OF THE EXISTING CONCRETE SHALL BE THOROUGHLY CLEANED BY SANDBLASTING, FOLLOWED BY AN AIR-WATER JET TO REMOVE ALL LOOSE AND ADHERING CONTAMINATING MATERIAL TO ENSURE FULL BONDING.

11.9 ALL REINFORCING STEEL ANCHORS INTO ROCK SHALL BE INSTALLED USING EITHER CEMENTITIOUS OR RESIN-TYPE GROUT WITH PROCEDURES RECOMMENDED BY THE MANUFACTURER.

11.10 THE CONTRACTOR SHALL ADHERE TO ALL ENVIRONMENTAL REQUIREMENTS AND PRESCRIBED WORKING CONDITIONS NOTED ON PERMITS AND APPROVALS FROM AGENCIES IN CONSTRUCTION OF ALL TEMPORARY AND PERMANENT WORK.

12.0 DEWATERING STRUCTURE AT PUMP GENERATION STATION (PGS)

12.1 FOR REMOVAL OF DEWATERING STRUCTURE AT PGS REFER TO AS-BUILT DRAWING PROVIDED BY ONTARIO POWER GENERATION.

13.0 QUANTITIES

13.1 THE CONTRACTOR SHALL USE THE MOST UP-TO DATE QUANTITY ESTIMATES ASSOCIATED WITH THESE DRAWINGS FOR BUDGETING PURPOSE. THESE QUANTITIES REPRESENT THE WORK COMPLETED AT A PRELIMINARY DESIGN LEVEL, BASED ON DESIGN INFORMATION PROVIDED AND DIRECTIONS RECEIVED FROM THE CONSTRUCTION TEAM, AND WILL BE SUBJECT TO MODIFICATION AND UPDATING AS THE DETAILED DESIGN AND CONSTRUCTION ARE PROCEEDED.

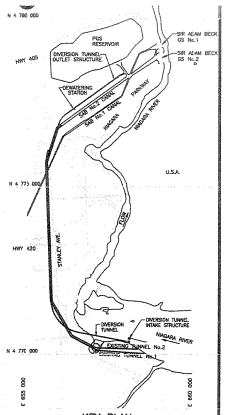
LIST OF DRAWINGS

INTAKE WORKS:

1. GENERAL NOTES
2. WEST APPROACH WALL
3. EAST APPROACH WALL
4. INTAKE CHANNEL
5. PIERS 1 AND 2 EXTENSION
6. NEW ACCELERATION WALL AND PIER 5 MODIFICATION
7. EXISTING ACCELERATING WALL REMOVAL

CIVIL WORKS:

8. CONSTRUCTION FACILITIES INTAKE AREA
9. CONSTRUCTION FACILITIES OUTLET AREA



KEY PLAN

DATE: 11 MAY 05

2	05/05/05	GENERAL REVISION	GT
1	05/04/05	GENERAL REVISION	GT
mf no	rev no	date	particulars	drawn	appr

NIAGARA TUNNEL FACILITY PROJECT

INTAKE WORKS - GENERAL NOTES

ONTARIO POWER GENERATION — Electricity Production - Hydroelectric Technical Services

STRABAG — Monsoon Enterprises

dsn	designed by		
drwn			
date yr/month/day 05/05-11	design approved		plot scale
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scale AS SHOWN	authorized		CAD file type
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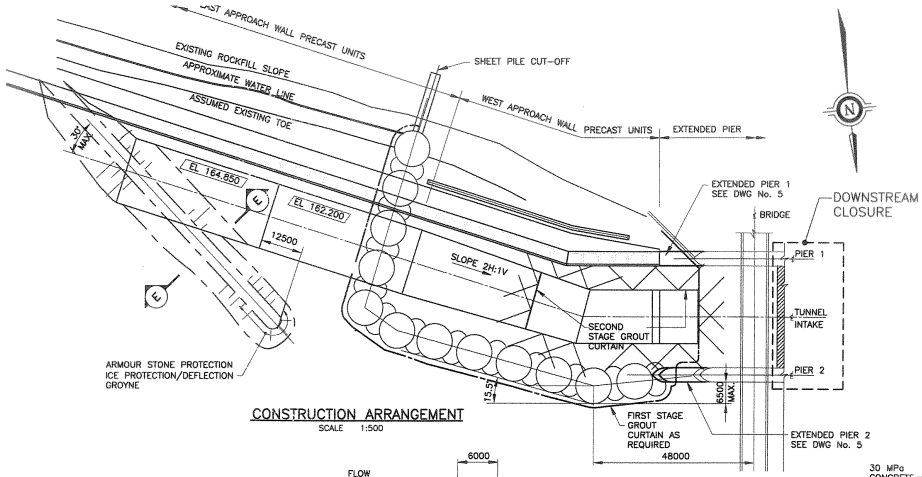
SURVEY DATUM

ELEVATIONS ARE IN METRES AND ARE BASED ON NAD83 SYSTEM



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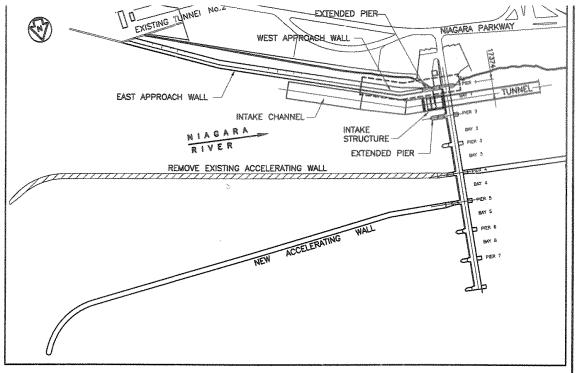

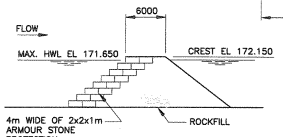

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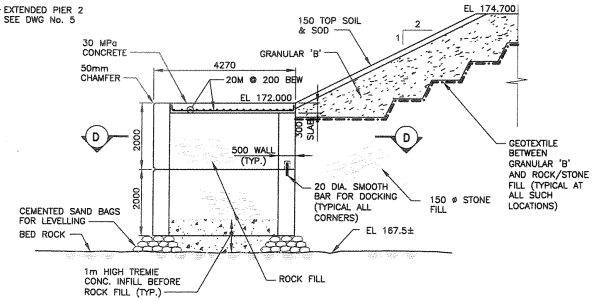

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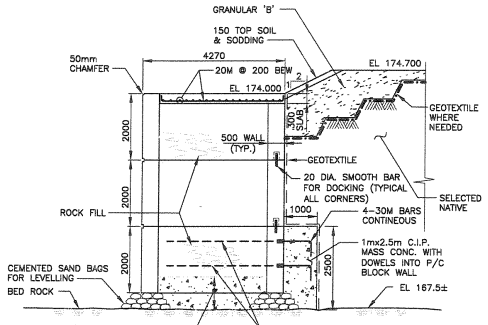

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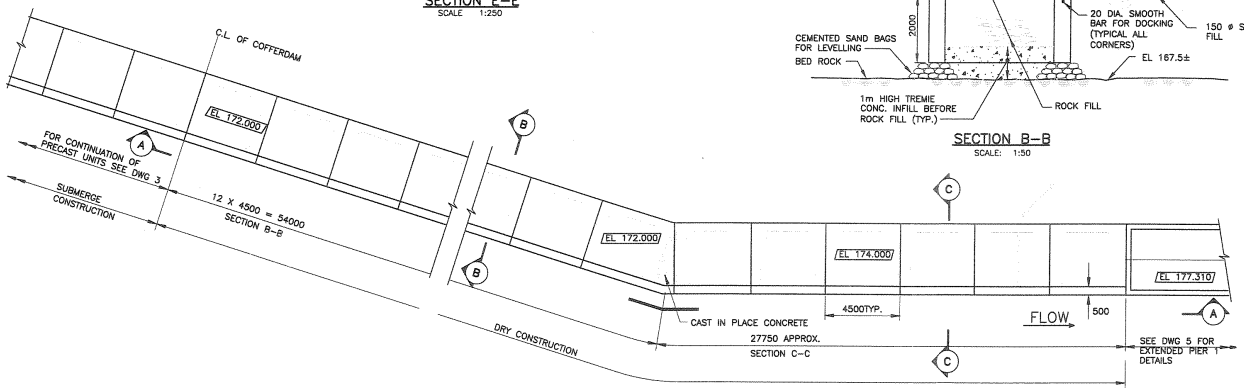

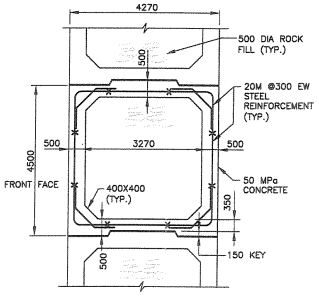

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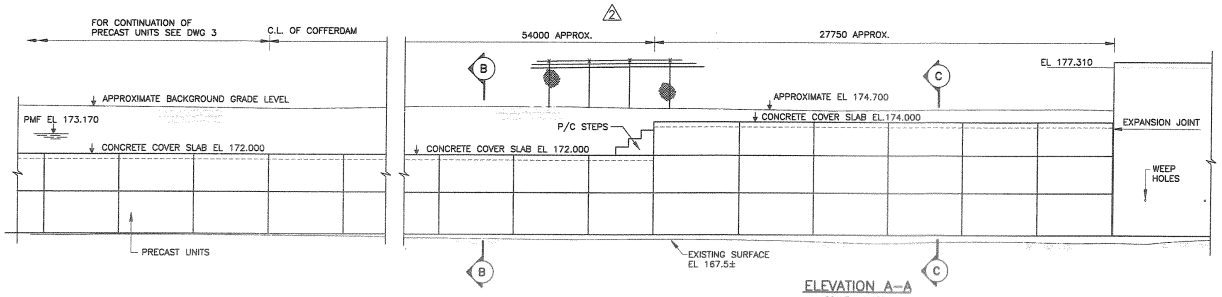
APPROX. WT. = 40 Tonnes/Unit



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1:100	0	2	4	6	8	10 m
1:200	0	4	8	12	16	20 m
1:250	0	5	10	15	20	25 m
1:500	0	10	20	30	40	50 m

DO NOT SCALE DRAWING

DATE: 11 MAY 05

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	1	26/04/05	MISC. REVISION	DT	

NIAGARA TUNNEL FACILITY PROJECT

INTAKE WORKS - WEST APPROACH WALL

ONTARIO POWER GENERATION — Electricity Production – Hydroelectric Technical Services

STRABAG — Monsoon Hendrison

date	designed by		
chkd			
date yr/mo/dd/day 05/05-11	design approved		plot scale
scale AS SHOWN	authorized		plot date / plot scale
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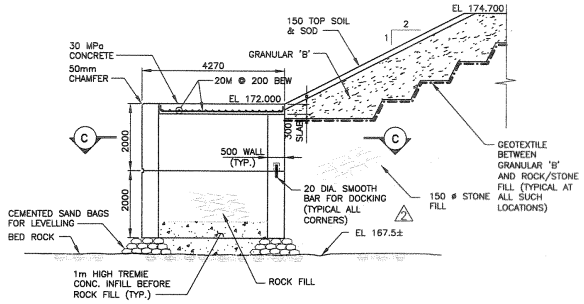

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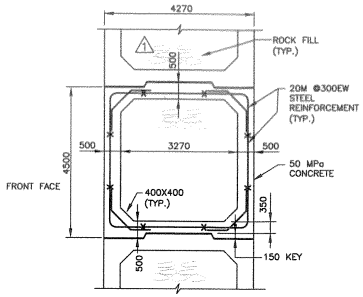

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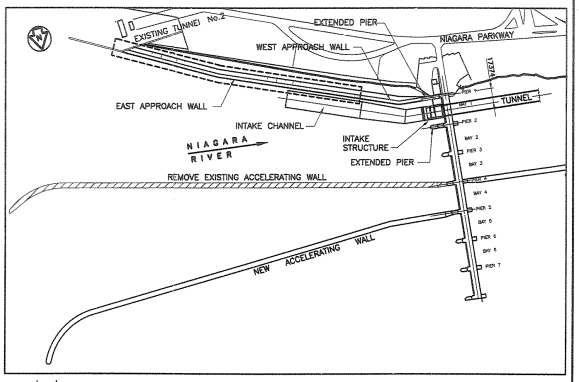

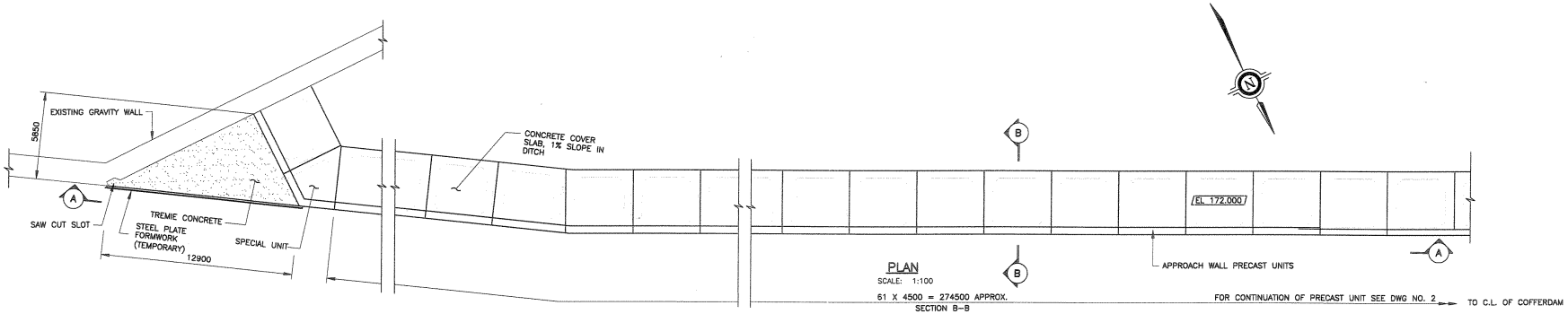

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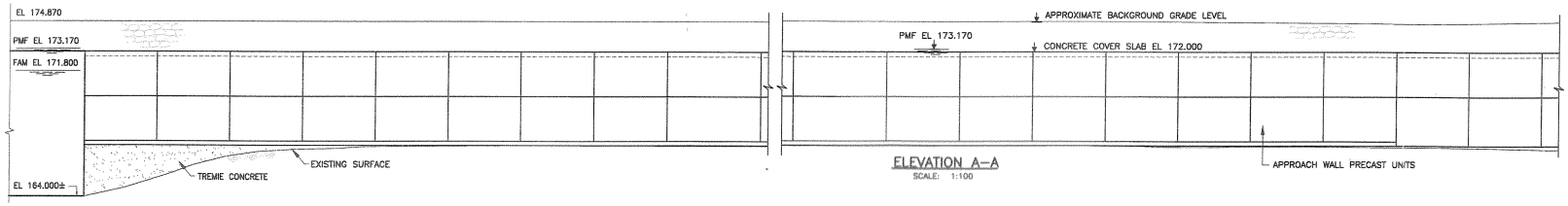

ELEVATION A–A
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DATE: 11 MAY 05

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1:200	0	4	8	12	16	20 m
1:250	0	5	10	15	20	25 m
1:500	0	10	20	30	40	50 m

DO NOT SCALE DRAWING

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2	05/05/05	GENERAL REVISION	DT	
1	03/06/05	MISC. REVISION	DT	

NIAGARA TUNNEL FACILITY PROJECT

INTAKE WORKS - EAST APPROACH WALL

ONTARIO POWER GENERATION — Electricity Production – Hydroelectric Technical Services

STRABAG — MORRISON HERSHFIELD

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chkd			
date	yr/month/day 05/05-11	design approved	
scale	AS SHOWN	authorized	

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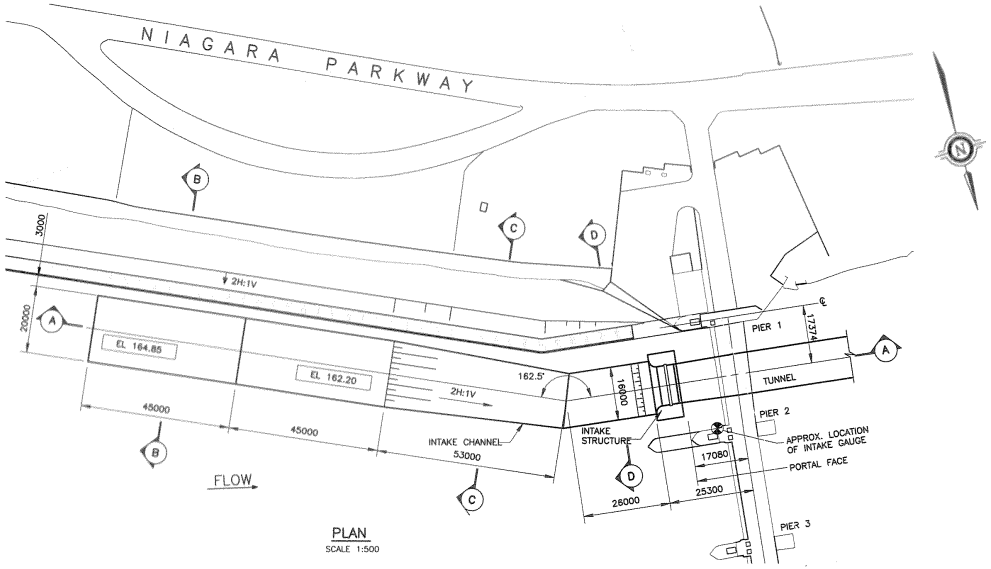

PLAN
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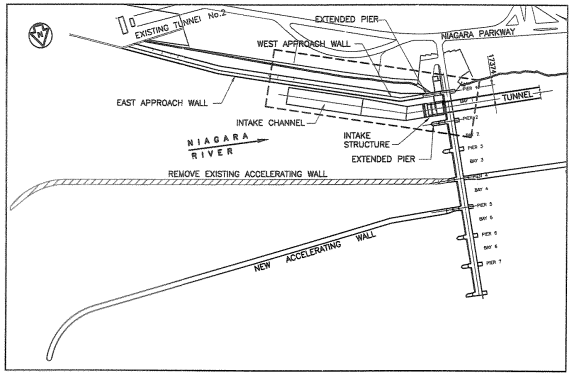

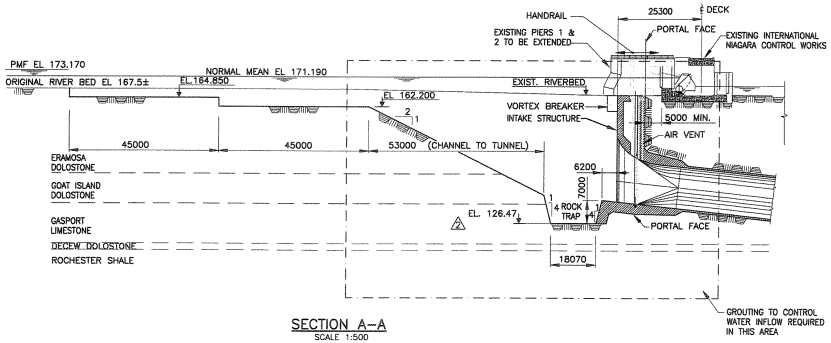

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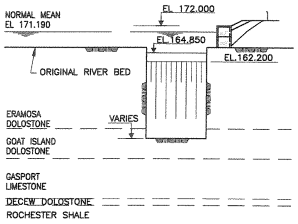

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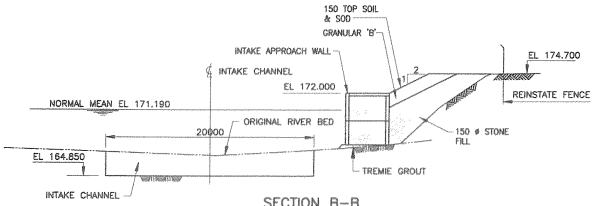

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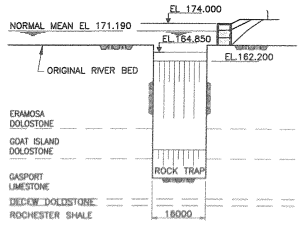

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DO NOT SCALE DRAWING

DATE: 11 MAY 05

rev. number	year	date	particulars	drawn	appd
2	05	05/05/05	GENERAL REVISION	DT	
1	05	05/04/05	NO CHANGE	DT	

NIAGARA TUNNEL FACILITY PROJECT

INTAKE WORKS - INTAKE CHANNEL

ONTARIO POWER GENERATION — Electricity Production – Hydroelectric Technical Services

STRABAG — MONSBROS MEDSTEAD

dwn		designed by	
chkd			
date	yr/mm/dd/day 05/05-11	design approved	
scale	AS SHOWN	authorized	

drg. ref. MH - 6004 — rev. 00

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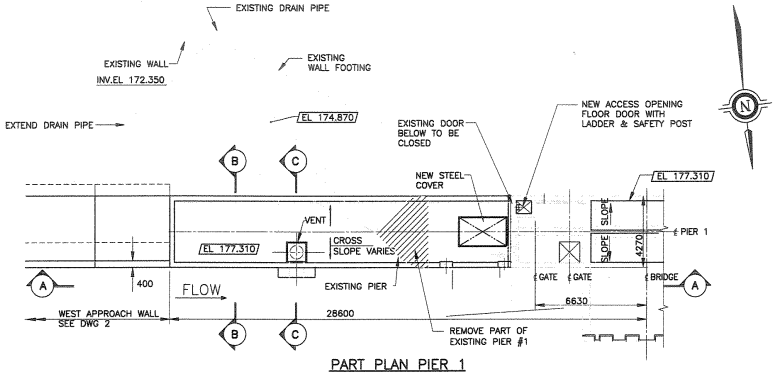

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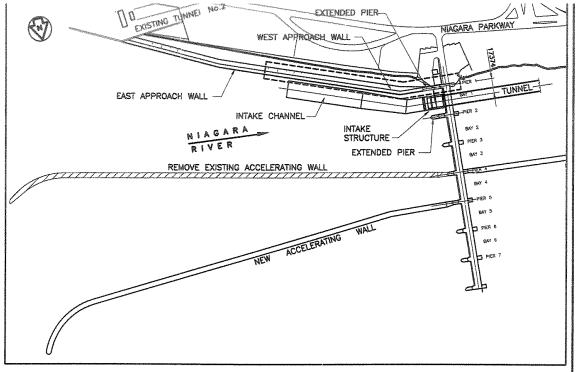

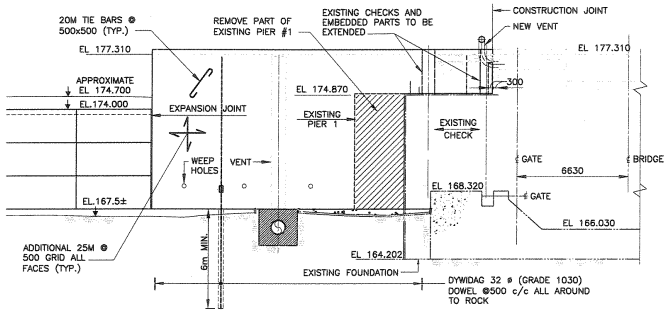

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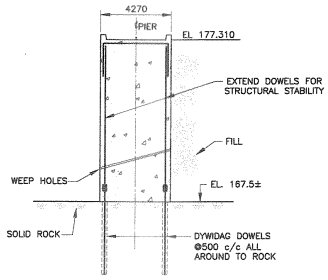

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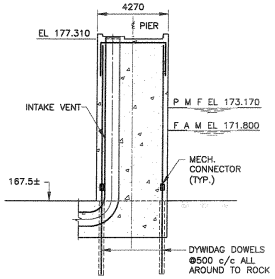

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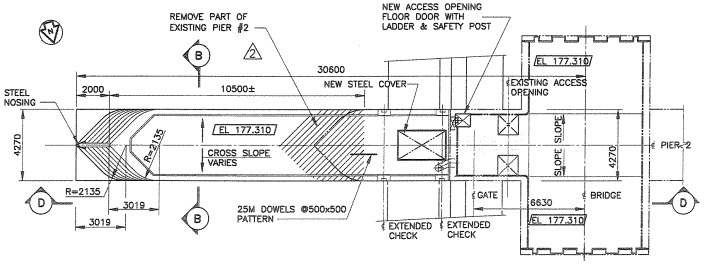

PLAN AT PIER 2
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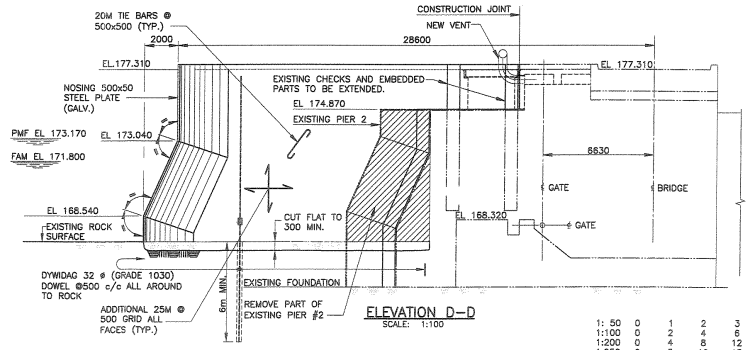

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1:200	0	4	8	12	16	20 m
1:250	0	5	10	15	20	25 m
1:500	0	10	20	30	40	50 m

DO NOT SCALE DRAWING

DATE: 11 MAY 05

mf rol number	ver no	date	particulars	prepd	appd
	2	08/05/05	GENERAL REVISION	DT	
	1	29/04/05	MISC. REVISION	DT	

NIAGARA TUNNEL FACILITY PROJECT

INTAKE WORKS -
PIER 1 AND PIER 2 EXTENSION

ONTARIOPOWER GENERATION — Electricity Production – Hydroelectric Technical Services

STRABAG — Monsoon Resources

dwn	designed by	
chkd		
date yr/month/day 05/05-11	design approved	prof. seals
		chief. seals
scale AS SHOWN	authorized	CAD file type
dwg no MH - 6005		rev 00

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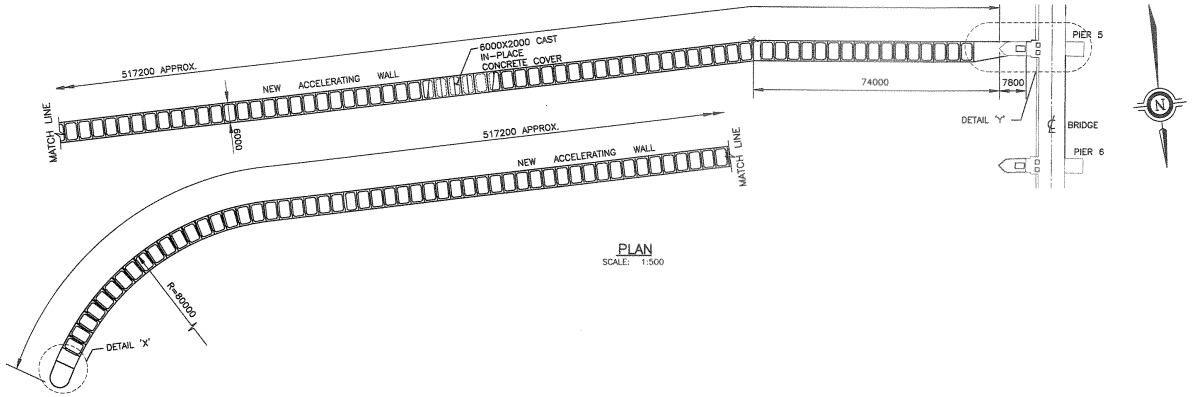

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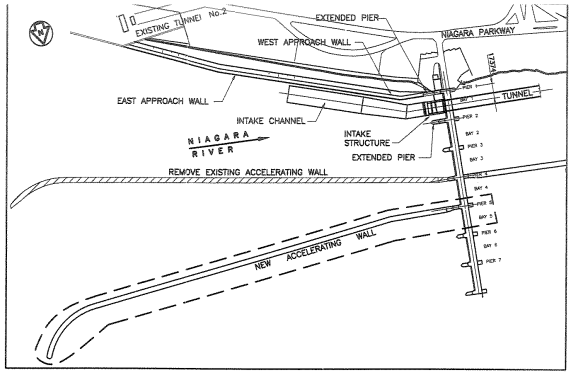
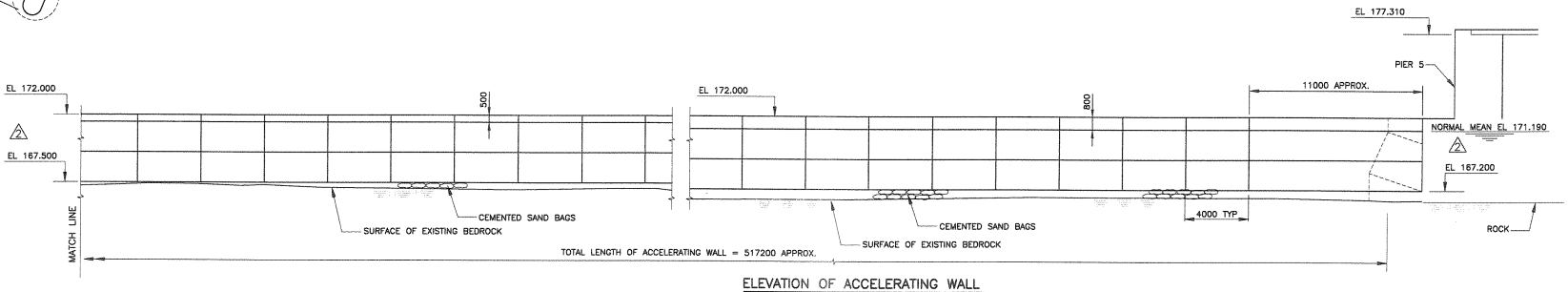
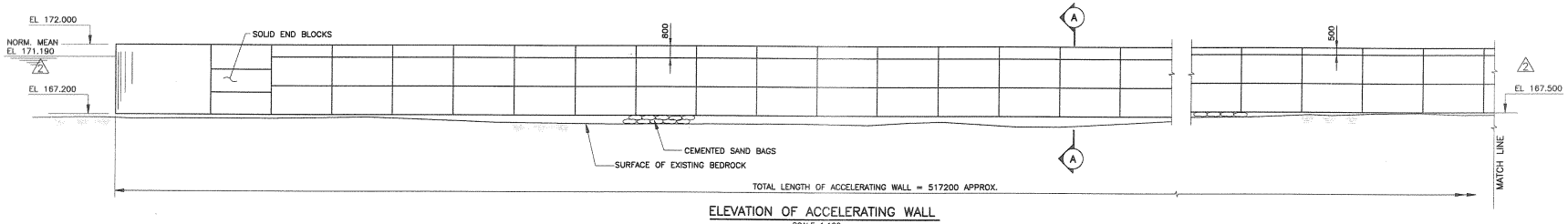




ELEVATION OF ACCELERATING WALL
SCALE 1:100



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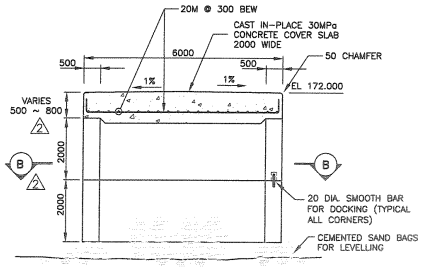

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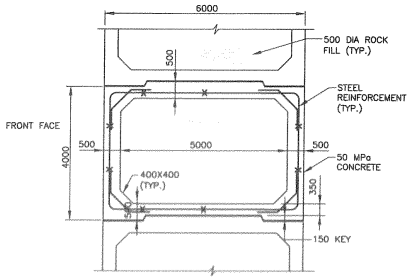

SECTION B–B
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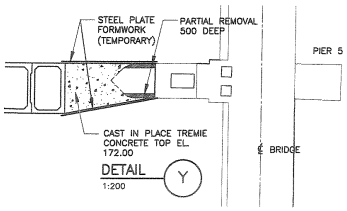
APPROX. WT. = 45 Tonnes/Unit



DETAIL Y
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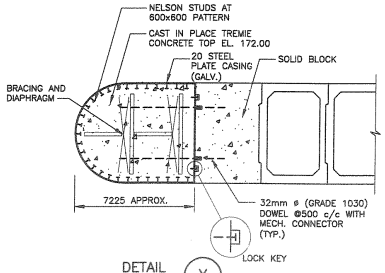

DETAIL X
1:100

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1:500	0	10	20	30	40	50	m

DO NOT SCALE DRAWING

DATE: 11 MAY 05

rev no	date	portion/sens	prep	appr
2	08/05/05	GENERAL REVISION	DT	
1	28/04/05	MISC. REVISION	DT	

NIAGARA TUNNEL FACILITY PROJECT

INTAKE WORKS - NEW ACCELERATING WALL AND PIER 5 MODIFICATION

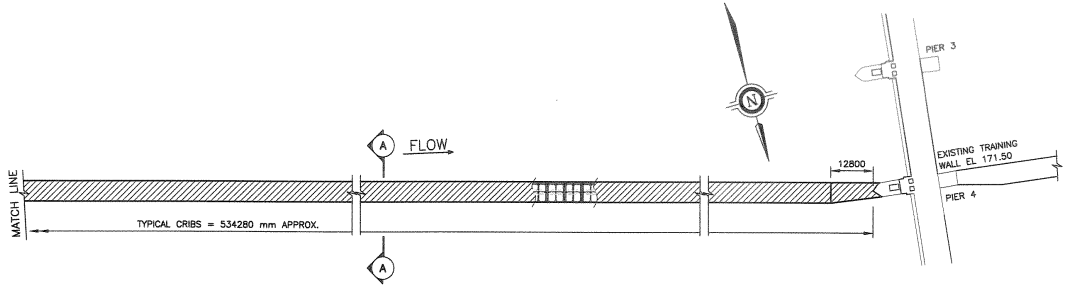
ONTARIO POWER GENERATION — Electricity Production - Hydroelectric Technical Services

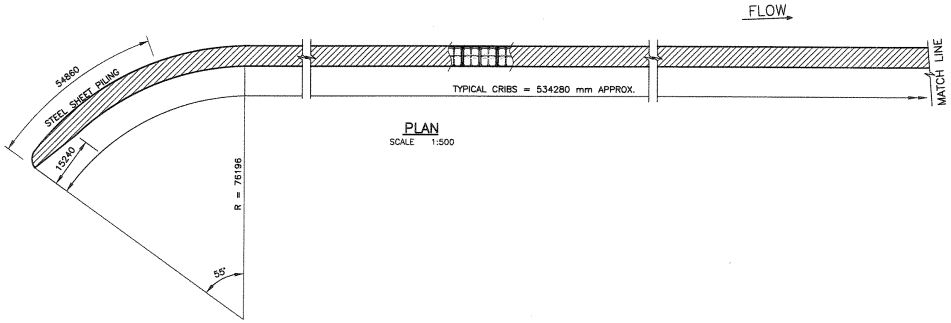
STRABAG — Monsoon Hydroplus

dwn		designed by	
chkd			
date	yr/month/day 05/05-11	design approved	
scale	AS SHOWN	authorized	

CAD file type

dwg no MH - 6006 rev 00





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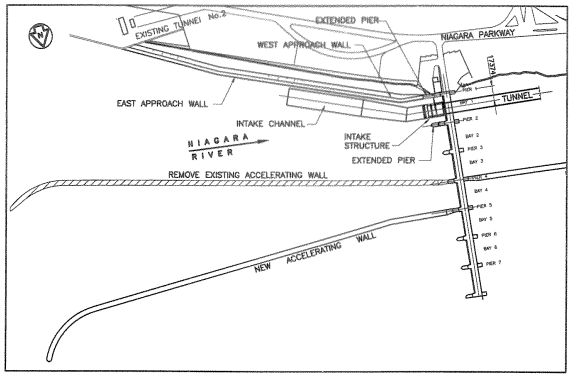


GENERAL NOTES

1.0 THE CONTRACTOR SHALL BE RESPONSIBLE FOR MEETING ALL THE ENVIRONMENTAL REQUIREMENTS REGARDING IN-RIVER WORK AND DISPOSAL OF MATERIALS REMOVED FROM THE SITE.

2.0 CROSS-SECTIONS SHOWN IN THIS DRAWING ARE BASED ON TYPICAL CRIB FOR ILLUSTRATION PURPOSES ONLY. THE CONTRACTOR SHALL REFER TO THE SET OF REFERENCE DRAWINGS NO. NF28-F-6269 REV 4, NF28-F-6275 REV D, AND NF28-F-6276 REV D PROVIDED BY OPG FOR OTHER RELEVANT DESIGN DETAILS OF THE EXISTING ACCELERATING WALL.

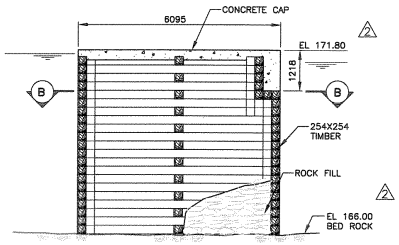
3.0 THE CONTRACTOR HAS THE RESPONSIBILITY TO CONDUCT FIELD SURVEY AND INSPECTION OF THE EXISTING STRUCTURE TO VERIFY ALL DETAILS AND DIMENSIONS NECESSARY IN PLANNING AND EXECUTION OF THE REMOVAL WORK.

CONSTRUCTION NOTES

1.0 MEANS AND METHODS USED IN DEMOLITION OF THE EXISTING ACCELERATING WALL SHALL BE SUCH AS TO MINIMIZE IMPACT ON THE OPERATION OF THE INCW. ALL IN-RIVER ACTIVITIES SHALL BE CO-ORDINATED WITH ONTARIO POWER GENERATION.

2.0 DEMOLITION OF THE WALL SHALL BE UNDERTAKEN SECTION BY SECTION STARTING FROM THE FAR END WORKING TOWARDS THE INCW STRUCTURE. THE LENGTH OF EACH WALL SECTION SHALL BE DETERMINED BY THE CONTRACTOR WITH AGREEMENT OF THE ENGINEERING CONSULTANT. FOR EACH SECTION TO BE REMOVED, DEMOLITION SHALL BE DONE FROM THE TOP DOWN. AS SUCH, THE CONCRETE CAP WILL BE BROKEN UP AND REMOVED, FOLLOWED BY SAW CUTTING AND REMOVAL OF THE TOP HALF OF THE TIMBER CRIB FRAME, AND FINALLY THE BOTTOM HALF.

3.0 ALL STRUCTURAL MATERIALS OF THE EXISTING WALL SHALL BE REMOVED FROM THE NIAGARA RIVER. ROCK FILL MATERIALS OF GOOD QUALITIES MAY BE RE-USED FOR CONSTRUCTION OF THE NEW ACCELERATING WALL SUBJECT TO THE APPROVAL OF THE ENGINEERING CONSULTANT AS WELL AS ONTARIO POWER GENERATION.



SECTION A-A
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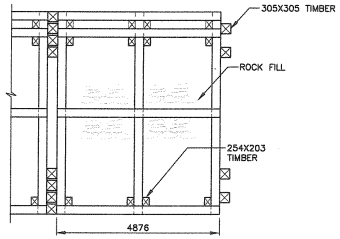

SECTION B-B
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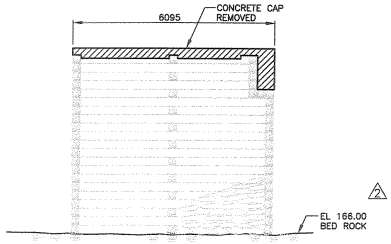

REMOVAL STAGE 1
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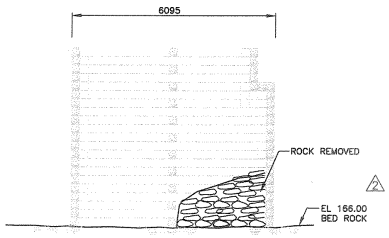

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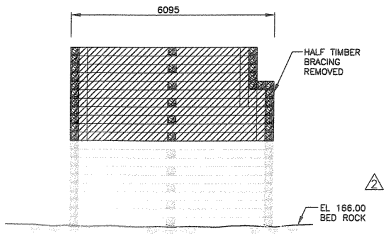

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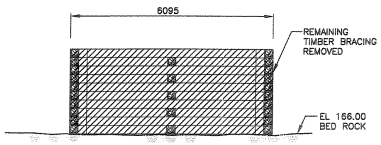

REMOVAL STAGE 4
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DO NOT SCALE DRAWING

DATE: 11 MAY 05

rev no	date	particulars	prep'd/chkd	appd
1	09/05/05	GENERAL REVISION	DT	
0	29/04/05	MISC. REVISION	DT	

NIAGARA TUNNEL FACILITY PROJECT

INTAKE WORKS - EXISTING ACCELERATING WALL REMOVAL

ONTARIO POWER GENERATION — Electricity Production - Hydroelectric Technical Services

STRABAG — MORRISON HERSHFIELD

con	designed by		
chkd			
date yr/month/day 05/05-11	design approved		plot scale
			plot code
scale AS SHOWN	authorized		CAD file type
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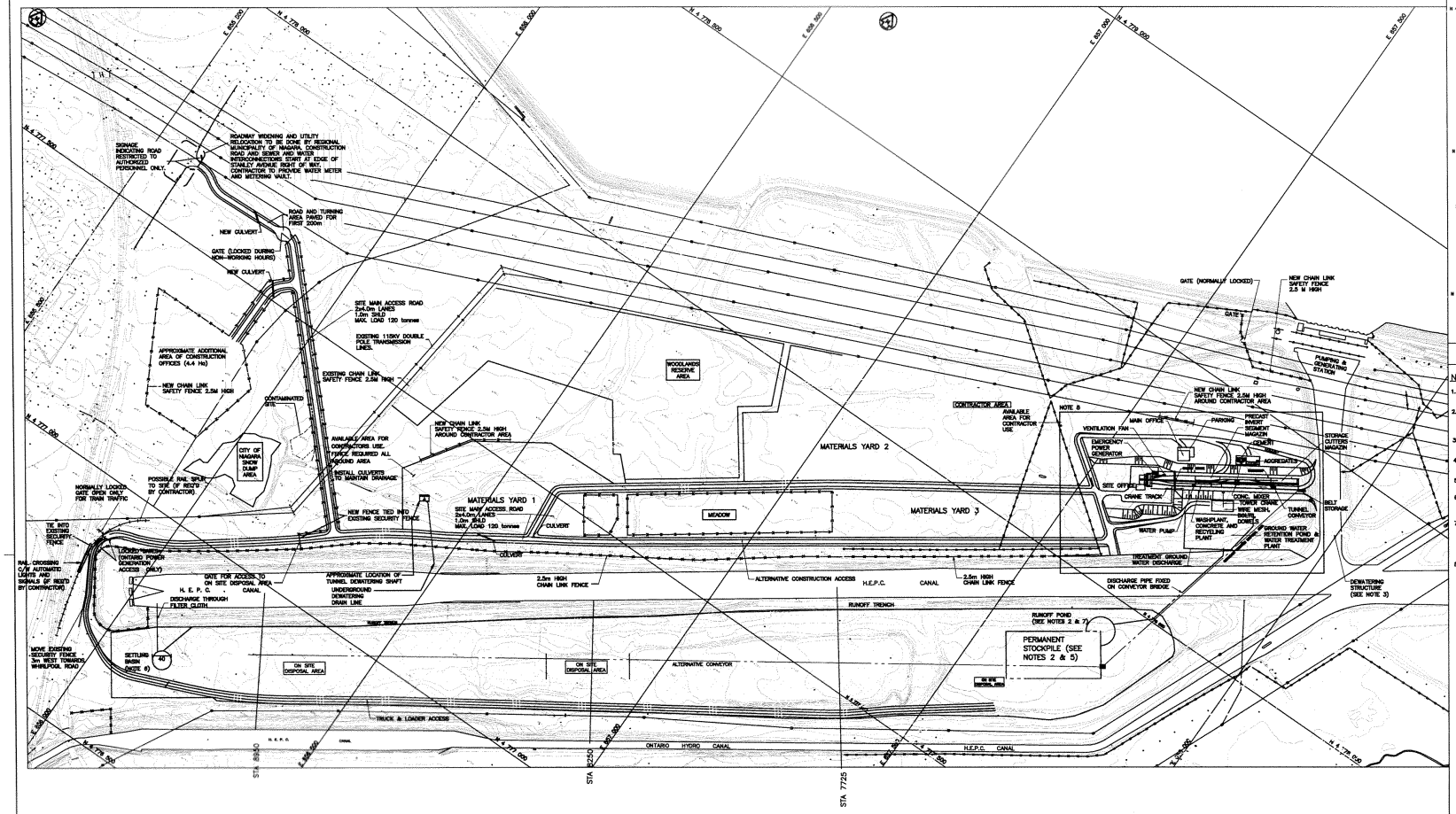

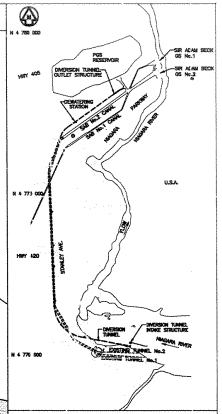

KEY PLAN
SCALE 1 : 50000

NOTES:

1. CONVEYOR CAPACITY 1200 t/hr CAPABLE OF WORKING 24 hr/day, 7 d/week.
2. PERMANENT SHALES CONTAINING BTEX STOCKPILE AND RUNOFF POND TO BE LINED IN ORDER TO AVOID GROUND CONTAMINATION.
3. STRUCTURE TO BE DEMOLISHED. EXISTING WATERMAIN ON THE STRUCTURE TO BE RELOCATED.
4. NO CLEARING AND CUTTING OF TREES PERMITTED BETWEEN MAY 1st TO JUNE 15th UNLESS BY OWNERS' PERMITS.
5. ROCHESTER, POWER GLEN & GRIMSBY FORMATION TO BE PLACED IN THE SEPARATE PILE.
6. CONTENTS OF SETTLING POND WILL BE TRANSFERED TO THE TREATMENT FACILITY IN MATERIALS YARD 2
7. CONTENTS OF THE RUNOFF POND WILL BE TRANSFERED DIRECTLY INTO THE TREATMENT FACILITY VIA PIPE. GROUND WATER FROM CONTAMINATED FORMATIONS WILL BE DIRECTED INTO THE RUNOFF POND, NOT INTO THE GROUND WATER RETENTION POND
8. SHOWED IN THE PLAN "SITE INSTALLATION TUNNELING"

LEGEND:

- AREA AVAILABLE FOR CONTRACTORS
- AREA NOT AVAILABLE FOR CONTRACTOR ACCESS
- DISPOSAL AREA
- PAVED CONSTRUCTION ROAD
- CHAIN LINK FENCE

EXCAVATED MATERIAL STOCKPILING PROCEDURES:
(BASED ON OPG'S MANAGEMENT OF EXCAVATED MATERIALS BY HATCH MOTT MacDONALD/ACRES INTERNATIONAL DATED DECEMBER 2004 AND ON OPG'S MANAGEMENT PLAN FOR BTEX BY HATCH MOTT MacDONALD DATED DECEMBER 2004)

*QUEENSTON SHALE TEMPORARILY STOCKPILED AT THE WEST END OF THE ON-SITE DISPOSAL AREA, SEPARATED FROM OTHER ROCK.

*SHALES CONTAINING BTEX (ROCHESTER,GRIMSBY & POWER GLEN FORMATION) PERMANENTLY STORED IN ON- SITE DISPOSAL AREA, SEPARATED FROM OTHER ROCK.

*LIMESTONES/DOLOMITES TEMPORARILY STORED FOR RE-USE.

*OTHER ROCKS - PERMANENTLY STOCKPILED IN ON-SITE DISPOSAL AREA, SEPARATED FROM OTHER ROCK.

rev cnl number	rev no	date	GENERAL REVISION	chkd	appd
	1	08/12			

NIAGARA TUNNEL FACILITY PROJECT

CONSTRUCTION FACILITIES
OUTLET AREA

ONTARIO POWER GENERATION — Electricity Production – Hydroelectric Technical Services

STRABAG — Mississauga, Mississauga

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chkd			
date yr/month/day 05/05-11	design approved	plot scale 1 : 1 M	
scale AS SHOWN	authorized	CAD file type DWG	
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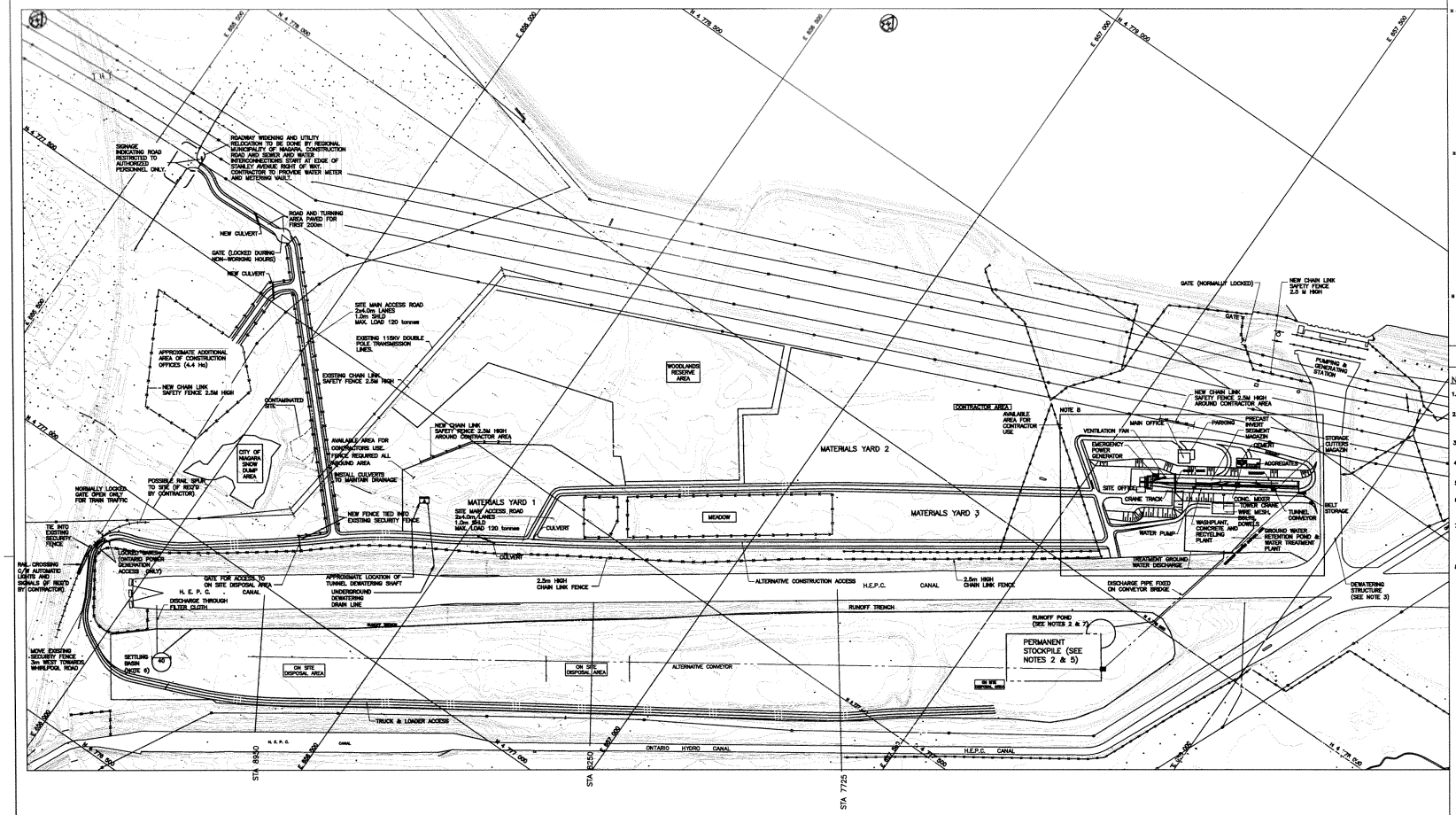

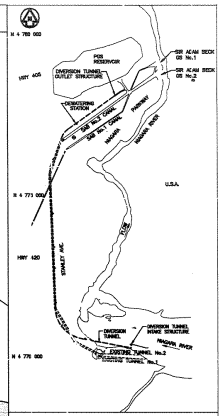

KEY PLAN
SCALE 1 : 50000

NOTES:

1. CONVEYOR CAPACITY 1200 t/hr CAPABLE OF WORKING 24 hr/day, 7 d/week.
2. PERMANENT SHALES CONTAINING STEX STOCKPILE AND RUNOFF POND TO BE LINED IN ORDER TO AVOID GROUND CONTAMINATION.
3. STRUCTURE TO BE DEMOLISHED. EXISTING WATERMAIN ON THE STRUCTURE TO BE RELOCATED.
4. NO CLEARING AND CUTTING OF TREES PERMITTED BETWEEN MAY 1st TO JUNE 15th UNLESS BY OMNDES' PERMITS.
5. ROCHESTER, POWER GLEN & GRIMSBY FORMATION TO BE PLACED IN THE SEPARATE PILE.
6. CONTENTS OF SETTLING POND WILL BE TRANSFERED TO THE TREATMENT FACILITY IN MATERIALS YARD 2
7. CONTENTS OF THE RUNOFF POND WILL BE TRANSFERED DIRECTLY INTO THE TREATMENT FACILITY VIA PIPE. GROUND WATER FROM CONTAMINATED FORMATIONS WILL BE DIRECTED INTO THE RUNOFF POND, NOT INTO THE GROUND WATER RETENTION POND
8. SHOWED IN THE PLAN "SITE INSTALLATION TUNNELING"

LEGEND:

- AREA AVAILABLE FOR CONTRACTORS
- AREA NOT AVAILABLE FOR CONTRACTOR ACCESS
- DISPOSAL AREA
- PAVED CONSTRUCTION ROAD
- CHAIN LINK FENCE

EXCAVATED MATERIAL STOCKPILING PROCEDURES:
(BASED ON OPG'S MANAGEMENT OF EXCAVATED MATERIALS BY HATCH MOTT MacDONALD/ACRES INTERNATIONAL DATED DECEMBER 2004 AND ON OPG'S MANAGEMENT PLAN FOR BTEX BY HATCH MOTT MacDONALD DATED DECEMBER 2004)

*QUEENSTON SHALE TEMPORARILY STOCKPILED AT THE WEST END OF THE ON-SITE DISPOSAL AREA, SEPARATED FROM OTHER ROCK.

*SHALES CONTAINING BTEX (ROCHESTER,GRIMSBY & POWER GLEN FORMATION) PERMANENTLY STORED IN ON- SITE DISPOSAL AREA, SEPARATED FROM OTHER ROCK.

*LIMESTONES/DOLOMITES TEMPORARILY STORED FOR RE-USE.

*OTHER ROCKS – PERMANENTLY STOCKPILED IN ON-SITE DISPOSAL AREA, SEPARATED FROM OTHER ROCK.

rev number	rev date	description	drwn	chkd	appd
1	05/12	GENERAL REVISION			

NIAGARA TUNNEL FACILITY PROJECT

CONSTRUCTION FACILITIES
OUTLET AREA

ONTARIO POWER GENERATION — Electricity Production – Hydroelectric Technical Services

STRABAG — Mossinor Hydrofield — MH

drn	designed by	
chkd		
date y/month/day 05/05-11	design approved	plot scale 1 : 1 M
scale AS SHOWN	authorized	CAD file type DWG
dwg no MH - 6009		rev 01

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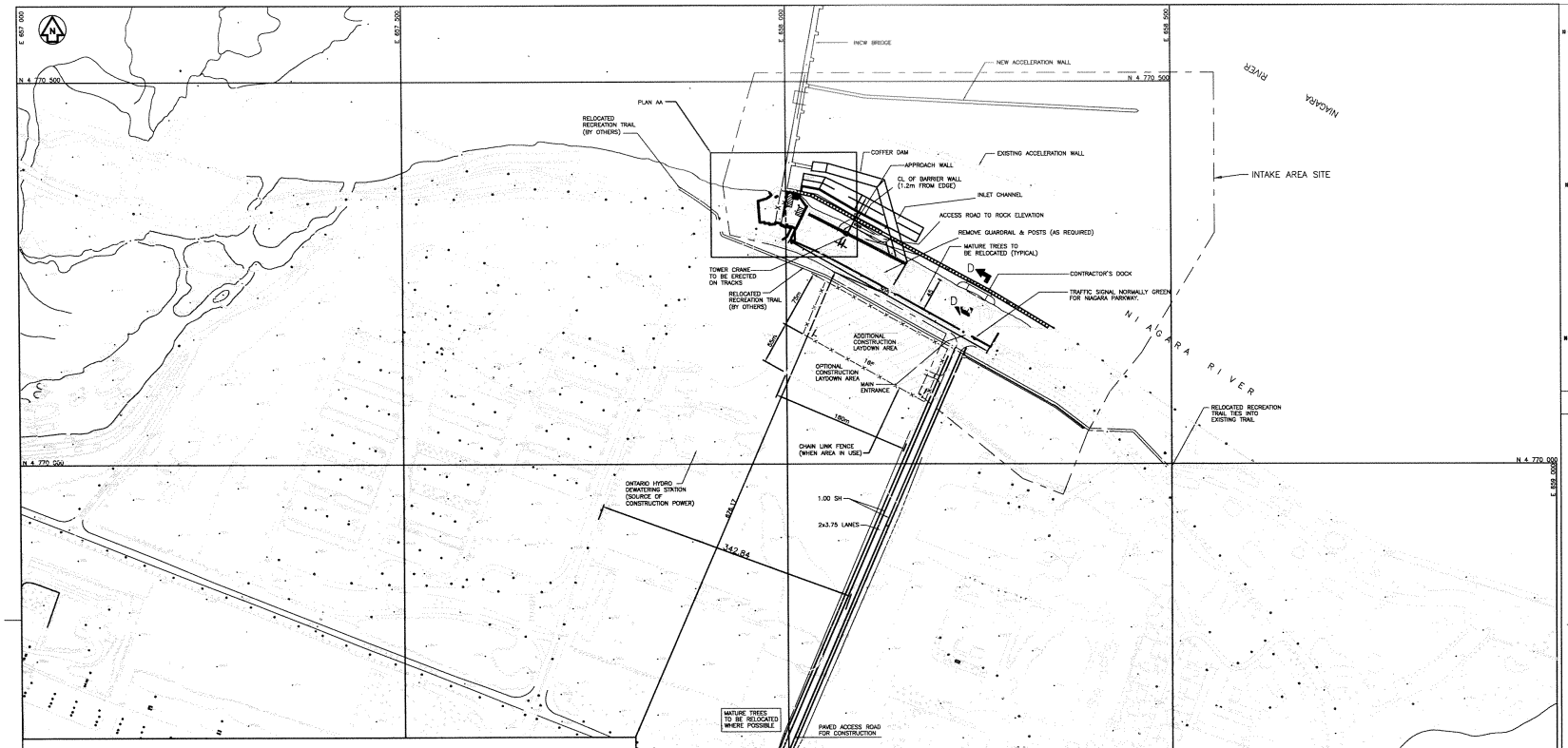
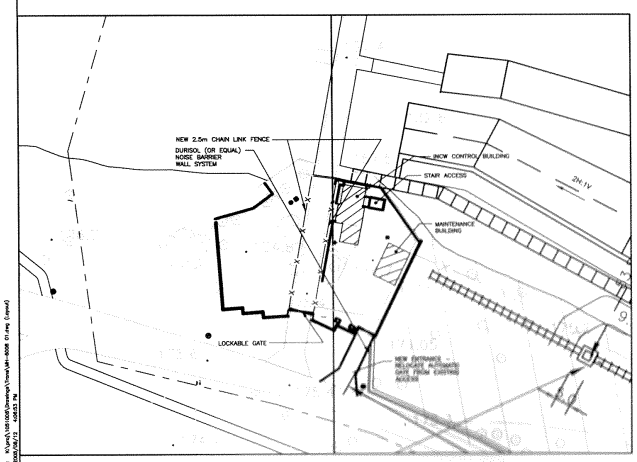
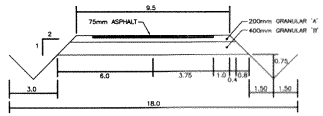




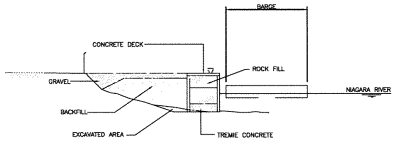
PLAN A–A AT INCW CONTROL BUILDING

SCALE 1:500



INLET ACCESS ROAD CROSS SECTION

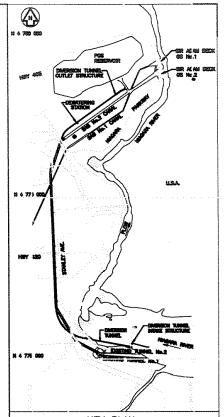
HORIZONTAL SCALE 1:100
VERTICAL SCALE 1:50



SECTION D–D

SCALE 1:200

1:200 0 5 10 15 20 m
1:2000 0 50 100 150 200 m



KEY PLAN

SCALE 1 : 50000

NOTES:

1. STOCKPILING AREA TO CONTAIN AN IMPERVIOUS LINER FOR POSSIBLE CONTAMINATION IN EXCAVATED MATERIALS

rev no	date	particulars	drwn	appd
1	06/12	GENERAL REVISION		

NIAGARA TUNNEL FACILITY PROJECT

CONSTRUCTION FACILITIES
INTAKE AREA

ONTARIO POWER GENERATION — Electricity Production – Hydroelectric Technical Services

STRABAG — MORRISON HERSHFIELD MH

dwn	designed by		
chkd			
date yr/month/day 05/03/02	design approved	plot scale 1 : 1 M	
scale AS SHOWN	authorized	CAD file type DWG	
dwg no MH - 6008		ver 01	

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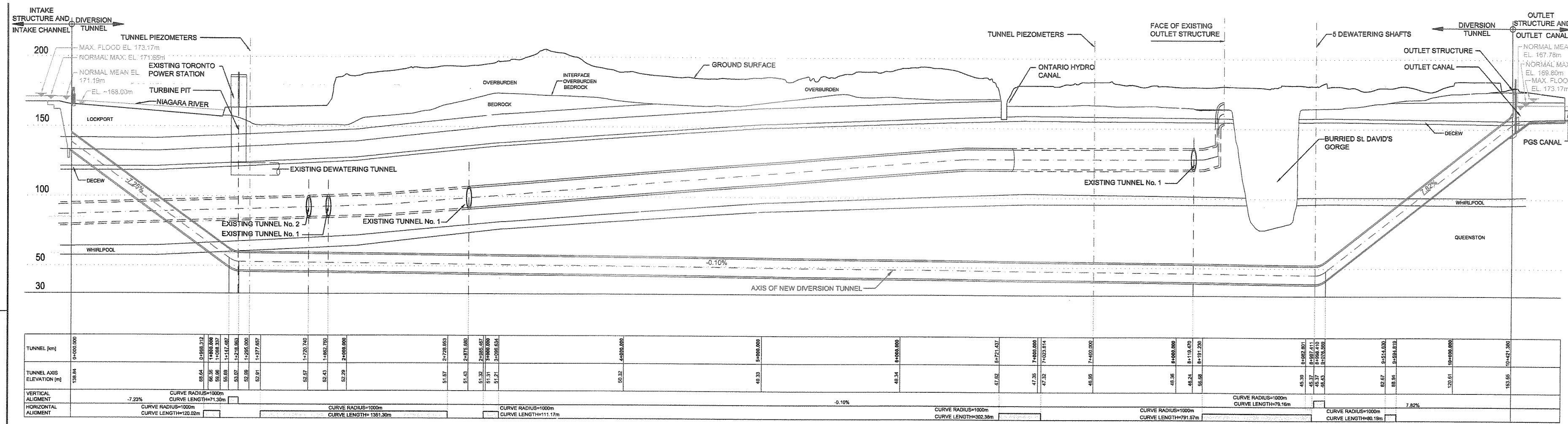
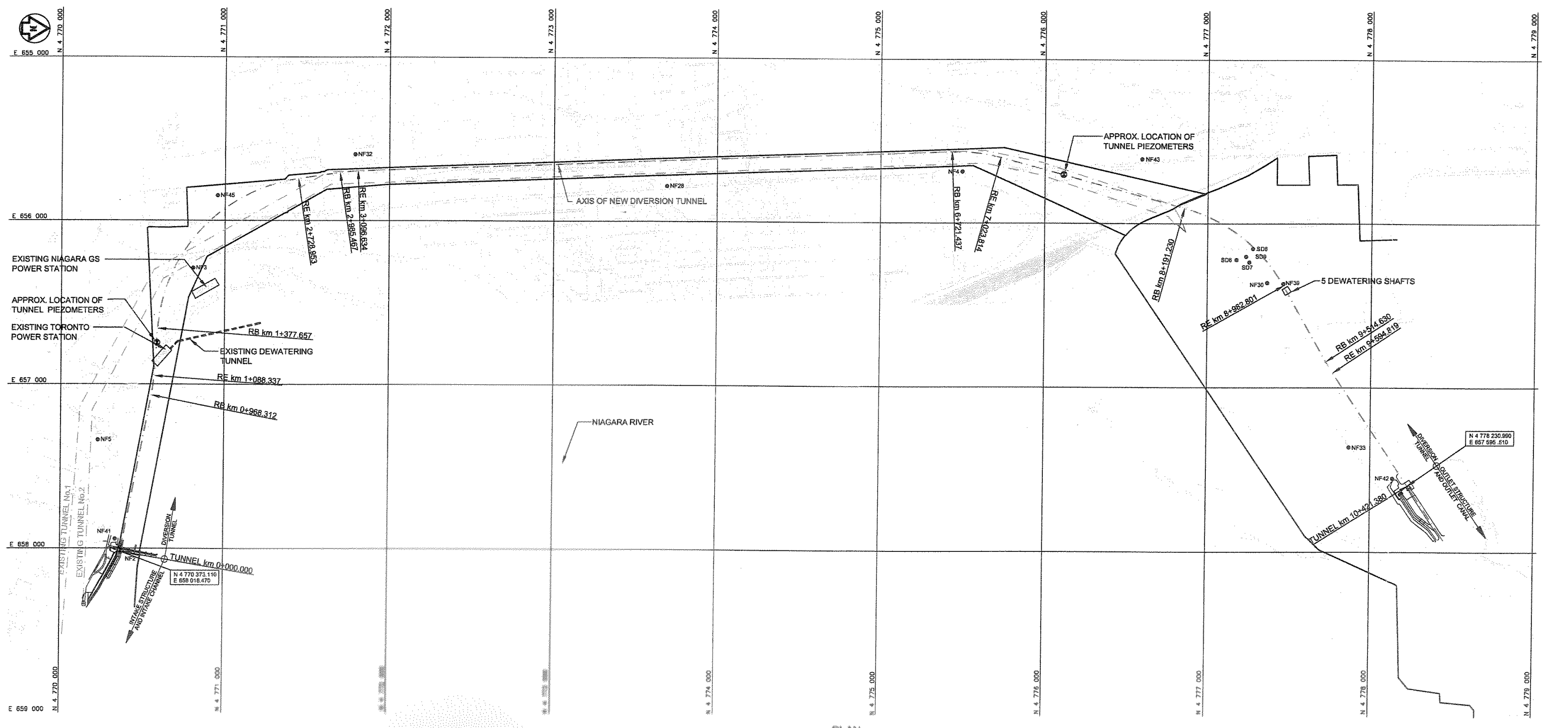


LONGITUDINAL SECTION
SCALE 1 : 1000/1 : 100



PLAN
SCALE 1 : 10000

LEGEND:

km...KILOMETER
RB...BEGIN OF CURVE
RE...END OF CURVE
NF, SD...GEOTECHNICAL BOREHOLES

01			
00		FIRST ISSUE	
mf no number	ver no	date	particulars

NIAGARA TUNNEL FACILITY PROJECT

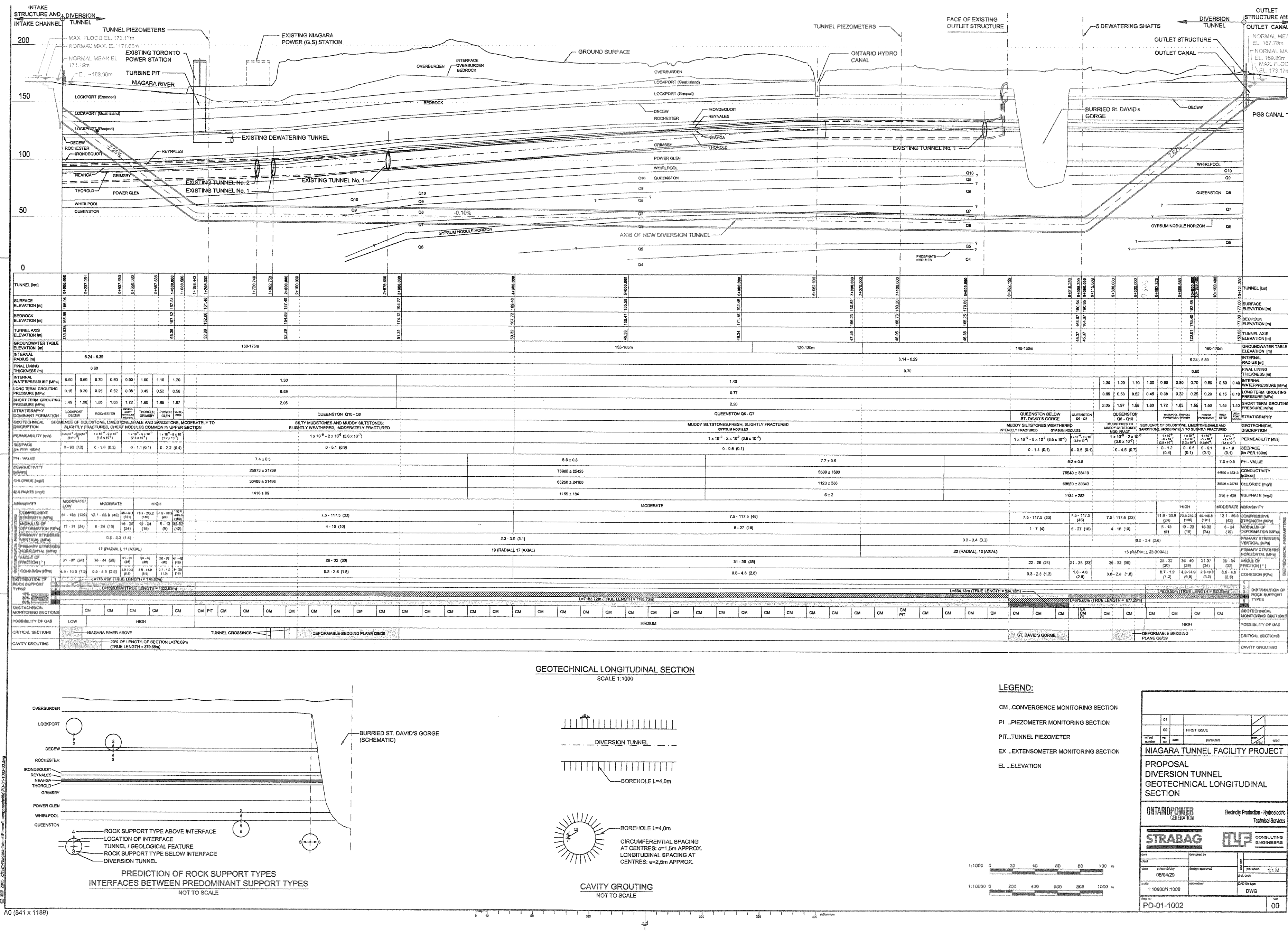
PROPOSAL
DIVERSION TUNNEL
PLAN AND LONGITUDINAL SECTION

ONTARIO POWER GENERATION — Electricity Production - Hydroelectric Technical Services

STRABAG — ILF CONSULTING ENGINEERS

date: 05/04/29
scale: 1:10000/1:1000
plot scale: 1:1 M
CAD file type: DWG
dwg no: PD-01-1001
ver: 00

A0 (841 x 1189)



INTAKE STRUCTURE AND INTAKE CHANNEL
DIVERSION TUNNEL
TUNNEL PIEZOMETERS
MAX. FLOOD EL. 173.17m
NORMAL MAX. EL. 171.69m
NORMAL MEAN EL. 171.19m
EL. ~168.00m
EXISTING TORONTO POWER STATION
TURBINE PIT
NIAGARA RIVER
EXISTING NIAGARA POWER (G.S) STATION
GROUND SURFACE
OVERBURDEN
INTERFACE OVERBURDEN BEDROCK
BEDROCK
EXISTING DEWATERING TUNNEL
EXISTING TUNNEL No. 2
EXISTING TUNNEL No. 1
AXIS OF NEW DIVERSION TUNNEL
GYPSUM NODULE HORIZON
ONTARIO HYDRO CANAL
FACE OF EXISTING OUTLET STRUCTURE
5 DEWATERING SHAFTS
BURRIED St. DAVID's GORGE
OUTLET STRUCTURE AND OUTLET CANAL
OUTLET STRUCTURE
OUTLET CANAL
NORMAL MEAN EL. 167.78m
NORMAL MAX. EL. 169.80m
MAX. FLOOD EL. 173.17m
PGS CANAL
LOCKPORT (Eramosa)
LOCKPORT (Goat Island)
LOCKPORT (Gasport)
DECEW
ROCHESTER
IRONDEQUOIT
REYNALES
NEAHGA
GRIMSBY
THOROLD
POWER GLEN
WHIRLPOOL
QUEENSTON
-0.10%
TUNNEL [km]
SURFACE ELEVATION [m]
BEDROCK ELEVATION [m]
TUNNEL AXIS ELEVATION [m]
GROUNDWATER TABLE ELEVATION [m]
INTERNAL RADIUS [m]
FINAL LINING THICKNESS [m]
INTERNAL WATERPRESSURE [MPa]
LONG TERM GROUTING PRESSURE [MPa]
SHORT TERM GROUTING PRESSURE [MPa]
STRATIGRAPHY DOMINANT FORMATION
GEOTECHNICAL DISCRIPTION
PERMEABILITY [m/s]
SEEPAGE [l/s PER 100m]
PH - VALUE
CONDUCTIVITY [µS/cm]
CHLORIDE [mg/l]
SULPHATE [mg/l]
ABRASIVITY
GEOTECHNICAL PARAMETERS
DISTRIBUTION OF ROCK SUPPORT TYPES
GEOTECHNICAL MONITORING SECTIONS
POSSIBILITY OF GAS
CRITICAL SECTIONS
CAVITY GROUTING
NIAGARA RIVER ABOVE
TUNNEL CROSSINGS
DEFORMABLE BEDDING PLANE Q8/Q9
ST. DAVID'S GORGE
GEOTECHNICAL LONGITUDINAL SECTION
SCALE 1:1000
BURRIED ST. DAVID'S GORGE (SCHEMATIC)
ROCK SUPPORT TYPE ABOVE INTERFACE
LOCATION OF INTERFACE
TUNNEL / GEOLOGICAL FEATURE
ROCK SUPPORT TYPE BELOW INTERFACE
DIVERSION TUNNEL
PREDICTION OF ROCK SUPPORT TYPES
INTERFACES BETWEEN PREDOMINANT SUPPORT TYPES
NOT TO SCALE
DIVERSION TUNNEL
BOREHOLE L=4,0m
CIRCUMFERENTIAL SPACING AT CENTRES: c=1,5m APPROX.
LONGITUDINAL SPACING AT CENTRES: e=2,5m APPROX.
CAVITY GROUTING
NOT TO SCALE
LEGEND:
CM...CONVERGENCE MONITORING SECTION
PI ...PIEZOMETER MONITORING SECTION
PIT...TUNNEL PIEZOMETER
EX ...EXTENSOMETER MONITORING SECTION
EL ...ELEVATION
FIRST ISSUE
NIAGARA TUNNEL FACILITY PROJECT
PROPOSAL
DIVERSION TUNNEL
GEOTECHNICAL LONGITUDINAL SECTION
ONTARIOPOWER GENERATION
Electricity Production - Hydroelectric Technical Services
STRABAG
ILF CONSULTING ENGINEERS
05/04/29
1:10000/1:1000
1:1 M
DWG
PD-01-1002
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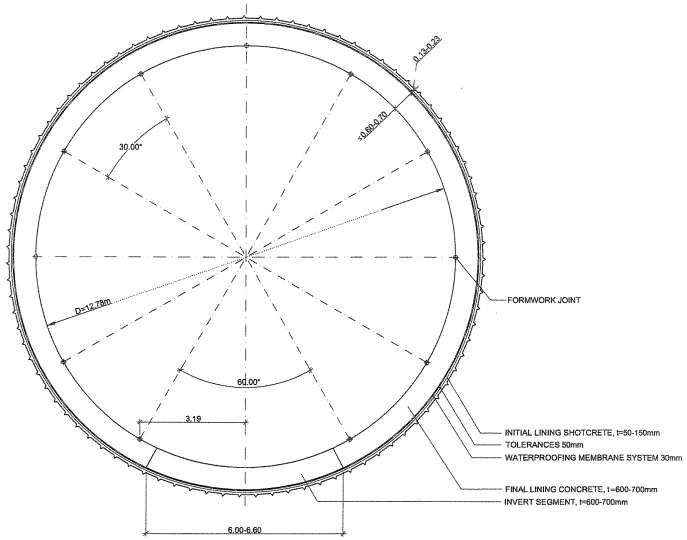
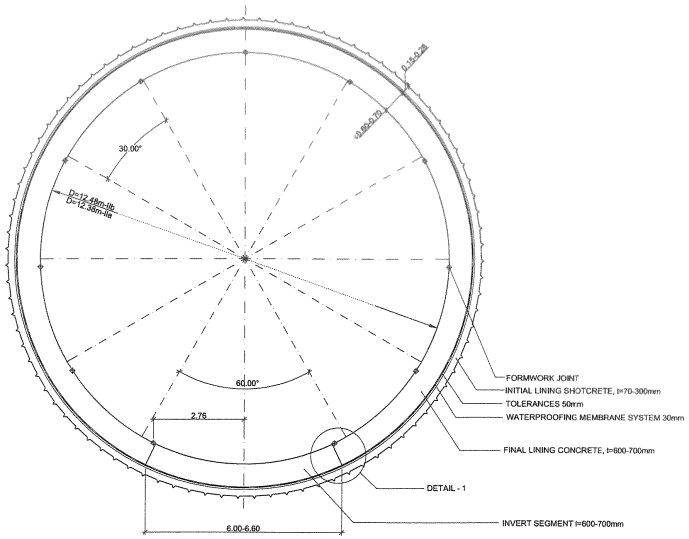
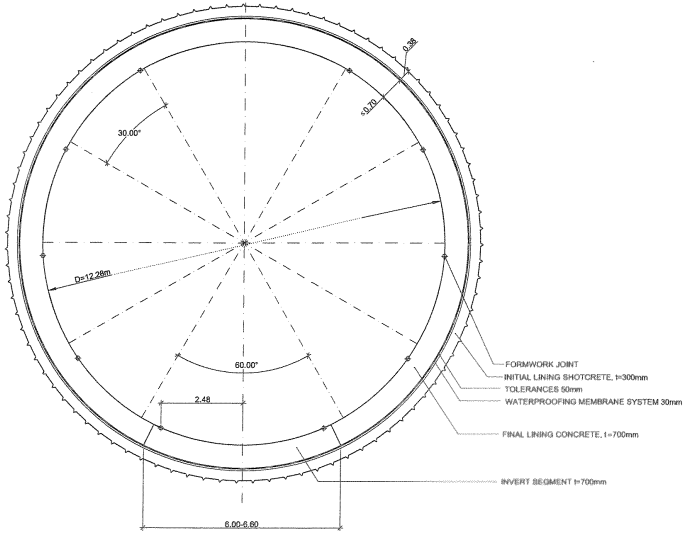
A0 (841 x 1189)



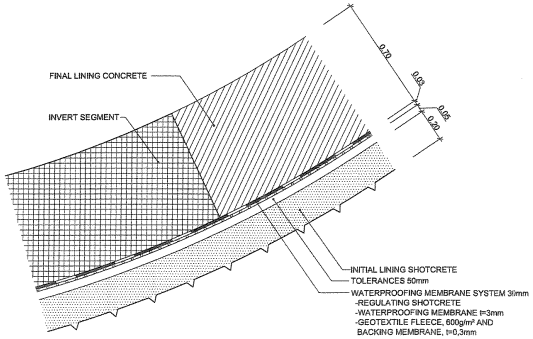
TYPICAL CROSS SECTION - I, D_{TBM}=14.44m
SCALE 1:50



TYPICAL CROSS SECTION - IIa, D_{TBM}=14.44m, t ≤ 0.70+0.15m
TYPICAL CROSS SECTION - IIb, D_{TBM}=14.44m, t ≤ 0.70+0.20m
SCALE 1:50

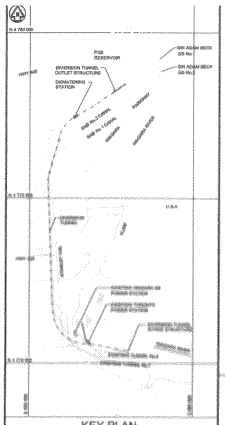


TYPICAL CROSS SECTION - III, D_{TBM}=14.44m
SCALE 1:50



DETAIL - 1
SCALE: 1:10

1:50 0 1 2 3 4 5 m
1:10 0 0.2 0.4 0.6 0.8 1 m



KEY PLAN
SCALE 1 : 50000

NOTES:

1. FINAL LINING CONCRETE FORMWORK TO BE ADJUSTED TO VARIABLE INTERNAL DIAMETER AT FORMWORK JOINTS
2. SIZE OF INVERT SEGMENT TO BE CONFIRMED BY THE REQUIREMENTS FOR MATERIAL TRANSPORT AND MUCKING
3. TEMPORARY DRAINAGE ARRANGEMENT TO BE DETAILED ON SITE
4. TYPICAL CROSS SECTION-LINING THICKNESS COMBINATIONS

FINAL LINING	t=0,6m	t=0,7m
INITIAL LINING		
t=0,05m	I	I
t=0,07m	I	IIa
t=0,10m	I	IIa
t=0,15m	I	IIa
t=0,20m	IIa	IIb
t=0,30m	IIb	III

ref. roll number	rev. no.	date	particulars	prepd.	chkd.	appd.
	01					
	00		FIRST ISSUE			

NIAGARA TUNNEL FACILITY PROJECT

PROPOSAL
DIVERSION TUNNEL
TYPICAL CROSS SECTIONS
AND DETAIL

ONTARIOPOWER GENERATION — Electricity Production - Hydroelectric Technical Services

STRABAG — AYF CONSULTING ENGINEERS

date		designed by	
drawn			
date	yr/mo/dd/day	design approved	
	05/04/29		
scale	1:50 / 1:10	authorized	

plot scale 1:1 M
drg. code
CAD file type DWG

drg no PD-01-1004 ver 00

A0 (841 x 1189)

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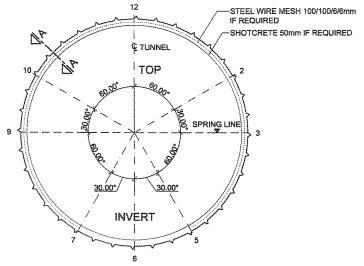
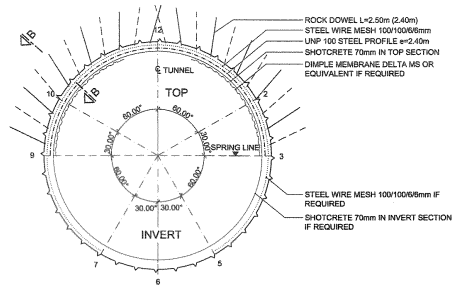
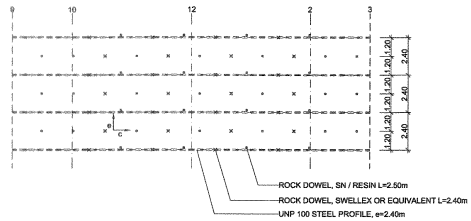


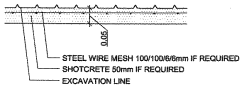
ROCK SUPPORT TYPE 1
CROSS SECTION, SCALE 1:100



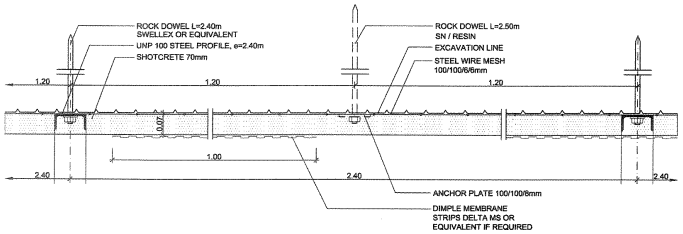
ROCK SUPPORT TYPE 2
CROSS SECTION, SCALE 1:100



DEVELOPED VIEW OF TOP SECTION
SCALE 1:100



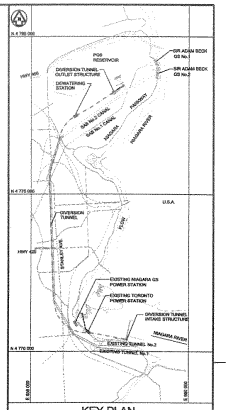
DETAIL SECTION A-A
SCALE 1:5



DETAIL SECTION B-B
SCALE M1:5

EXCAVATION AND SUPPORT TYPES 1 AND 2

ROCK MASS CHARACTERISTICS	ROCK MASS STRATIGRAPHY (DOMINANT)	ROCK SUPPORT TYPES	CLASSIFICATION CRITERIA: ROCK MASS BEHAVIOUR PRESENCE OF WATER	RADIAL DEF.	EFFECT ON ADVANCE OF TBM	SUPPORT MEASURES: SUPPORT MEASURES	TOP 12 TO 2 (10)	DISTANCE TO EXC. FACE	QUANTITY PER M	TOP 2 (10) TO 3 (9)	DISTANCE TO EXC. FACE	QUANTITY PER M	INV ERT 3 (9) TO 5 (7)	DISTANCE TO EXC. FACE	QUANTITY PER M	INVERT 5 (7) TO 6	DISTANCE TO EXC. FACE	QUANTITY PER M	TOTAL QUANTITY	UNIT
STABLE ROCK	LOCKPORT DE CEW	1	NO GEOLOGICAL OVERBREAK SIGMA 1 > 100 MPa	< 5 mm 200 m																
		1A	DRY OR NEGLIGIBLE INFLOW	BEHIND TBM CUTTER HEAD	CONTINUOUS ADVANCE		-	-	-	-	-	-	-	-	-	-	-	-		
		1B	ROCK SENSITIVE TO WATER		CONTINUOUS ADVANCE AND SUPPORT INSTALLATION	1. STEEL WIRE MESH 100/100/6/6 MM 2. SHOTCRETE	1 LAYER, EXTRADOS 50 mm	< 40 m < 40 m	15,12 15,12	1 LAYER EXTRADOS 50 mm	< 40 m < 40 m	7,56 7,56	1 LAYER EXTRADOS 50 mm	< 40 m < 40 m	15,12 15,12	50 mm	< 40 m	7,56	37,80 45,36	m2 m2
LOOSENING OF ROCK IN CROWN OR LOCALIZED AREA	LOCKPORT DE CEW WHIRLPOOL	2	WEDGES OF ROCK < 0,2 x 0,2 x 0,2 m APPROX.	< 5 mm 200 m																
		2A	DRY OR NEGLIGIBLE WATER	BEHIND TBM CUTTER HEAD	CONTINUOUS ADVANCE INTERRUPTED BY SUPPORT INSTALLATION	1. STEEL WIRE MESH 100/100/6/6 MM 2. STEEL PROFILES U NP 100 3. ROCK DOWELS SWELLEX OR EQ., L = 2.4 m 4. SHOTCRETE 5. ROCK DOWELS SN / RESIN, L = 2.5 m	1 LAYER, EXTRADOS e = 2.4 m c/e 4.0/1.2 70 mm c/e 4.0/1.2	< 7 m < 7 m < 7 m < 40 m < 40 m	15,12 6,30 3,33 15,12 3,33	1 LAYER, EXTRADOS e = 2.4 m - 70 mm c/e 4.0/1.2	< 40 m < 40 m - < 40 m < 40 m	7,56 3,15 - 7,56 2,50	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	- - - - -	22,68 9,45 3,33 22,68 5,83	m2 m pcs m2 pcs
		2B	SUBSTANTIAL INFLOW			6. DIMPLE MEMBRANE STRIPS L:W 4.0:1.0	e = 2.4 m	< 40 m	1,67	e = 2.4 m	< 40 m	1,67	-	-	-	-	-	-	3,33	m2
		2C	ROCK SENSITIVE TO WATER			1. STEEL WIRE MESH 100/100/6/6 MM 2. STEEL PROFILES U NP 100 3. ROCK DOWELS SWELLEX OR EQ., L = 2.4 m 4. SHOTCRETE 5. ROCK DOWELS SN / RESIN, L = 2.5 m 6. DIMPLE MEMBRANE STRIPS L:W 4.0:1.0	1 LAYER, EXTRADOS e = 2.4 m c/e 4.0/1.2 70 mm c/e 4.0/1.2 e = 2.4 m	< 7 m < 7 m < 7 m < 40 m < 40 m < 40 m	15,12 6,30 3,33 15,12 3,33 1,67	1 LAYER, EXTRADOS e = 2.4 m - 70 mm c/e 4.0/1.2 e = 2.4 m	< 40 m < 40 m - < 40 m < 40 m < 40 m	7,56 3,15 - 7,56 2,50 1,67	1 LAYER EXTRADOS - - 70 mm - -	< 40 m - - < 40 m - -	15,12 - - 15,12 - -	- - - 70 mm - -	< 40 m - - < 40 m - -	7,56 - - 7,56 - -	37,80 9,45 3,33 45,36 5,83 3,33	m2 m pcs m2 pcs m2



KEY PLAN
SCALE 1 : 50000

NOTES:

1. LOOSE ROCK TO BE REMOVED
2. LOCAL OVERBREAK TO BE FILLED WITH SHOTCRETE
3. POSITION OF ROCK DOWELS TO BE ADJUSTED TO REACH OF INSTALLATION EQUIPMENT.
4. STEEL WIRE MESH TO BE FIXED IN SHORT HOLES WITH ANCHORS (NOT SHOWN)
5. POSITION 2, 5, 7 AND 10 TO BE ADJUSTED TO ACTUAL GRIPPER POSITION OF TBM
6. QUANTITIES OF SUPPORT MEASURES ARE BASED ON LENGTH OF EXCAVATION LINE
7. SUPPORT MEASURES INCLUDED IN "CROSS SECTION" ARE DRAWN NOT TO SCALE
8.

STEEL PROFILE		UNP 100	UNIT
WEIGHT		10.6	kg/m
2ND MOMENT OF AREA y-y		206	cm⁴
	h	50.0	mm
	b	100.0	mm

1:100 0 2 4 6 8 10 m
1:5 0 0.1 0.2 0.3 0.4 0.5 m

rev no.	date	particulars	chkd	appd
02	05/05/12	ROCK MASS CHARACTERISTICS		
01	05/05/20	ANCHOR PLATE		
00		FIRST ISSUE		

NIAGARA TUNNEL FACILITY PROJECT

PROPOSAL
DIVERSION TUNNEL
ROCK SUPPORT TYPES 1 AND 2

ONTARIO POWER GENERATION — Electricity Production - Hydroelectric Technical Services

STRABAG — ILF CONSULTING ENGINEERS

drawn	designed by		
chkd			
date yy/mm/dd 05/04/20	design approved	plot scale 1:1 M	
scale 1:100/1:5	authorized	CAD file type DWG	

dwg no. PD-01-1005 — rev 02

A0 (841 x 1189)

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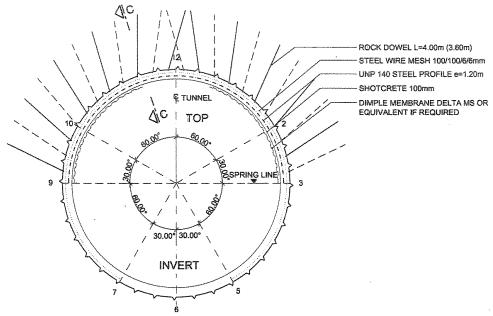
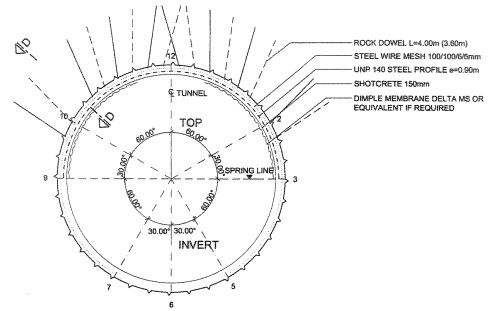
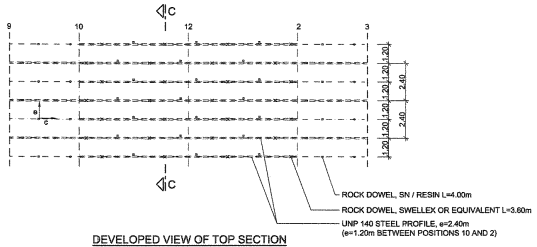


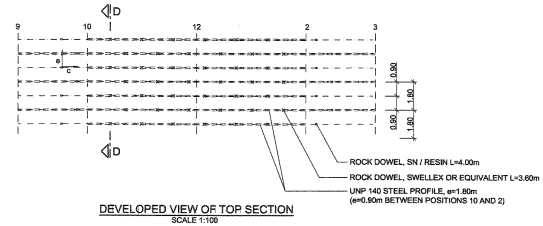
ROCK SUPPORT TYPE 3
CROSS SECTION, SCALE 1:100



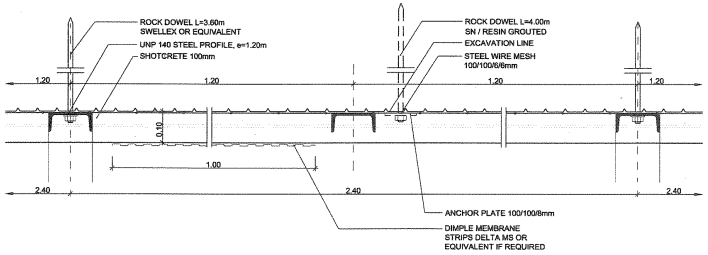
ROCK SUPPORT TYPE 4
CROSS SECTION, SCALE 1:100



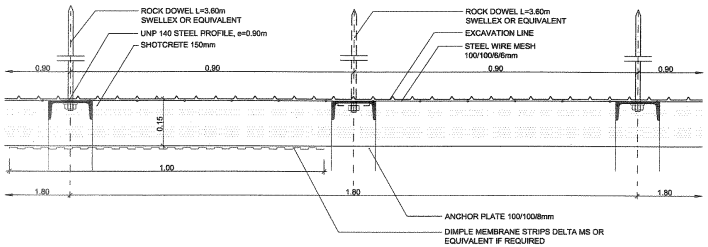
DEVELOPED VIEW OF TOP SECTION
SCALE 1:100



DEVELOPED VIEW OF TOP SECTION
SCALE 1:100



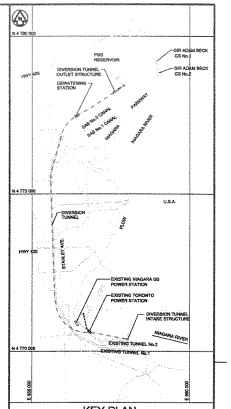
DETAIL SECTION C-C
SCALE 1:5



DETAIL SECTION D-D
SCALE 1:5

EXCAVATION AND SUPPORT TYPES 3 AND 4

ROCK MASS CHARACTERISTICS	ROCK MASS STRATIGRAPHY (DOMINANT)	ROCK SUPPORT TYPES	CLASSIFICATION CRITERIA ROCK MASS BEHAVIOUR	CLASSIFICATION CRITERIA PRESSENCE OF WATER	RADIAL DEF.	EFFECT ON ADVANCE OF TBM	SUPPORT MEASURES	TOP 12 TO 2 (10)	DISTANCE TO EXC. FACE	QUANTITY PER M	TOP 2 (10) TO 3 (9)	DISTANCE TO EXC. FACE	QUANTITY PER M	INVERT 3 (9) TO 5 (7)	DISTANCE TO EXC. FACE	QUANTITY PER M	INVERT 5 (7) TO 6	DISTANCE TO EXC. FACE	QUANTITY PER M	TOTAL QUANTITY	UNIT
UNSTABLE OR CLOSELY BROKEN ROCK	ROCHESTER REYNALES NEAHGA TOROLD GRIMSBY POWERGLEN WHIRLPOOL QUEENSTON	3	WEDGES OF ROCK < 0,5 x 0,5 x 0,5 m APPROX.		< 10 mm 200 m																
FREQUENT OVERBREAK DUE TO DISCONTINUITIES		3A	DRY OR LIMITED WATER		BEHIND TBM CUTTER HEAD	CONTINUOUS ADVANCE INTERRUPTED BY SUPPORT INSTALLATION	1. STEEL WIRE MESH 100/100/6/6 MM	1 LAYER, EXTRADOS	< 7 m	15,12	1 LAYER, EXTRADOS	< 40 m	7,56	1 LAYER, EXTRADOS	< 40 m	15,12	-	-	-	37,80	m2
							2. STEEL PROFILES U NP 140	e = 1.2 m	< 7 m	12,60	e = 2.4 m	< 40 m	3,15	-	-	-	-	-	-	15,75	m
							3. ROCK DOWELS SWELLEX OR EQ., L = 3.6 m	c/e 4.0/1.2	< 7 m	3,33	-	-	-	-	-	-	-	-	-	3,33	pcs
							4. SHOTCRETE	100 mm	< 40 m	15,12	100 mm	< 40 m	7,56	100 mm	< 40 m	15,12	100 mm	< 40 m	7,56	45,36	m2
							5. ROCK DOWELS SN / RESIN, L = 4.0 m	c/e 4.0/1.2	< 40 m	2,50	c/e 4.0/1.2	< 40 m	3,33	-	-	-	-	-	-	5,83	pcs
		3B	SUBSTANTIAL INFLOW				6. DIMPLE MEMBRANE STRIPS LxW 4,0x1,0	e = 2.4 m	< 40 m	1,67	e = 2.4 m	< 40 m	1,67	-	-	-	-	-	-	3,33	m2
UNSTABLE OR CLOSELY BROKEN ROCK CONTINUOUS OVERBREAK DUE TO ANY OF: -DISCONTINUITIES -SIDEWALL SPALLING -INVERT HEAVE	LOCKPORT ROCHESTER REYNALES NEAHGA TOROLD GRIMSBY POWERGLEN WHIRLPOOL QUEENSTON	4	WEDGES OF ROCK < 1,0 x 1,0 x 1,0 m APPROX.		< 20 mm 200 m																
		4A	DRY OR UNLIMITED WATER		BEHIND TBM CUTTER HEAD	CONTINUOUS ADVANCE INTERRUPTED BY SUPPORT INSTALLATION	1. STEEL WIRE MESH 100/100/6/6 MM	1 LAYER, EXTRADOS	< 7 m	15,12	1 LAYER, EXTRADOS	< 40 m	7,56	1 LAYER, EXTRADOS	< 40 m	15,12	-	-	-	37,80	m2
							2. STEEL PROFILES U NP 140	e = 0.9 m	< 7 m	16,80	e = 1.8 m	< 40 m	4,20	-	-	-	-	-	-	21,00	m
							3. ROCK DOWELS SWELLEX OR EQ., L = 3.6 m	c/e 2.0/0.9	< 7 m	6,67	-	-	-	-	-	-	-	-	-	6,67	pcs
							4. SHOTCRETE	150 mm	< 40 m	15,12	150 mm	< 40 m	7,56	150 mm	< 40 m	15,12	150 mm	< 40 m	7,56	45,36	m2
							5. ROCK DOWELS SN / RESIN, L = 4.0 m	-	-	-	c/e 4.0/0.9	< 40 m	4,44	-	-	-	-	-	-	4,44	pcs
		4B	SUBSTANTIAL INFLOW				6. DIMPLE MEMBRANE STRIPS LxW 4,0x1,0	e = 2.4 m	< 40 m	1,67	e = 1.8 m	< 40 m	1,67	-	-	-	-	-	-	3,33	m2



KEY PLAN
SCALE 1 : 50000

NOTES:

1. LOOSE ROCK TO BE REMOVED
2. LOCAL OVERBREAK TO BE FILLED WITH SHOTCRETE
3. POSITION OF ROCK DOWELS TO BE ADJUSTED TO REACH OF INSTALLATION EQUIPMENT.
4. STEEL WIRE MESH TO BE FIXED IN SHORT HOLES WITH ANCHORS (NOT SHOWN)
5. POSITION 2, 5, 7 AND 10 TO BE ADJUSTED TO ACTUAL GRIPPER POSITION OF TBM
6. QUANTITIES OF SUPPORT MEASURES ARE BASED ON LENGTH OF EXCAVATION LINE
7. SUPPORT MEASURES INCLUDED IN "CROSS SECTION" ARE DRAWN NOT TO SCALE
8.

STEEL PROFILE		UNP 140	UNIT
WEIGHT		16.0	kg/m
2*MOMENT OF AREA y-y		605	cm*
	h	80.0	mm
	b	140.0	mm

1:100 0 2 4 6 8 10 m
1:5 0 0.1 0.2 0.3 0.4 0.5 m

issue	date	description
02	05/08/13	ROCK MASS CHARACTERISTICS
01	03/08/29	ANCHOR PLATE
00		FIRST ISSUE

NIAGARA TUNNEL FACILITY PROJECT

PROPOSAL
DIVERSION TUNNEL
ROCK SUPPORT TYPES 3 AND 4

ONTARIO POWER GENERATION — Electricity Production - Hydroelectric Technical Services

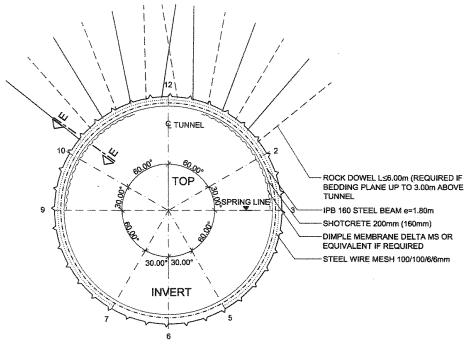
STRABAG — CONSULTING ENGINEERS

date 05/04/29 — scale 1:100 — 1:1 M — 1:100

scale 1:100/1:5 — CAD file type DWG — 1:5

dwg no. PD-01-1006 — rev 02

A0 (841 x 1189)

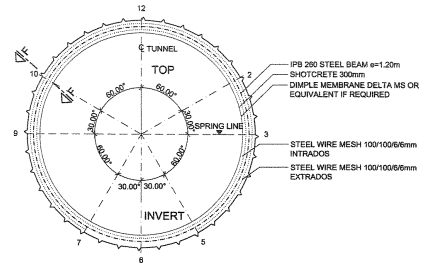


ROCK SUPPORT TYPE 5
CROSS SECTION, SCALE 1:100

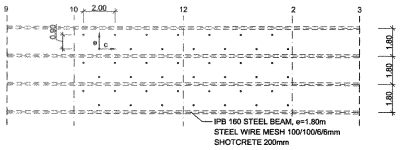
ROCK SUPPORT TYPE 5:
BEDDING PLANE >3,0m ABOVE TUNNEL
SHOTCRETE THICKNESS 200mm
NO ROCK DOWELS

BEDDING PLANE 1,5m-3,0m ABOVE TUNNEL
SHOTCRETE THICKNESS 160mm
ROCK DOWELS: L=6,0m

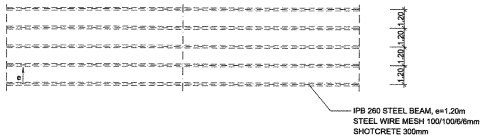
BEDDING PLANE 0m-1,5m ABOVE TUNNEL
SHOTCRETE THICKNESS 160mm
ROCK DOWELS: L=4,0m



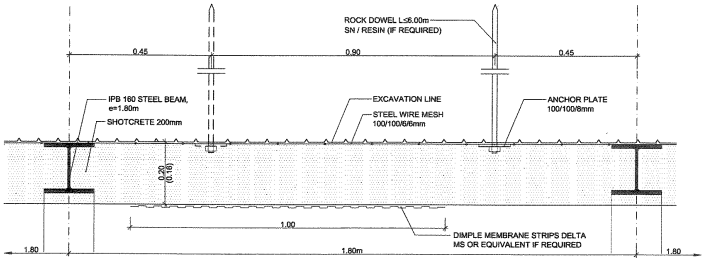
ROCK SUPPORT TYPE 6
CROSS SECTION, SCALE 1:100



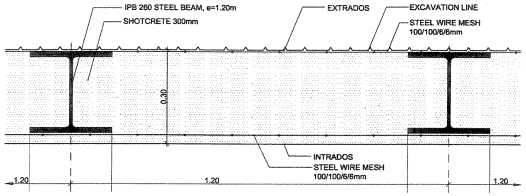
DEVELOPED VIEW OF TOP SECTION
SCALE 1:100



DEVELOPED VIEW OF TOP SECTION
SCALE 1:100



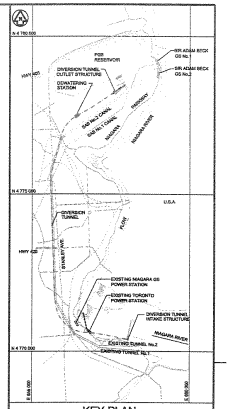
DETAIL SECTION E-E
SCALE 1:5



DETAIL SECTION F-F
SCALE 1:5

EXCAVATION AND SUPPORT TYPES 5 AND 6

ROCK MASS CHARACTERISTICS	ROCK MASS STRATIGRAPHY (DOMINANT)	ROCK SUPPORT TYPES	CLASSIFICATION CRITERIA: ROCK MASS BEHAVIOUR PRESENCE OF WATER	CLASSIFICATION CRITERIA: RADIAL DEF.	CLASSIFICATION CRITERIA: EFFECT ON ADVANCE OF TBM	SUPPORT MEASURES	DISTANCE TO EXC. FACE	QUANTITY PER M	TOP 2 (10) TO 3 (9)	DISTANCE TO EXC. FACE	QUANTITY PER M	INVERT 3 (9) TO 5 (7)	DISTANCE TO EXC. FACE	QUANTITY PER M	INVERT 5 (7) TO 6	DISTANCE TO EXC. FACE	QUANTITY PER M	TOTAL QUANTITY	UNIT
CONTINUOUS OVERBREAK DUE TO ANY OF: - SIDEWALL SPALLING - INVERT HEAVE - SLABBING	QUEENSTON	5	WEDGES OF ROCK < 15,0 x 3,0 x 3,0 m APPROX.	< 50 mm 200 m BEHIND TBM CUTTER HEAD	CONTINUOUS ADVANCE GOVERNED BY SUPPORT INSTALLATION														
		5A	DRY OR LIMITED WATER			1. STEEL WIRE MESH 100/100/6/6 MM	< 7 m	15,12	1 LAYER, EXTRADOS	< 7 m	7,56	1 LAYER, EXTRADOS	< 7 m	15,12				37,8	m2
						2. STEEL BEAM IPB 160	< 7 m	8,40	e = 1.8 m	< 7 m	4,20	e = 1.8 m	< 7 m	8,40	e = 1.8 m	< 7 m	4,20	25,20	m
						3. ROCK DOWELS SN/RESIN L 6.00M	< 7 m	7,78										7,78	pcs
SQUEEZING ROCK CONDITIONS, ROCK PRESSURE GENERALLY EXCEEDING ROCK MASS STRENGTH, CROWN IS WITHIN 3M OF BEDDING PLANE						4. SHOTCRETE	< 40 m	15,12	200 mm	< 40 m	7,56	200 mm	< 40 m	15,12	200 mm	< 40 m	7,56	45,36	m2
		5B	SUBSTANTIAL INFLOW			5. DIMPLE MEMBRANE STRIPS LxW 4,0x1,0	< 40 m	1,67	e = 2.4 m	< 40 m	1,67	-	-	-	-	-	-	3,33	m2
CONTINUOUS OVERBREAK DUE TO ANY OF - SIDEWALL SPALLING - INVERT HEAVE - SLABBING	QUEENSTON	6	WEDGES OF ROCK < 20,0 x 10,0 x 4,0 m APPROX.	< 50 mm 200 m BEHIND TBM CUTTER HEAD	CONTINUOUS ADVANCE GOVERNED BY SUPPORT INSTALLATION	1. STEEL WIRE MESH 100/100/6/6 MM	< 7 m	15,12	1 LAYER, EXTRADOS	< 7 m	7,56	1 LAYER, EXTRADOS	< 7 m	15,12	-	-	-	37,80	m2
						2. STEEL BEAM IPB 260	< 7 m	12,60	e = 1.2 m	< 7 m	6,30	e = 1.2 m	< 7 m	12,60	e = 1.2 m	< 7 m	6,30	37,90	m
						3. STEEL WIRE MESH 100/100/6/6 MM	< 40 m	15,12	1 LAYER, INTRADOS	< 40 m	7,56	1 LAYER, INTRADOS	< 40 m	15,12	1 LAYER, INTRADOS	< 40 m	7,56	45,36	m2
SQUEEZING ROCK CONDITIONS, ROCK PRESSURE GENERALLY EXCEEDING ROCK MASS STRENGTH, CLOSELY BROKEN SHEAR AND AND THRUST ZONES, CROWN IS WITHIN 3M OF BEDDING PLANE, ALL OTHER COND. REQUIRING GREATER SUPPORT THAN UNDER COND. 4Q AND 5						4. SHOTCRETE	< 7 + < 40 m	15,12	100 + 200 mm	< 7 + < 40 m	7,56	100 + 200 mm	< 7 + < 40 m	15,12	100 + 200 mm	< 7 + < 40 m	7,56	45,36	m2



KEY PLAN
SCALE 1 : 50000

NOTES:

1. LOOSE ROCK TO BE REMOVED
2. LOCAL OVERBREAK TO BE FILLED WITH SHOTCRETE
3. POSITION OF ROCK DOWELS TO BE ADJUSTED TO REACH OF INSTALLATION EQUIPMENT.
4. STEEL WIRE MESH TO BE FIXED IN SHORT HOLES WITH ANCHORS (NOT SHOWN)
5. POSITION 2, 5, 7 AND 10 TO BE ADJUSTED TO ACTUAL GRIPPER POSITION OF TBM
6. QUANTITIES OF SUPPORT MEASURES ARE BASED ON LENGTH OF EXCAVATION LINE
7. SUPPORT MEASURES INCLUDED IN "CROSS SECTION" ARE DRAWN NOT TO SCALE

8. STEEL PROFILE		IPB 160	IPB 260	UNIT
WEIGHT		42.6	93.0	kg/m
2nd MOMENT OF AREA y-y		2490	14920	cm^4
	h	160.0	260.0	mm
	b	160.0	280.0	mm

1:100 0 2 4 6 8 10 m
1:5 0 0.1 0.2 0.3 0.4 0.5 m

ref no	rev no	date	particulars	drwn	chkd	appd
	02	05/05/12	ROCK MASS CHARACTERISTICS			
	01	05/05/21	DOWELS TYPE 5			
	00		FIRST ISSUE			

NIAGARA TUNNEL FACILITY PROJECT

PROPOSAL
DIVERSION TUNNEL
ROCK SUPPORT TYPES 5 AND 6

ONTARIO POWER GENERATION — Electricity Production - Hydroelectric Technical Services

STRABAG — ILF CONSULTING ENGINEERING

drawn	designed by		
chkd			
date 05/04/29	project/dsg approved	plot scale 1:1 M	plot date
scale 1:100/1:5	authorized	CAD file type DWG	

drwg no PD-01-1007 rev 02

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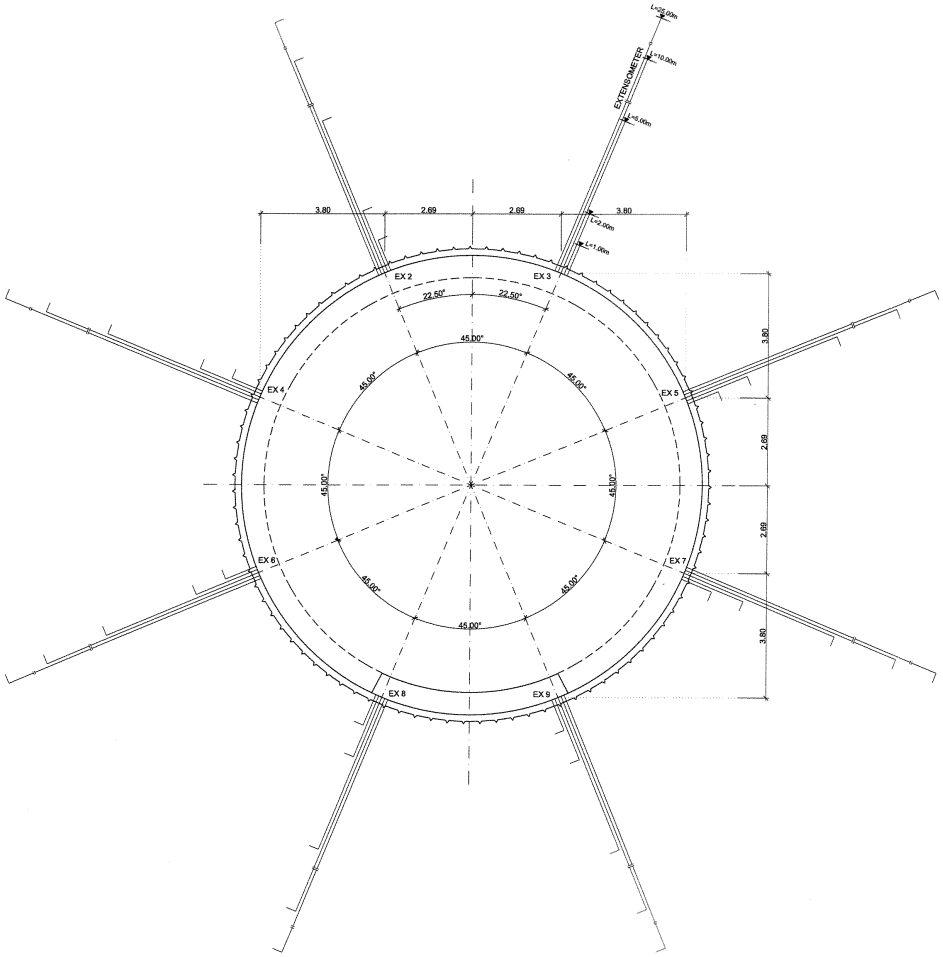
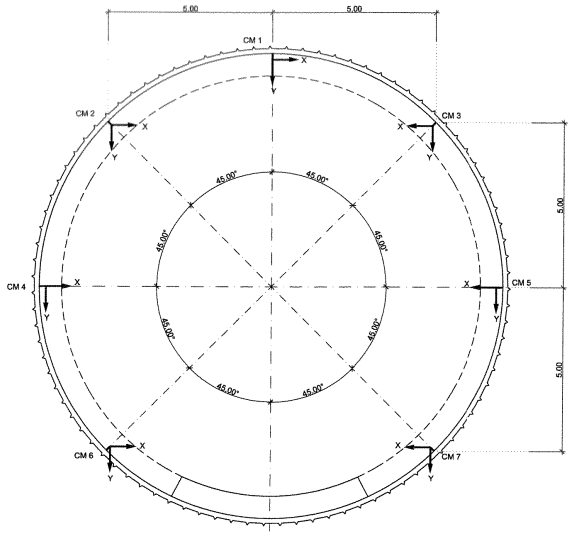
A0 (841 x 1189)

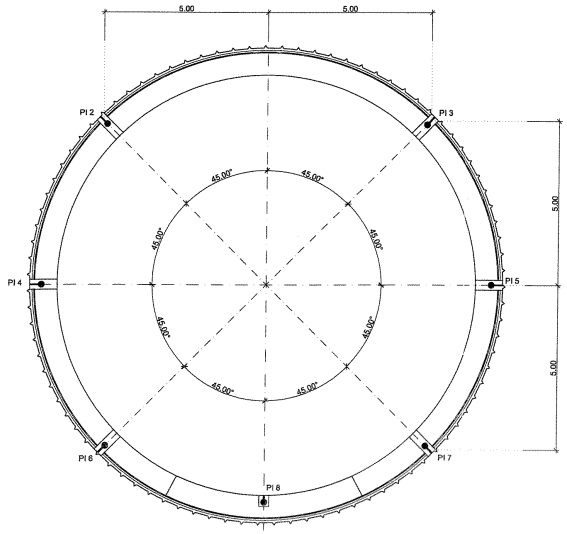
EXTENSOMETER MONITORING SECTION (EX)

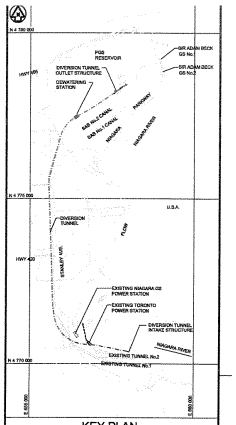


CONVERGENCE MONITORING SECTION (CM)



PIEZOMETER MONITORING SECTION (PI)





NOTES:

1. EXTENSOMETERS AND PIEZOMETERS TO BE PERMANENTELY LINKED TO DATA LOGGER AT THE GROUND SURFACE
2. FOR DETAILS OF PIEZOMETERS REFER TO DRG. PD-01-1021
3. FOR LOCATION OF MONITORING CROSS SECTIONS REFER TO DRG. PD-01-1002

ref. ref. number	ver. no.	date	particulars	drn.	chk.	appr.
	01					
	00		FIRST ISSUE			

NIAGARA TUNNEL FACILITY PROJECT

PROPOSAL
DIVERSION TUNNEL
GEOTECHNICAL MEASUREMENTS

ONTARIO POWER GENERATION — Electricity Production - Hydroelectric Technical Services

STRABAG — CONSULTING ENGINEERS

drn.	designed by		
chkd.			
date 05/04/29	design approved		plot scale 1:1 M
scale 1:50	authorized		plot. code
			CAD file type DWG

drg.no PD-01-1008 — ver. 00

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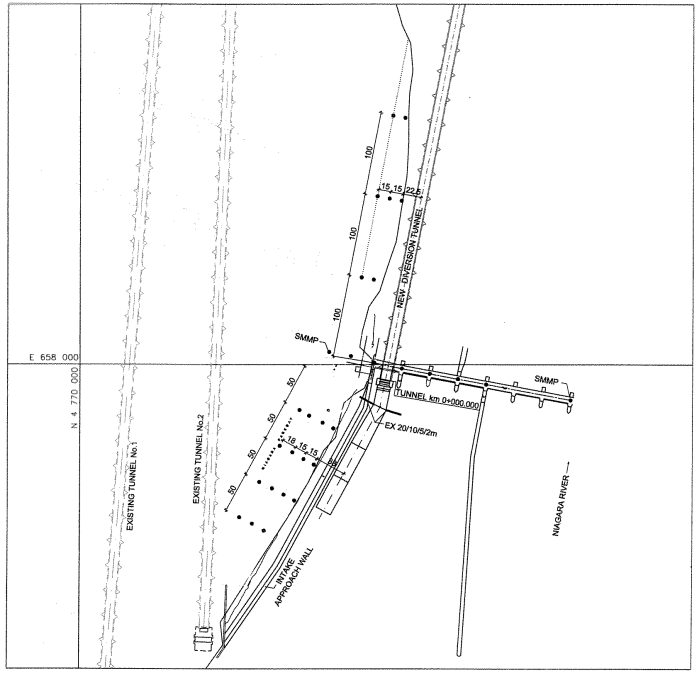
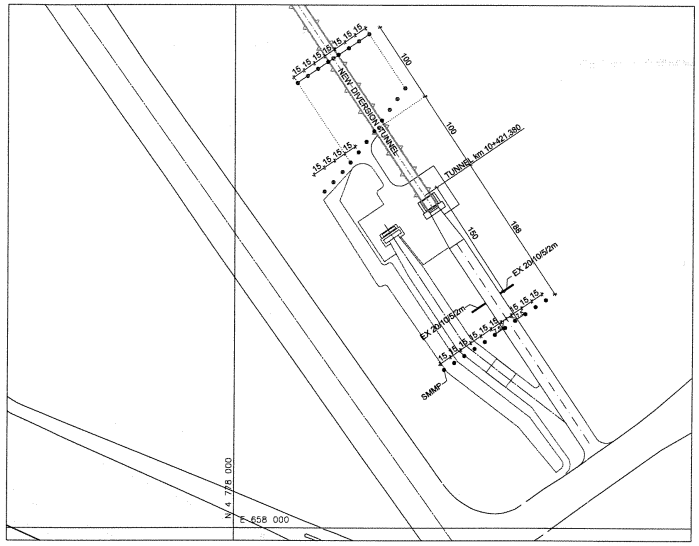
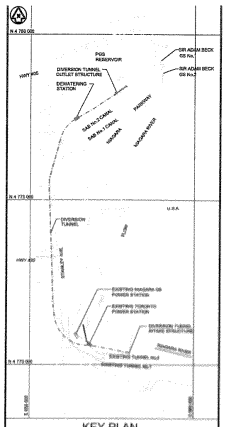


PLAN - INTAKE AREA
SCALE 1 : 2000



PLAN - OUTLET AREA
SCALE 1 : 2000



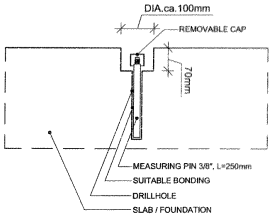
KEY PLAN
SCALE 1 : 50000

LEGEND:

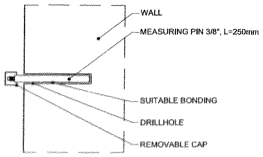
- ● ... MEASURING POINTS ON GROUND LEVEL
- ▼ ... MEASURING POINTS AT WALLS
- EX ... EXTENSOMETER

NOTES:

DIMENSIONS IN PLANS ARE IN METRES
UNLESS SHOWN OTHERWISE



MEASURING POINTS ON GROUND LEVEL



MEASURING POINTS AT WALLS

SURFACE MOVEMENT MONITORING POINT (SMMP)
SCALE 1 : 5

1:2000 0 50 100 150 200 m
1:5 0 100 200 300 400 500 mm

rev no/ number	rev no	date	particulars	chk	appr
	01				
	00		FIRST ISSUE		

NIAGARA TUNNEL FACILITY PROJECT

PROPOSAL
DIVERSION TUNNEL
GEOTECHNICAL MEASUREMENTS
SURFACE AND SUBSURFACE

ONTARIO POWER GENERATION — Electricity Production - Hydroelectric Technical Services

STRABAG — HLF CONSULTING ENGINEERS

date	yr/mo/dd/day	designed by	
	05/04/29	drawn approved	
scale	1:5, 1:2000	authorized	
			CAD file type DWG
			plot scale 1:1 M
			plot code
drg no	PD-01-1009		rev 00

A0 (841 x 1189)

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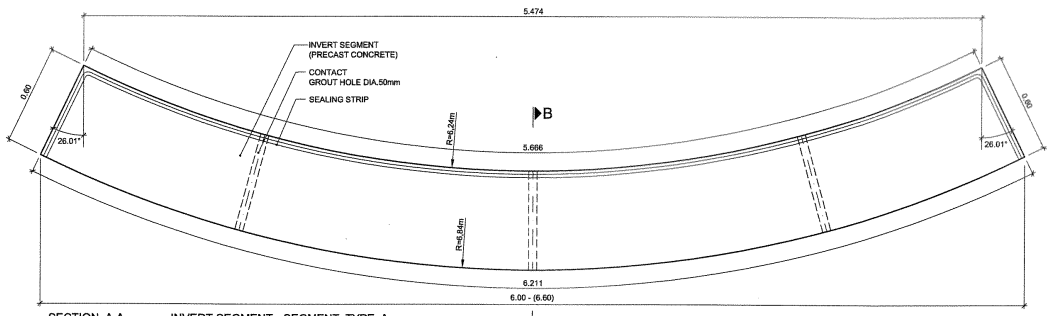
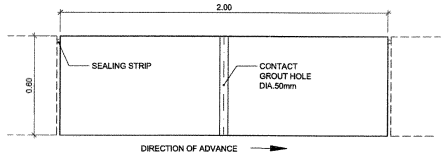


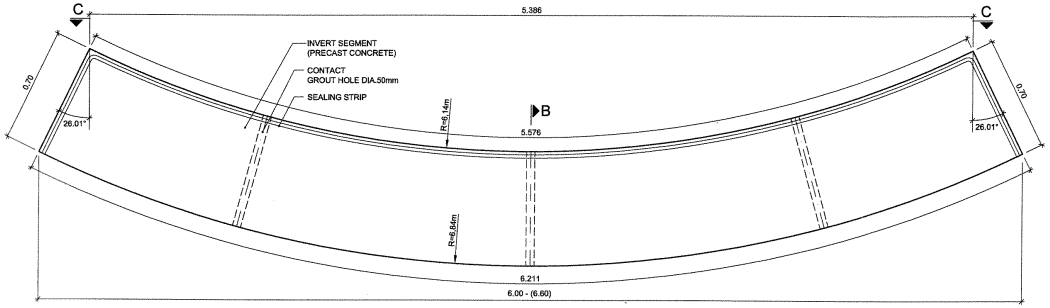
SECTION A-A INVERT SEGMENT - SEGMENT TYPE A:

SCALE: 1:10



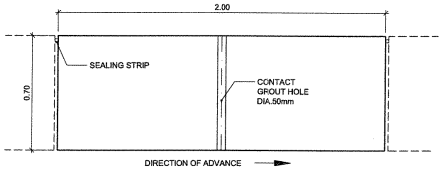
SECTION B-B SEGMENT TYPE A:

SCALE: 1:10



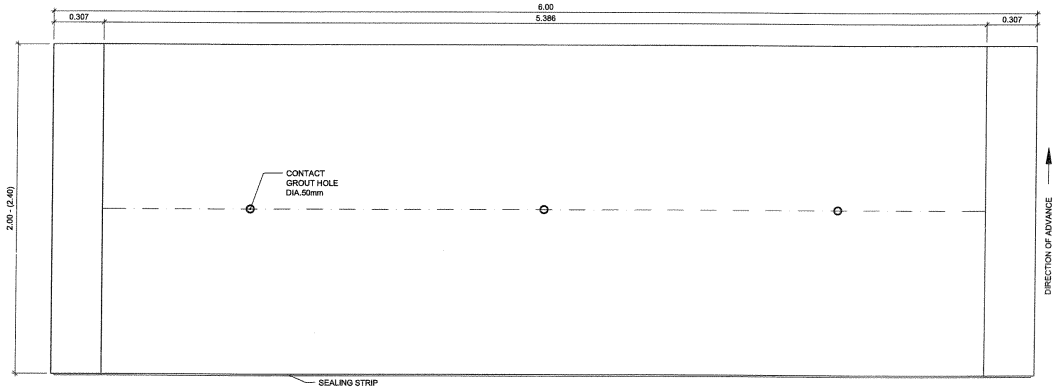
SECTION A-A INVERT SEGMENT - SEGMENT TYPE B:

SCALE: 1:10



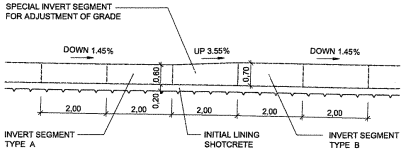
SECTION B-B SEGMENT TYPE B:

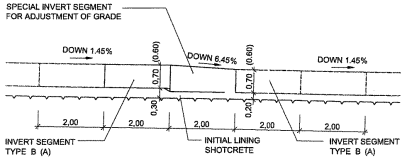
SCALE: 1:10



SECTION C-C INVERT SEGMENT - SEGMENT TYPE B:

SCALE: 1:10



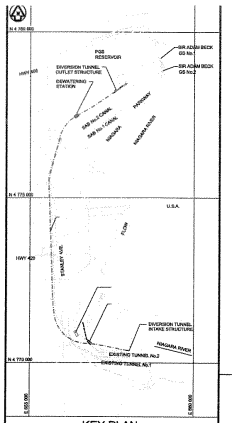


LINING THICKNESS CHANGE (INVERT):

SCALE: 1:50

1:50 0 1 2 3 4 5 m

1:10 0 200 400 600 800 1000 mm



KEY PLAN

SCALE 1 : 50000

NOTES:

1. MAX. CHANGE OF LINING THICKNESS AT TRANSITIONS IS 100mm.
2. MIN. LENGTH OF TRANSITIONS AT CHANGES OF INTERNAL DIAMETER IS 2.0m

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REFER REVISION	NO.	DATE	PARTICULARS	APPD	REVD

NIAGARA TUNNEL FACILITY PROJECT

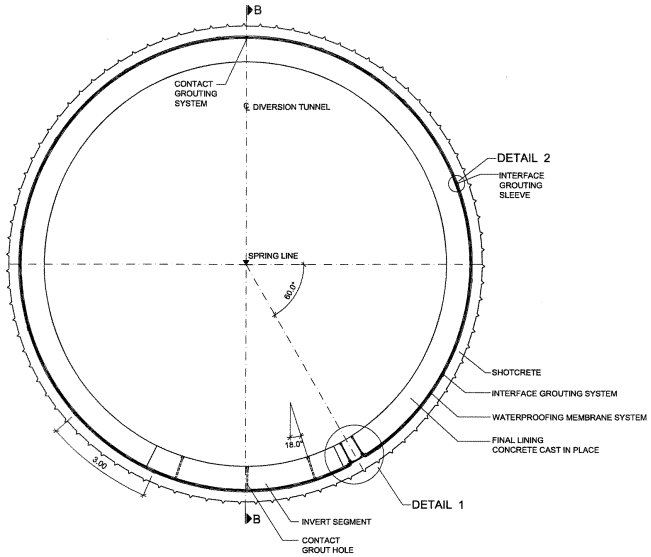
PROPOSAL
DIVERSION TUNNEL
INVERT SEGMENT
SECTIONS AND DETAILS

ONTARIO POWER GENERATION — Electricity Production - Hydroelectric Technical Services

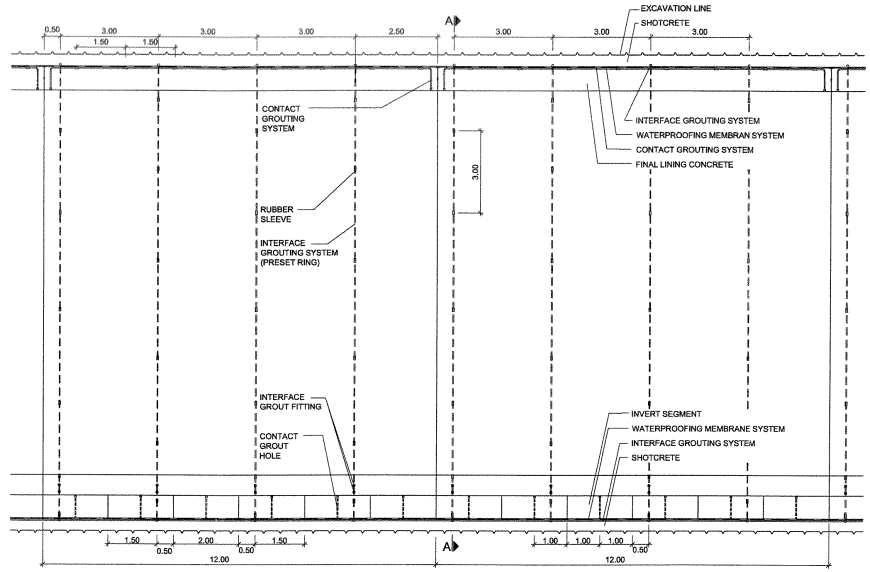
STRABAG — ILF CONSULTING ENGINEERS

DWN	designed by	SCALE	
CHK			
date yr/mo/dd/day 05/04/29	design approved	plot scale 1:1 M	
scale 1:10, 50	authorized	CAD file type DWG	
dwg no PD-01-1010			ver 00

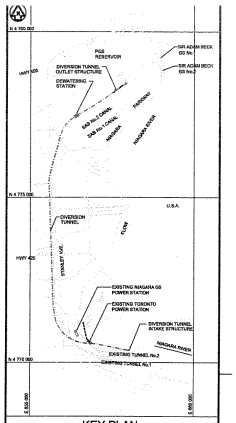
A0 (841 x 1189)



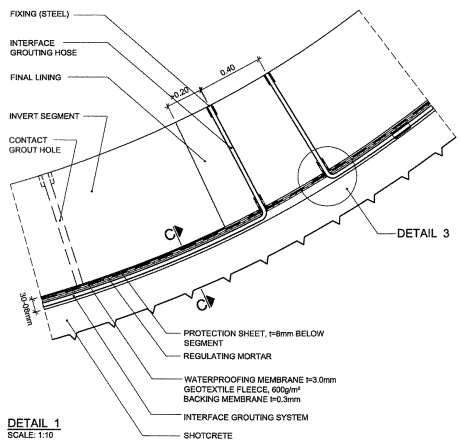
CROSS SECTION A-A
SCALE: 1:50



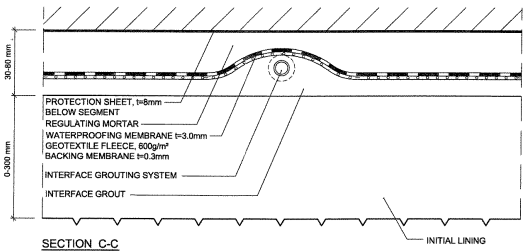
LONGITUDINAL SECTION B-B
SCALE: 1:50



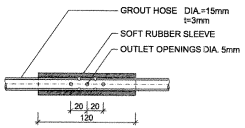
KEY PLAN
SCALE 1 : 50000



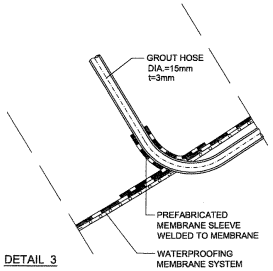
DETAIL 1
SCALE: 1:10



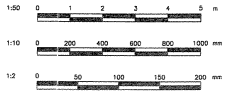
SECTION C-C
SCALE: 1:2



DETAIL 2
SCALE: 1:2
INTERFACE GROUTING SYSTEM
GROUT HOSE WITH OUTLET VALVE



DETAIL 3
SCALE: 1:2



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ref. of number	rev. no.	date	particulars	drawn / checked	appr.

NIAGARA TUNNEL FACILITY PROJECT

PROPOSAL
DIVERSION TUNNEL
INTERFACE GROUTING
SECTION AND DETAILS

ONTARIO POWER GENERATION — Electricity Production - Hydroelectric Technical Services

STRABAG — ILF CONSULTING ENGINEERS

drawn:	designed by:		
checked:			
date: 05/04/29	design approved:	DRAWING SCALE:	print scale 1:1 M
scale: 1:50, 1:10, 1:2	authorized:	CAD file type: DWG	
dwg no: PD-01-1019			ver. 00

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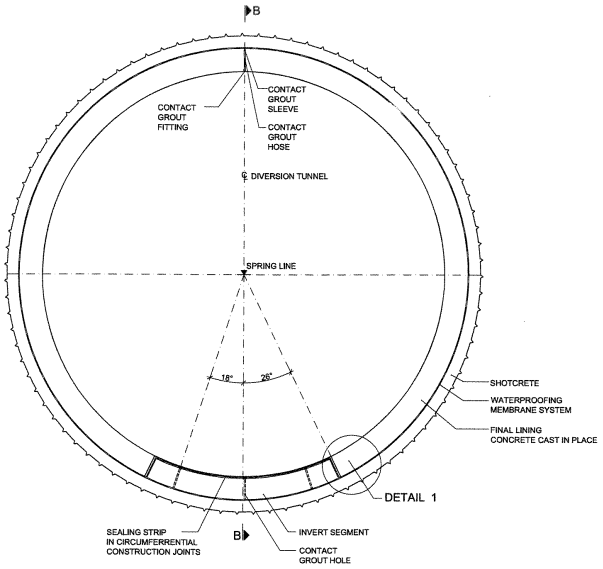
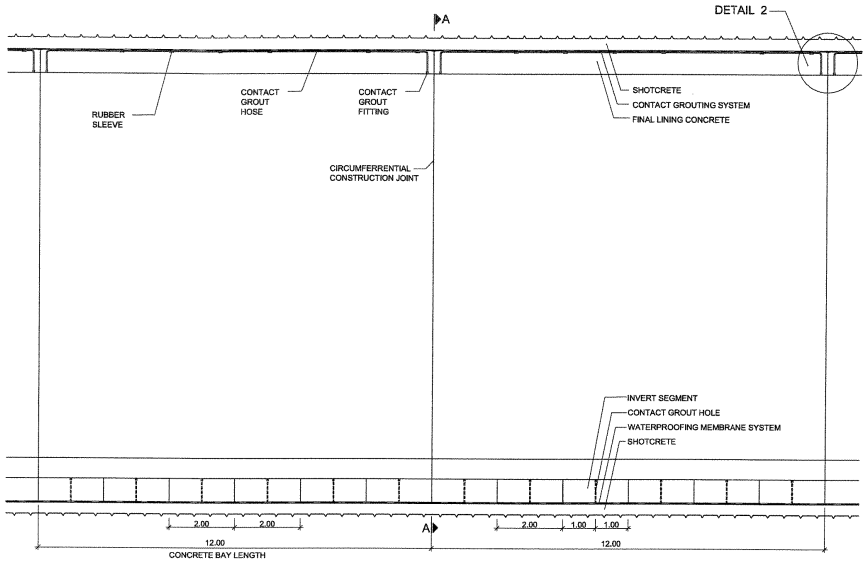
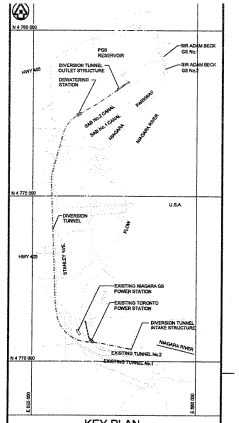


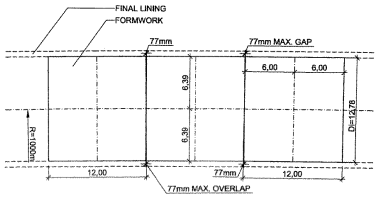
CROSS SECTION A-A
SCALE: 1:50



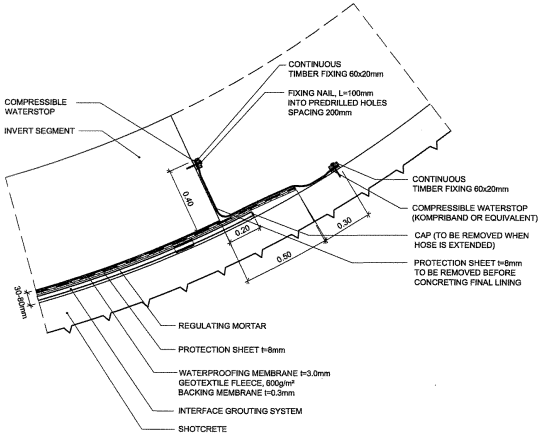
LONGITUDINAL SECTION B-B
SCALE: 1:50



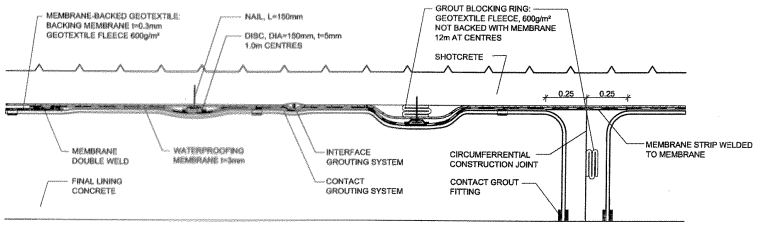
KEY PLAN
SCALE 1 : 50000



12m LONG FORMWORK AT HORIZONTAL / VERTICAL CURVE
SCALE: 1:200



DETAIL 1
SCALE: 1:10
WATERPROOFING MEMBRANE PROTECTION



DETAIL 2
NOT TO SCALE
FIXING OF WATERPROOFING MEMBRANE SYSTEM AND CONTACT GROUTING SYSTEM

1:200 0 5 10 15 20 m
1:50 0 1 2 3 4 5 m
1:10 0 200 400 600 800 1000 mm

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NIAGARA TUNNEL FACILITY PROJECT

PROPOSAL
DIVERSION TUNNEL
FINAL LINING SECTIONS
AND DETAILS

ONTARIO POWER GENERATION — Electricity Production - Hydroelectric Technical Services

STRABAG — HLF CONSULTING ENGINEERS

drawn	designed by		
chkd			
date 05/04/29	design approved	plot scale 1:1 M	
scale 1:10, 1:50, 1:200	authorized	plot code	
		CAD file type DWG	

drg no PD-01-1020 — rev 00

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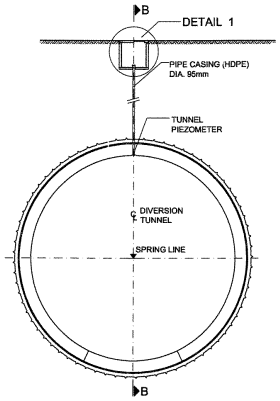
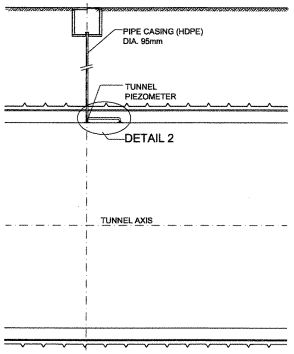
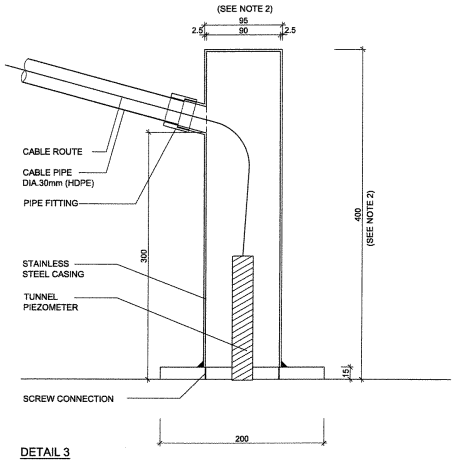


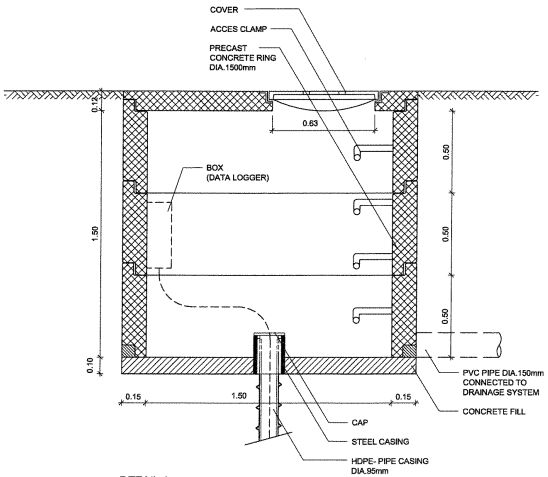
CROSS SECTION A-A
SCALE 1:100



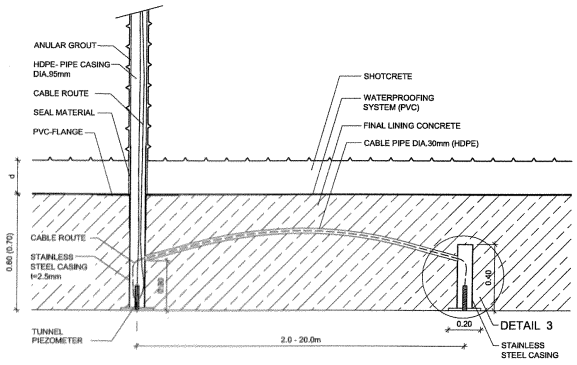
LONGITUDINAL SECTION B-B
SCALE 1:100



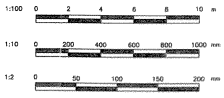
DETAIL 3
SCALE: 1:2

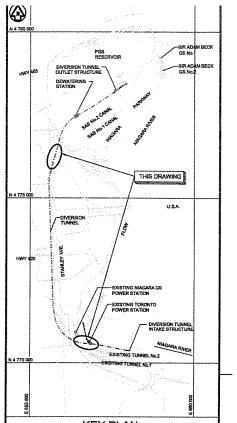


DETAIL 1
SCALE 1:10



DETAIL 2
SCALE 1:10





KEY PLAN
SCALE 1 : 50000

NOTES:

1. POSSIBLE OFFSET OF DRILLHOLE 2m WITH RESPECT TO DRILLING ACCURACY
2. DIMENSIONS OF STAINLESS STEEL CASING TO BE ADJUSTED ACCORDING TO THE PIEZOMETER MANUFACTURER'S RECOMMENDATION TO ALLOW MAINTENANCE OF THE INSTRUMENTS
3. TUNNEL PIEZOMETERS TO BE INSTALLED AT STATION 1+295.000m AND STATION 7+400.000m APPROXIMATELY.

ref. no. number	rev. no.	date	particulars	drawn	appr.
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NIAGARA TUNNEL FACILITY PROJECT

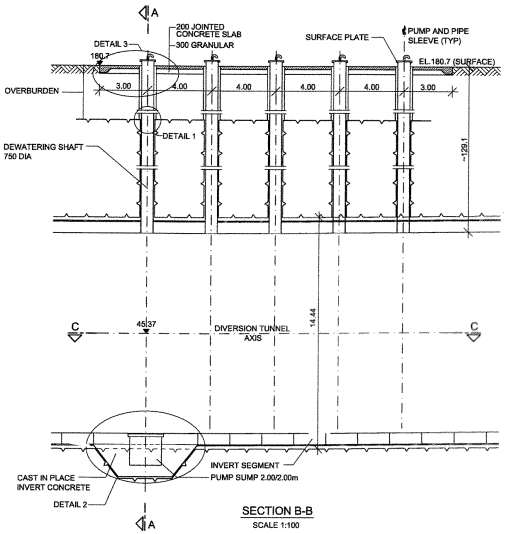
PROPOSAL
DIVERSION TUNNEL
TUNNEL PIEZOMETERS
SECTIONS AND DETAILS

ONTARIO POWER GENERATION — Electricity Production - Hydroelectric Technical Services

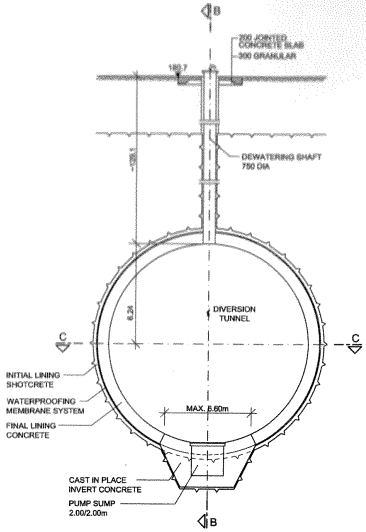
STRABAG — RJF CONSULTING ENGINEERS

drawn	designed by	S 200 scale	1:1 M
chkd		D	
date yy/mm/dd 05/04/29	design approved		
scale 1:2, 1:10, 1:100	publication	CAD file type DWG	
dwg no. PD-01-1021			ver 00

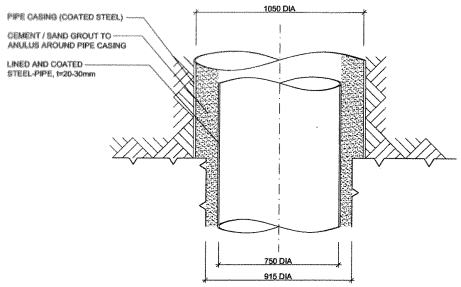
A0 (641 x 1189)



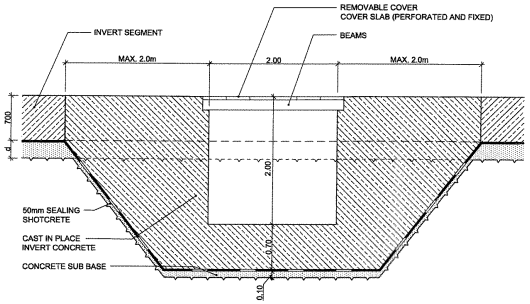
SECTION B-B
SCALE 1:100



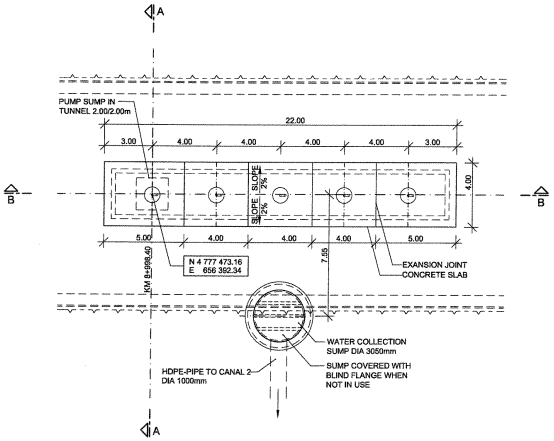
SECTION A-A
SCALE 1:100



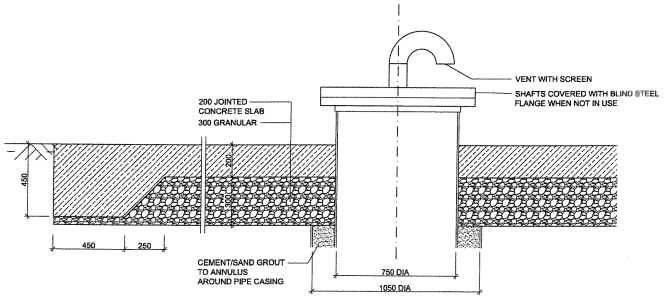
DETAIL 1
SCALE 1:10



DETAIL 2
SCALE 1:25

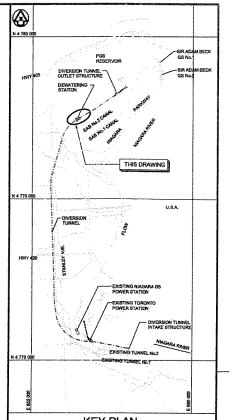


SURFACE PLAN
SCALE 1:100



DETAIL 3
SCALE 1:10

1:10 0 0.2 0.4 0.6 0.8 1.0 m
1:25 0 0.5 1.0 1.5 2.0 2.5 m
1:100 0 2 4 6 8 10 m



KEY PLAN
SCALE 1 : 50000

NOTES:

1. STEEL PIPE DIA.=750mm COATED WITH PE AND LINED WITH FUSION BONDED EPOXY

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NIAGARA TUNNEL FACILITY PROJECT

PROPOSAL
DIVERSION TUNNEL
DEWATERING SYSTEM PLAN, SECTIONS AND DETAILS

ONTARIO POWER GENERATION — Electricity Production - Hydroelectric Technical Services

STRABAG — ILF CONSULTING ENGINEERS

drawn	designed by		
chkd			
date yy/mm/dd/day 06/04/29	design approved		
scale 1:10, 1:25, 1:100	authorized		
			CAD file/ver DWG
dwg no PD-01-1022			ver 00

A0 (841 x 1189)

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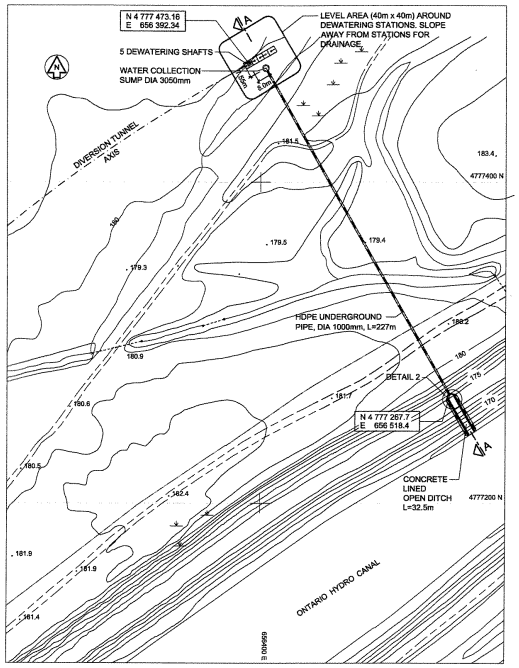
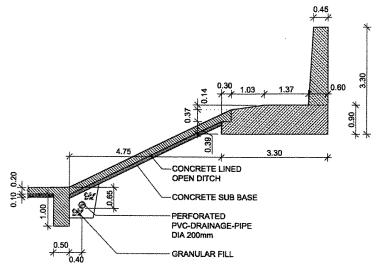
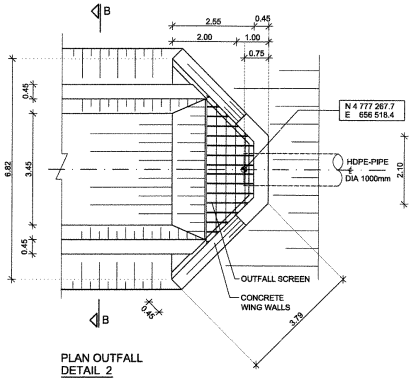


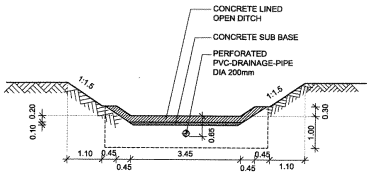
PLAN
SCALE 1:1000



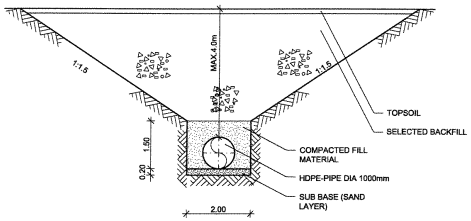
DETAIL 1
SCALE 1:50



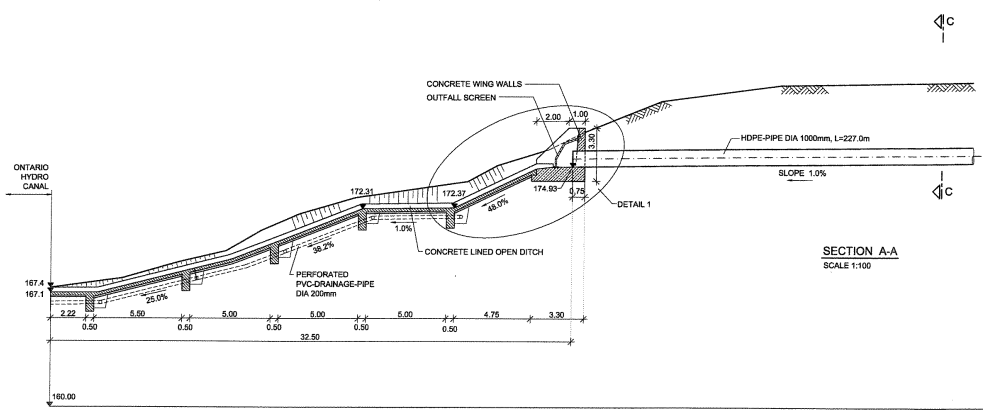
PLAN OUTFALL
DETAIL 2
SCALE 1:50



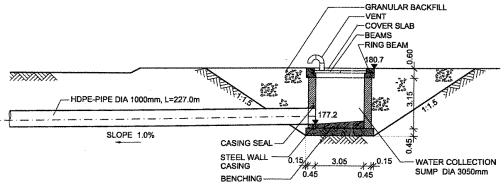
SECTION B-B
SCALE 1:50

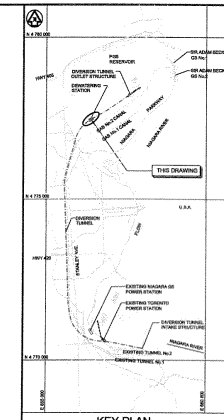


SECTION C-C
SCALE 1:50



SECTION A-A
SCALE 1:100





KEY PLAN
SCALE 1 : 50000

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ref no number	rev no	date	particulars	dwn	chkd	appd

NIAGARA TUNNEL FACILITY PROJECT

PROPOSAL
DIVERSION TUNNEL
DEWATERING OUTFALL AND PIPE
PLAN, SECTIONS AND DETAILS

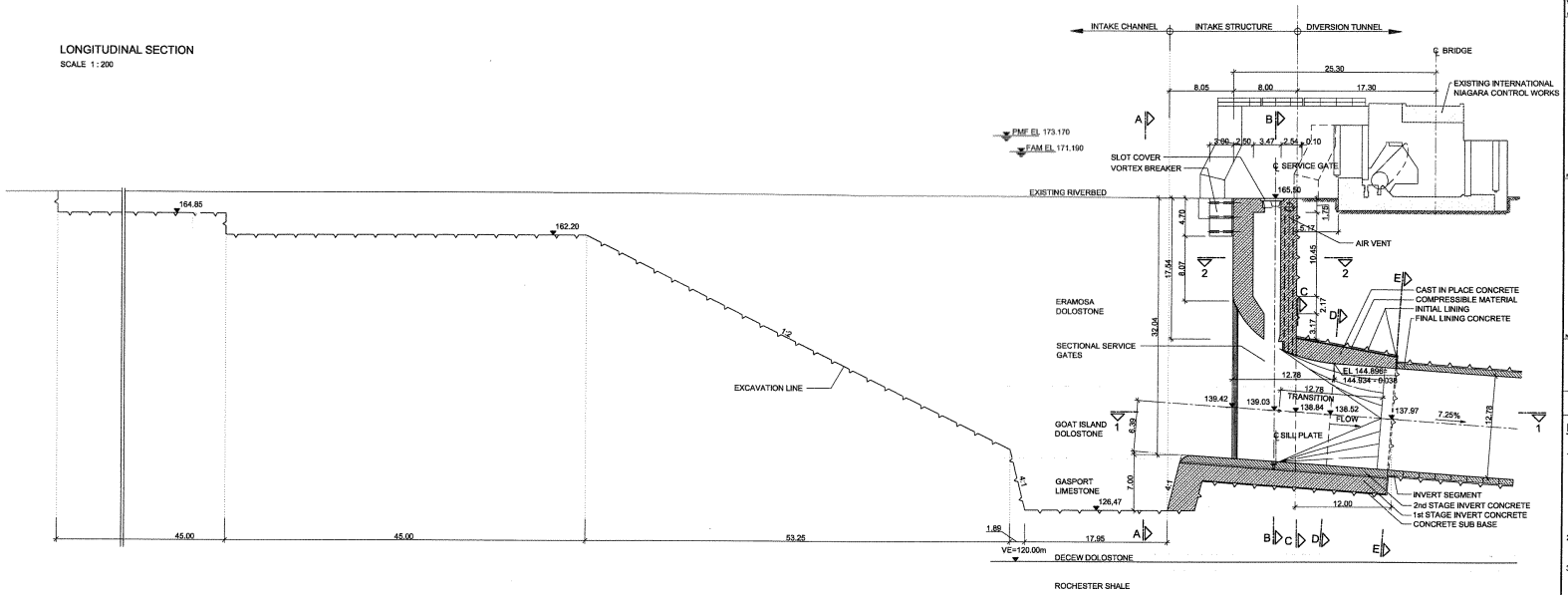
ONTARIO POWER GENERATION — Electricity Production - Hydroelectric Technical Services

STRABAG — ILF CONSULTING ENGINEERS

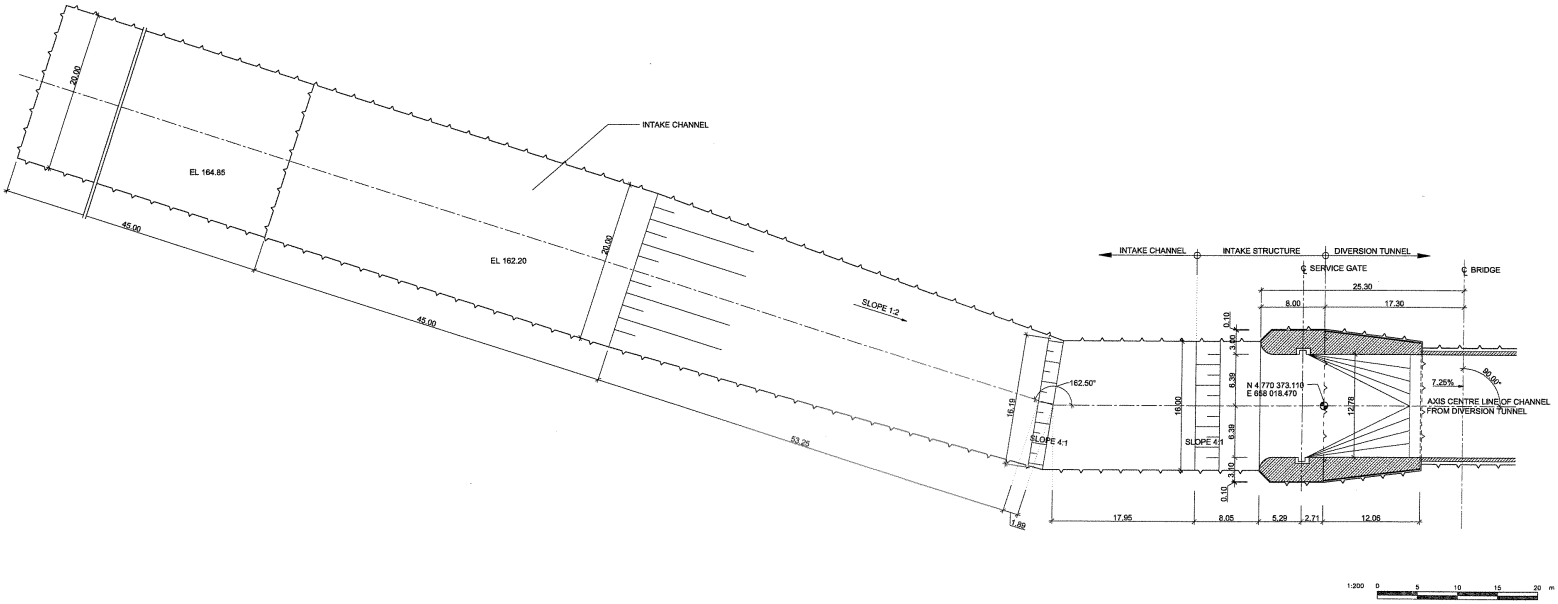
date	designed by		
date			
date	primordial day 05/04/29	design approved	plot scale 1:1 M
scale 1:50, 1:100, 1:1000	authorized		CAD file type DWG
dwg no PD-01-1023			rev 00

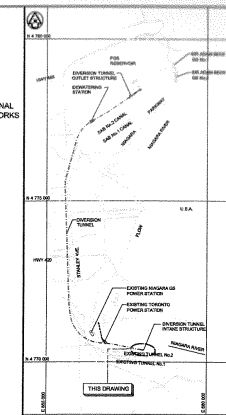
A0 (841 x 1189)

LONGITUDINAL SECTION
SCALE 1 : 200



PLAN 1 - 1
SCALE 1 : 200





KEY PLAN
SCALE 1 : 50000

NOTES:

1. INITIAL LINING CONSISTING OF:
   DIMPLE MEMBRANE DELTA MS OR EQUIVALENT IF REQUIRED
   STEEL WIRE MESH 150/150/6/6mm
   ROCK DOWELS L=3.60m, a/c=1.20/2.00m
   SWELLEX OR EQUIVALENT
   SHOTCRETE t=150mm
2. COMPRESSIBLE MATERIAL CONSISTING OF STYRODUR OR EQUIVALENT
3. SECTIONS A-A, B-B, C-C, D-D, E-E ON DRAWING PD-02-1016

LEGEND:

FAM ... FLOW ALLOWANCE MAXIMUM ELEVATION

PMF ... PROBABLE MAXIMUM FLOOD ELEVATION

BH ... BOREHOLE

	01		
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NIAGARA TUNNEL FACILITY PROJECT

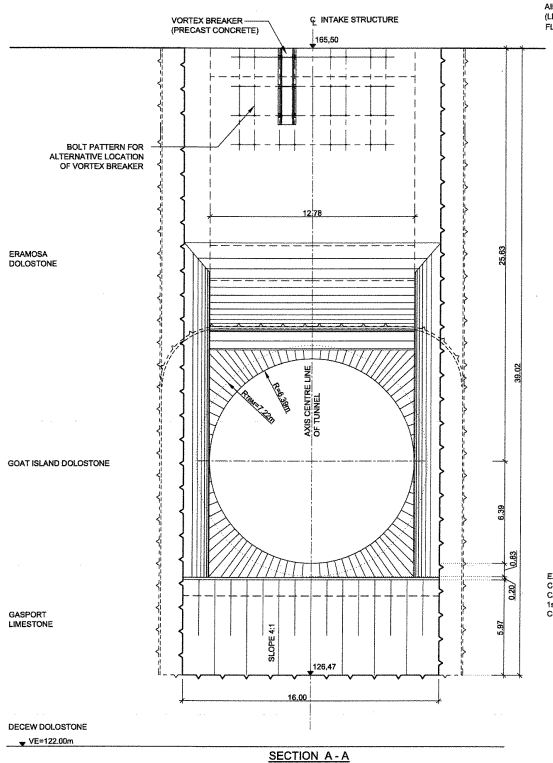
PROPOSAL
INTAKE STRUCTURE
PLAN AND LONGITUDINAL SECTION

ONTARIOPOWER GENERATION — Electricity Production - Hydroelectric Technical Services

STRABAG — ILF CONSULTING ENGINEERS

date	designed by		
drawn			
date	yyhmm/dd/day	design approved	1:1 M
	05/04/29		
scale		authorized	CAD file type
	1:200		DWG
dwg no			ver
PD-02-1015			00

A0 (841 x 1189)



SECTION A - A

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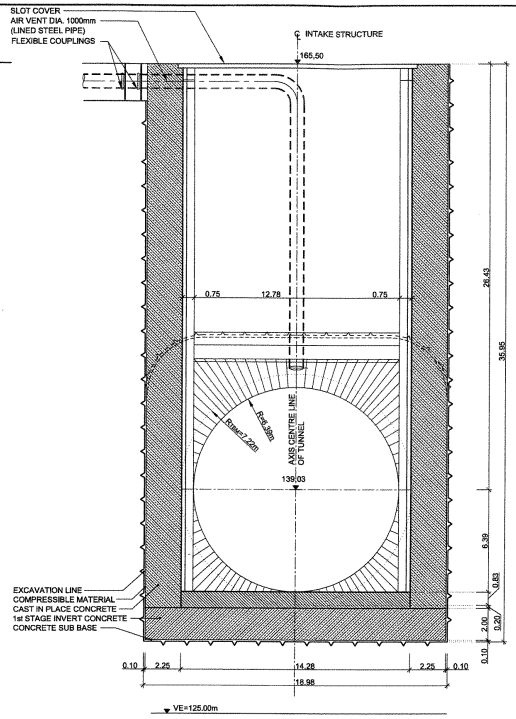

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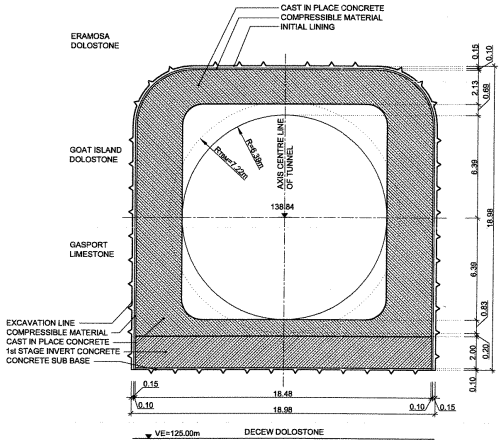

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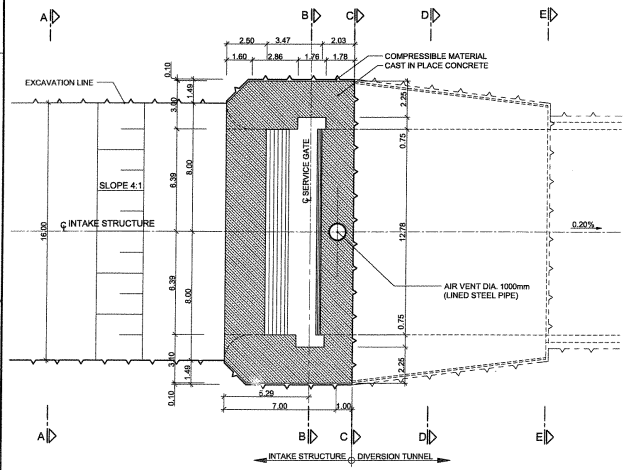
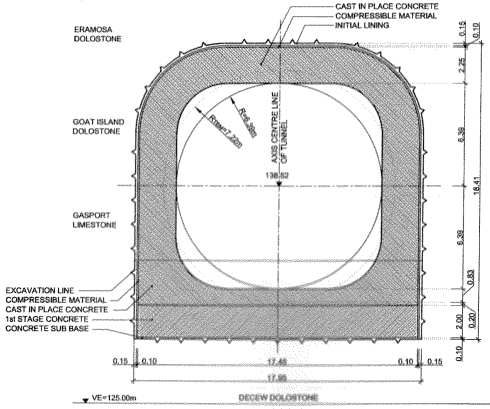


PLAN 2 - 2

SCALE 1 : 100



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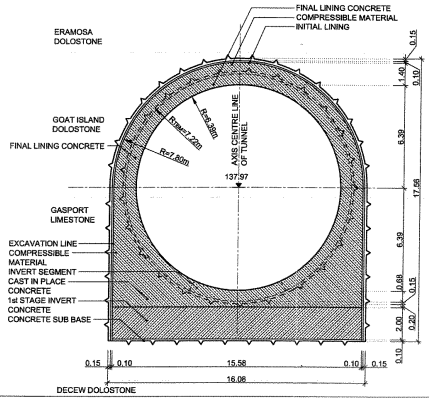

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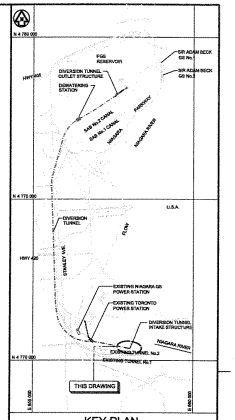

KEY PLAN

SCALE 1 : 50000

NOTES:

1. INITIAL LINING CONSISTING OF:
   DIMPLE MEMBRANE DELTA MS OR EQUIVALENT IF REQUIRED
   STEEL WIRE MESH 150/150/6/6mm
   ROCK DOWELS L=3.60m, a/c=1.20/2.00m
   SWELLEX OR EQUIVALENT
   SHOTCRETE t=150mm
2. COMPRESSIBLE MATERIAL CONSISTING OF STYRODUR OR EQUIVALENT
3. AIR VENT STEEL PIPE LINED WITH FUSION BONDED EPOXY.

1:100 0 2,5 5 7,5 10 m

rev no	date	particulars	drn	appr
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NIAGARA TUNNEL FACILITY PROJECT

PROPOSAL
INTAKE STRUCTURE
CROSS SECTIONS

ONTARIOPOWER GENERATION — Electricity Production - Hydroelectric Technical Services

STRABAG — HLF CONSULTING ENGINEERS

drawn:	designed by:		
date: 05/04/09	checked/date:	design approved:	plot scale: 1:1 M
scale: 1:100	authorized:		CAD file type: DWG
dwg no: PD-02-1016			rev: 00

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LONGITUDINAL SECTION
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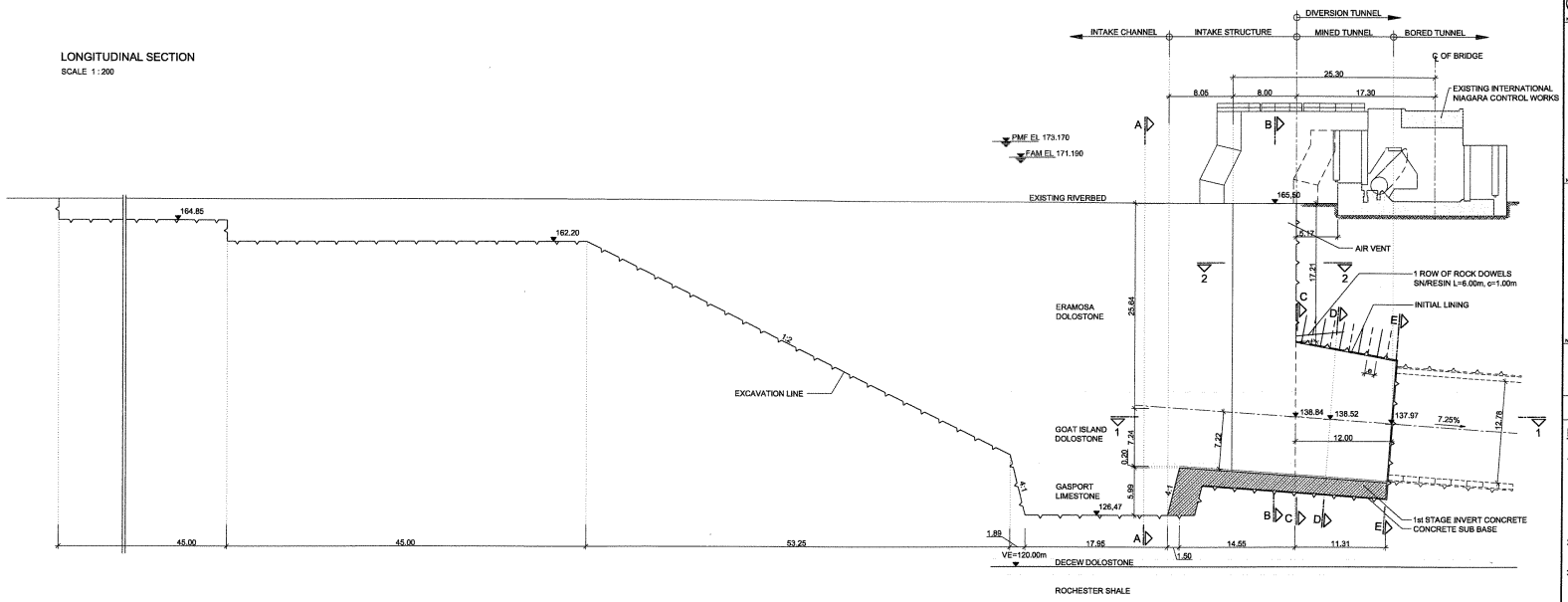

PLAN 1 - 1
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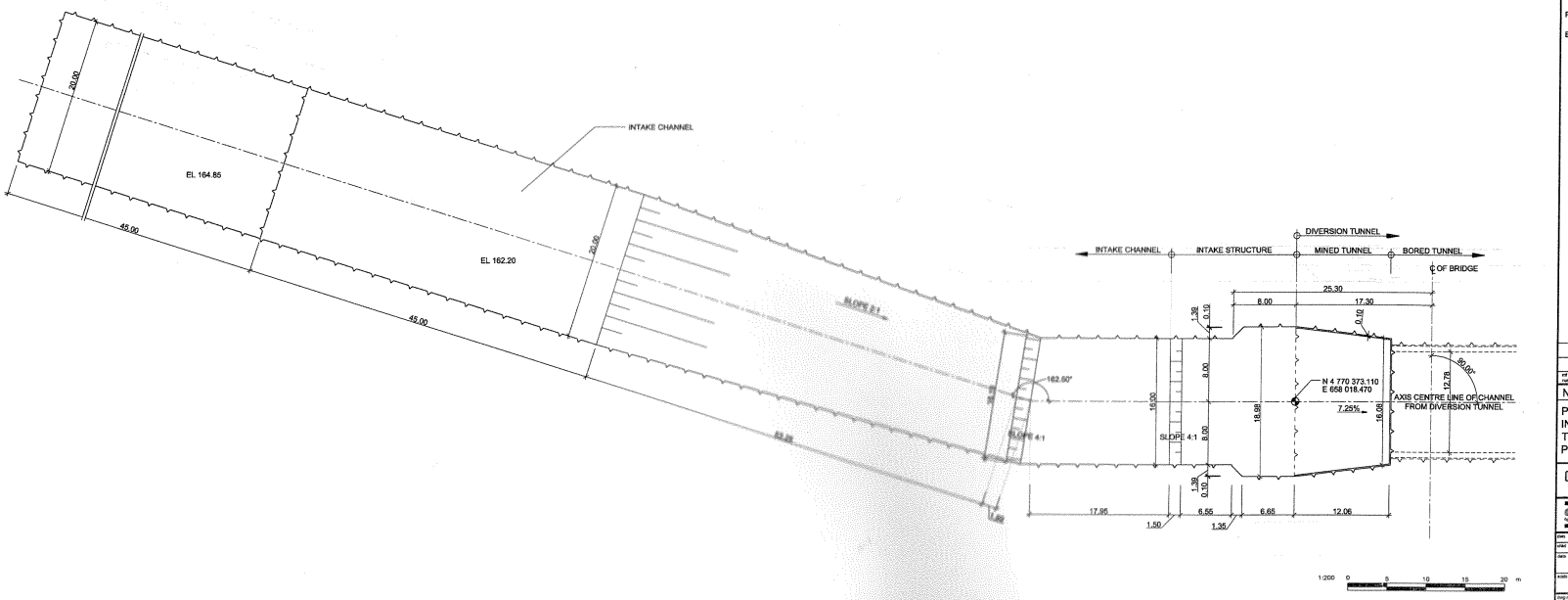

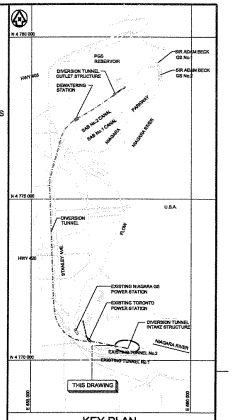

KEY PLAN
SCALE 1 : 50000

NOTES:

1. INITIAL LINING CONSISTING OF:
   DIMPLE MEMBRANE DELTA MS OR EQUIVALENT
   IF REQUIRED
   STEEL WIRE MESH 150/150/6/6mm
   ROCK DOWELS L=3.60m, s/c=1.20/2.00m
   SWELLEX OR EQUIVALENT
   SHOTCRETE t=150mm
2. COMPRESSIBLE MATERIAL CONSISTING OF STYRODUR OR EQUIVALENT
3. SECTIONS A-A, B-B, C-C, D-D, E-E ON DRAWING PD-02-1018

LEGEND:

FAM ... FLOW ALLOWANCE MAXIMUM ELEVATION

PMF ... PROBABLE MAXIMUM FLOOD ELEVATION

BH ... BOREHOLE

rev no	rev date	date	particulars	drn	chkd
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NIAGARA TUNNEL FACILITY PROJECT

PROPOSAL
INTAKE STRUCTURE
TBM RECEPTION
PLAN AND LONGIDUDINAL SECTION

ONTARIO POWER GENERATION — Electricity Production - Hydroelectric Technical Services

STRABAG — ILF CONSULTING ENGINEERS

date	prepared by	designed by	drawn by
05/04/29			
scale		drawing approved	drawn scale 1:1 M
1:200			plot scale
		authorized	CAD file type DWG
dwg no PD-02-1017			rev 00

A0 (841 x 1189)

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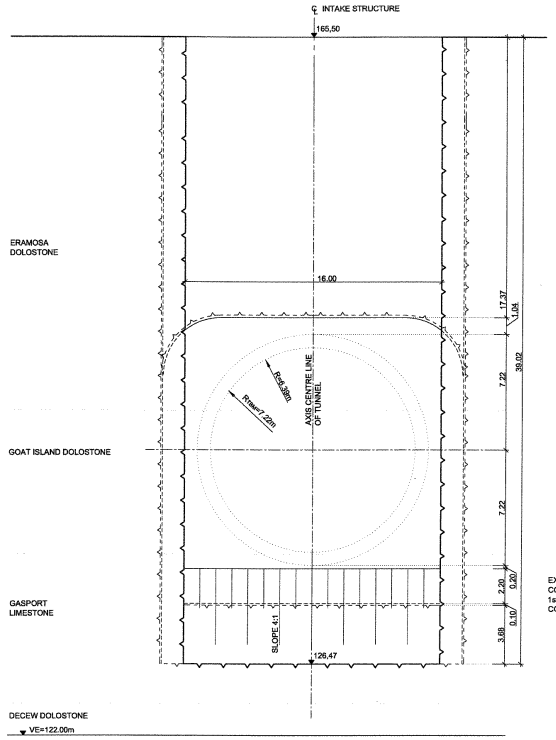

SECTION A - A

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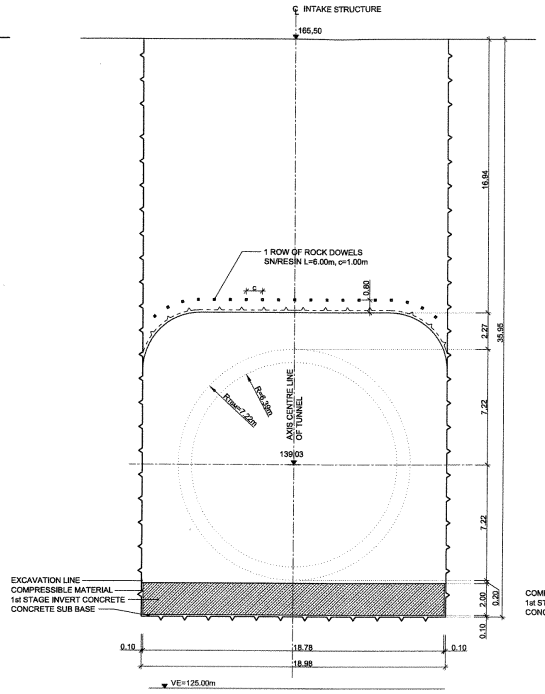

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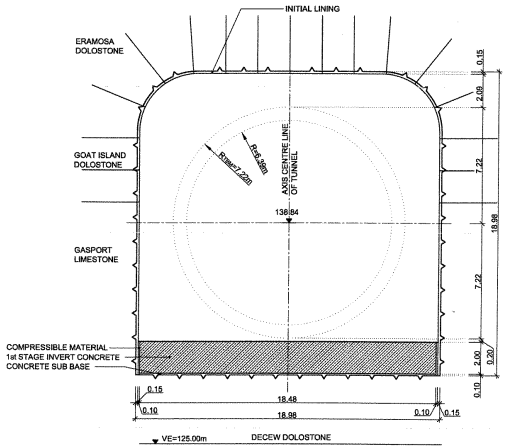

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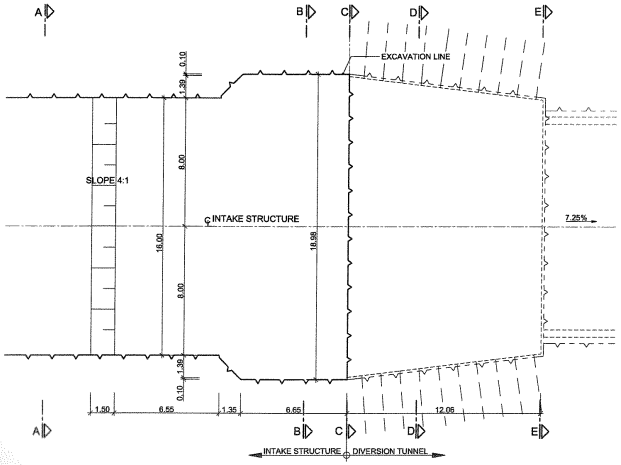
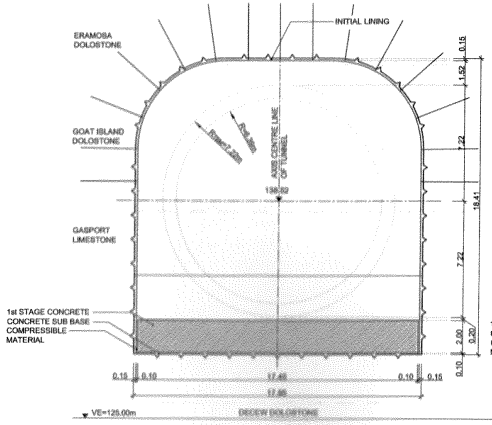


PLAN 2 - 2

SCALE 1 : 100



SECTION D - D

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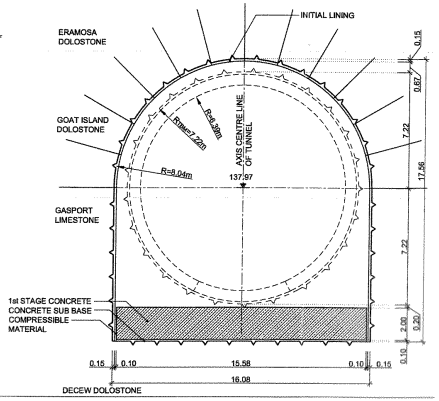

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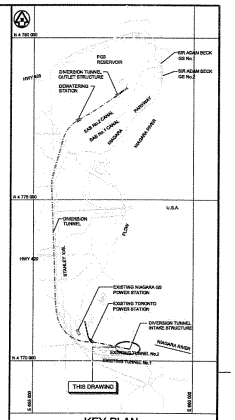

KEY PLAN

SCALE 1 : 50000

NOTES:

1. INITIAL LINING CONSISTING OF:
   DIMPLE MEMBRANE DELTA MS OR EQUIVALENT IF REQUIRED
   STEEL WIRE MESH 150/150/6/6mm
   ROCK DOWELS L=3.60m, e/c=1.20/2.00m
   SWELLEX OR EQUIVALENT
   SHOTCRETE t=150mm
2. COMPRESSIBLE MATERIAL CONSISTING OF STYRODUR OR EQUIVALENT
3. ADVANCE LENGTH OF ONE ROUND OF EXCAVATION AND SUPPORT INSTALLATION IN MINED TUNNEL SECTION TO BE RESTRICTED TO MAX. 1.50m

1:100 0 2.5 5 7.5 10 m

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NIAGARA TUNNEL FACILITY PROJECT

PROPOSAL
INTAKE STRUCTURE
TBM RECEPTION
SECTIONS

ONTARIOPOWER GENERATION — Electricity Production - Hydroelectric Technical Services

STRABAG — CONSULTING ENGINEERS

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PD-02-1018 — 00

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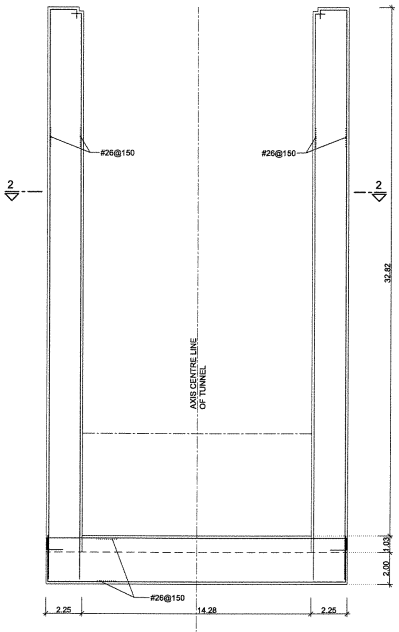

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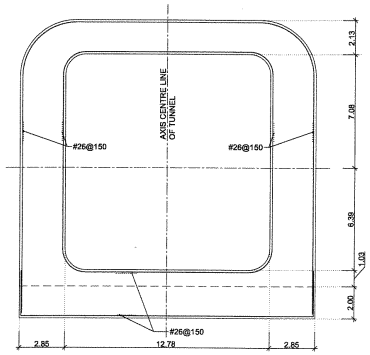

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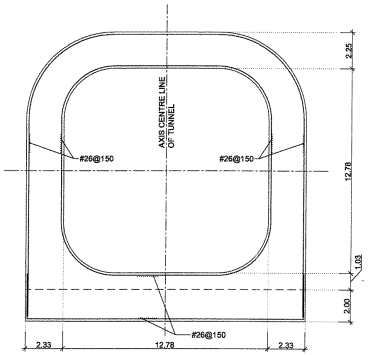

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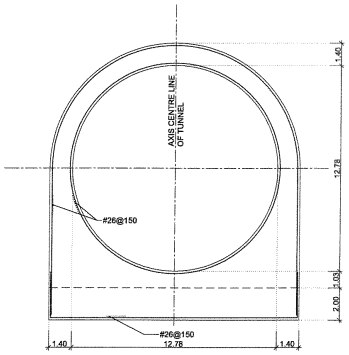

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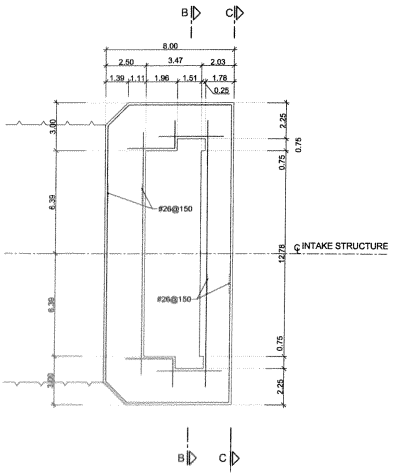
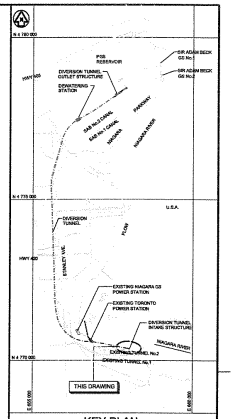


PLAN 2 - 2
SCALE 1 : 100



KEY PLAN
SCALE 1 : 50000

NOTES:

1. ARRANGEMENT OF BAR SIZE, SPACING AND LOCATION IS ONLY INDICATIVE
2. FOR AMOUNT OF STEEL 90kg/m³ ARE ASSUMED ON AVERAGE. INCLUDING MAX. 5 kg/m³ OF AUXILIARY REINFORCEMENT (I.E. CHAIRS AND SPACERS)
3. BAR SIZE AND SPACING OF REBAR MAY BE ADJUSTED SUBJECT TO THE RESULT OF DETAILED STRUCTURAL ANALYSIS.

1:100 0 2.5 5 7.5 10 m

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NIAGARA TUNNEL FACILITY PROJECT

PROPOSAL
INTAKE STRUCTURE
REINFORCEMENT
CROSS SECTIONS

ONTARIO POWER GENERATION — Electricity Production - Hydroelectric Technical Services

STRABAG — ALP CONSULTING ENGINEERS

client		designed by	
client			
date: yr/mo/dy 05/04/29		design approved	1:1 M plot scale
scale 1:100		authorized	CAD file/ type DWG
dwg no PD-02-1028			ver 00

A0 (841 x 1189)

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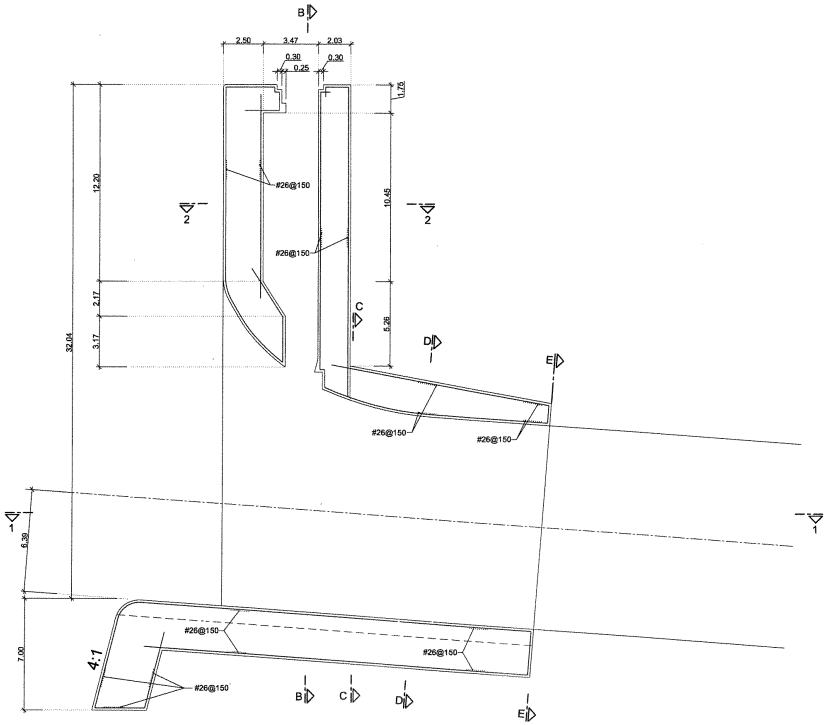
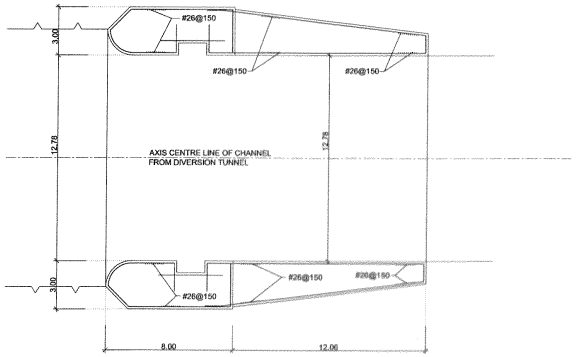


LONGITUDINAL SECTION

SCALE 1 : 100



PLAN 1 - 1

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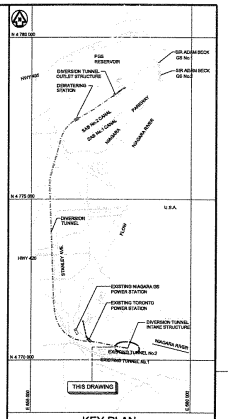

KEY PLAN

SCALE 1 : 50000

NOTES:

1. ARRANGEMENT OF BAR SIZE, SPACING AND LOCATION IS ONLY INDICATIVE
2. FOR AMOUNT OF STEEL 90kg/m³ ARE ASSUMED ON AVERAGE. INCLUDING MAX. 5 kg/m³ OF AUXILIARY REINFORCEMENT (I.E. CHAIRS AND SPACERS)
3. BAR SIZE AND SPACING OF REBAR MAY BE ADJUSTED SUBJECT TO THE RESULT OF DETAILED STRUCTURAL ANALYSIS.

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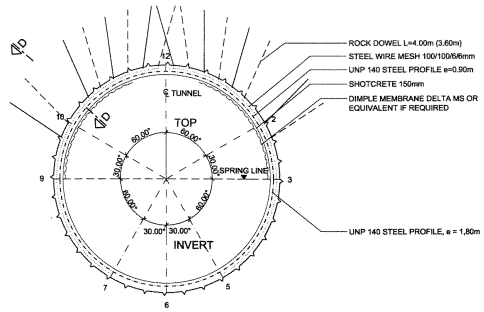
NIAGARA TUNNEL FACILITY PROJECT

PROPOSAL
INTAKE STRUCTURE
REINFORCEMENT
PLAN AND LONGITUDINAL SECTION

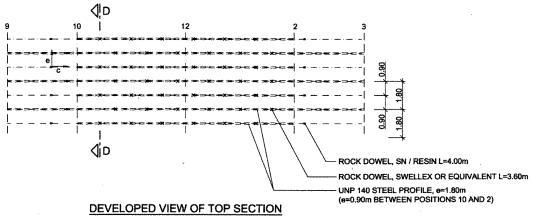
ONTARIOPOWER GENERATION — Electricity Production - Hydroelectric Technical Services

STRABAG — HLF CONSULTING ENGINEERS

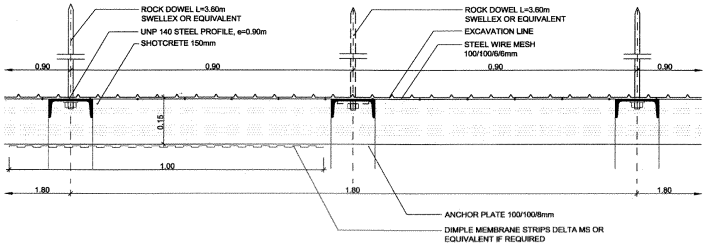
drawn	designed by		
chkd			
appr.	pr/month/day 05/04/29	design approved	std scale 1:1 M
			doc. code
scale 1:200	authorized		CAD file type DWG
dwg no. PD-02-1029			rev 00



ROCK SUPPORT TYPE 4Q
GROSS SECTION, SCALE 1:100

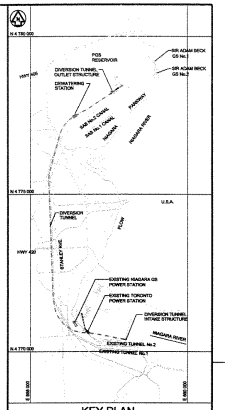


DEVELOPED VIEW OF TOP SECTION
SCALE 1:100



DETAIL SECTION D-D
SCALE 1:5

EXCAVATION AND SUPPORT TYPE 4Q																					
ROCK MASS CHARACTERISTIC	ROCK MASS STRATIGRAPHY (DOMINANT)	ROCK SUPPORT TYPES	CLASSIFICATION CRITERIA ROCK MASS BEHAVIOUR PRESENCE OF WATER	RADIAL DEF.	EFFECT ON ADVANCE OF TBM	SUPPORT MEASURES	TOP 12 TO 2 (10)	DISTANCE TO EXC. FACE	QUANTITY PER M	TOP 2 (10) TO 3 (9)	DISTANCE TO EXC. FACE	QUANTITY PER M	INVERT 3 (9) TO 5 (7)	DISTANCE TO EXC. FACE	QUANTITY PER M	INVERT 5 (7) TO 6	DISTANCE TO EXC. FACE	QUANTITY PER M	TOTAL QUANTITY	UNIT
CONTINUOUS OVERBREAK DUE ANY OF: - SIDEWALL SPALLING - INVERT HEAVE CROWN IS MORE THAN 3 M FROM BEDDING PLANE	QUEENSTON	4Q	WEDGES OF ROCK < 1,0 x 1,0 x 1,0 m APPROX.	< 20 mm 200 m																	
		4Q A	DRY OR UNLIMITED WATER	BEHIND TBM CUTTER HEAD	CONTINUOUS ADVANCE INTERRUPTED BY SUPPORT INSTALLATION	1. STEEL WIRE MESH 100/100/6/6 MM	1 LAYER, EXTRADOS	< 7 m	15,12	1 LAYER, EXTRADOS	< 7 m	7,56	1 LAYER, EXTRADOS	< 7 m	15,12	-	-	-	37,80	m2
						2. STEEL PROFILES U NP 140	e = 0.9 m	< 7 m	16,80	e = 1.8 m	< 7 m	4,20	e = 1.8 m	< 7 m	8,40	e = 1.8 m	< 7 m	4,20	33,60	m
						3. ROCK DOWELS SWELLEX OR EQ., L = 3.6 m	c/e 2.0/0.9	< 7 m	6,67	-	-	-	-	-	-	-	-	-	6,67	pcs
						4. SHOTCRETE	150 mm	< 40 m	15,12	150 mm	< 40 m	7,56	150 mm	< 40 m	15,12	150 mm	< 40 m	7,56	45,36	m2
						5. ROCK DOWELS SN / RESIN, L = 4.0 m	-	-	-	c/e 4.0/0.9	< 40 m	4,44	-	-	-	-	-	-	4,44	pcs
		4Q B	SUBSTANTIAL INFLOW			6. DIMPLE MEMBRANE STRIPS LxW 4,0x1,0	e = 2.4 m	< 40 m	1,67	e = 1.8 m	< 40 m	1,67	-	-	-	-	-	-	3,33	m2



KEY PLAN
SCALE 1 : 50000

NOTES:

1. LOOSE ROCK TO BE REMOVED
2. LOCAL OVERBREAK TO BE FILLED WITH SHOTCRETE
3. POSITION OF ROCK DOWELS TO BE ADJUSTED TO REACH OF INSTALLATION EQUIPMENT.
4. STEEL WIRE MESH TO BE FIXED IN SHORT HOLES WITH ANCHORS (NOT SHOWN)
5. POSITION 2, 5, 7 AND 10 TO BE ADJUSTED TO ACTUAL GRIPPER POSITION OF TBM
6. QUANTITIES OF SUPPORT MEASURES ARE BASED ON LENGTH OF EXCAVATION LINE
7. SUPPORT MEASURES INCLUDED IN "CROSS SECTION" ARE DRAWN NOT TO SCALE
8.

STEEL PROFILE		UNP 140	UNIT
WEIGHT		16.0	kg/m
2**MOMENT OF AREA y-y		605	cm^4
	h	60.0	mm
	b	140.0	mm

1:100 0 2 4 6 8 10 m
1:5 0 0.1 0.2 0.3 0.4 0.5m

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NIAGARA TUNNEL FACILITY PROJECT

PROPOSAL
DIVERSION TUNNEL
ROCK SUPPORT TYPE 4Q

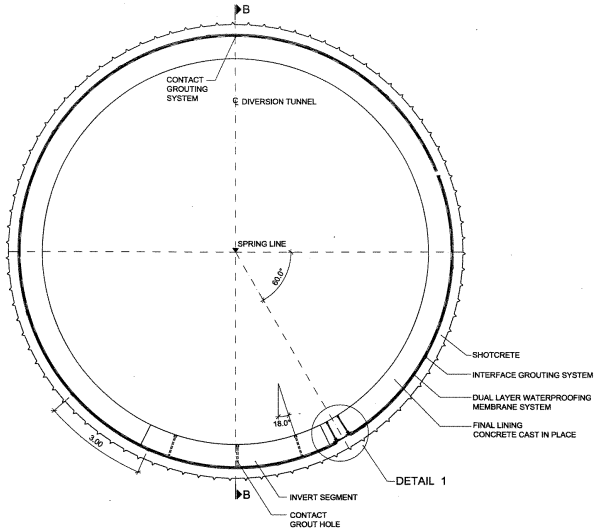
ONTARIO POWER GENERATION — Electricity Production - Hydroelectric Technical Services

STRABAG — ILF CONSULTING ENGINEERS

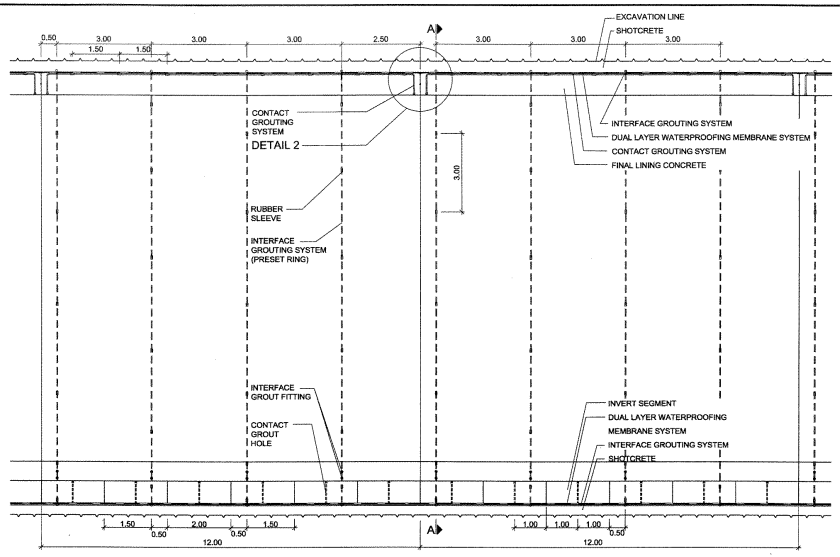
drawn: | designed by: | date: 05/04/29 | checked by: | design approved: | PW scale 1:1 M | DM scale 1:100 | scale 1:100/1:5 | authorized: | CAD file type DWG | dwg no. PD-01-1030 | rev 00

A0 (841 x 1189)

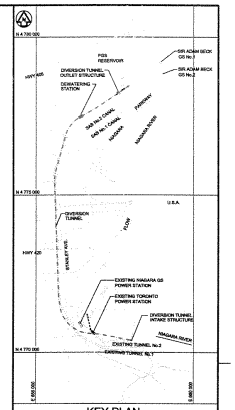
EE



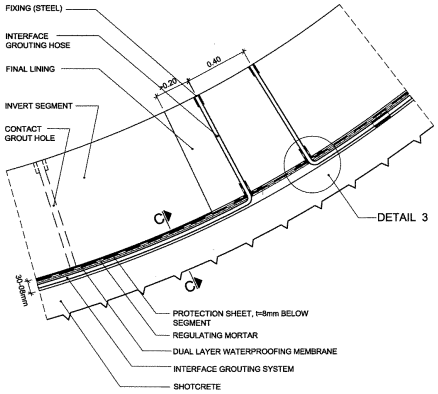
CROSS SECTION A-A
SCALE: 1:50



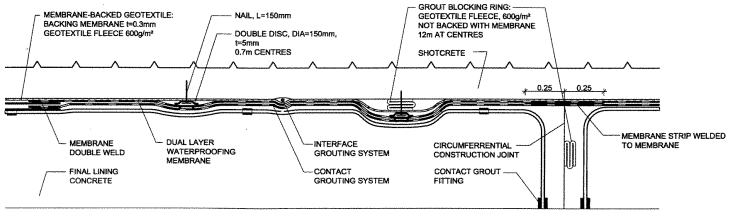
LONGITUDINAL SECTION B-B
SCALE: 1:50



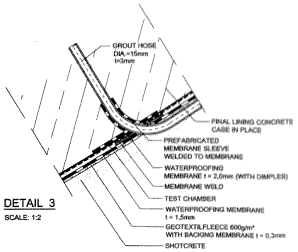
KEY PLAN
SCALE 1 : 50000



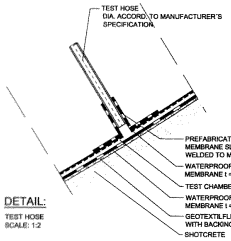
DETAIL 1
SCALE: 1:10



DETAIL 2
NOT TO SCALE
FIXING OF DUAL LAYER WATERPROOFING MEMBRANE SYSTEM AND CONTACT GROUTING SYSTEM



DETAIL 3
SCALE: 1:2



DETAIL:
TEST HOSE
SCALE: 1:2

1:50 0 1 2 3 4 5 m
1:10 0 200 400 600 800 1000 mm
1:2 0 50 100 150 200 mm

01			
00	FIRST ISSUE		
rev no	date	particulars	drawn / checked / approved

NIAGARA TUNNEL FACILITY PROJECT

PROPOSAL
DIVERSION TUNNEL
DUAL LAYER MEMBRANE SYSTEM
AND DETAILS

ONTARIO POWER GENERATION — Electricity Production - Hydroelectric Technical Services

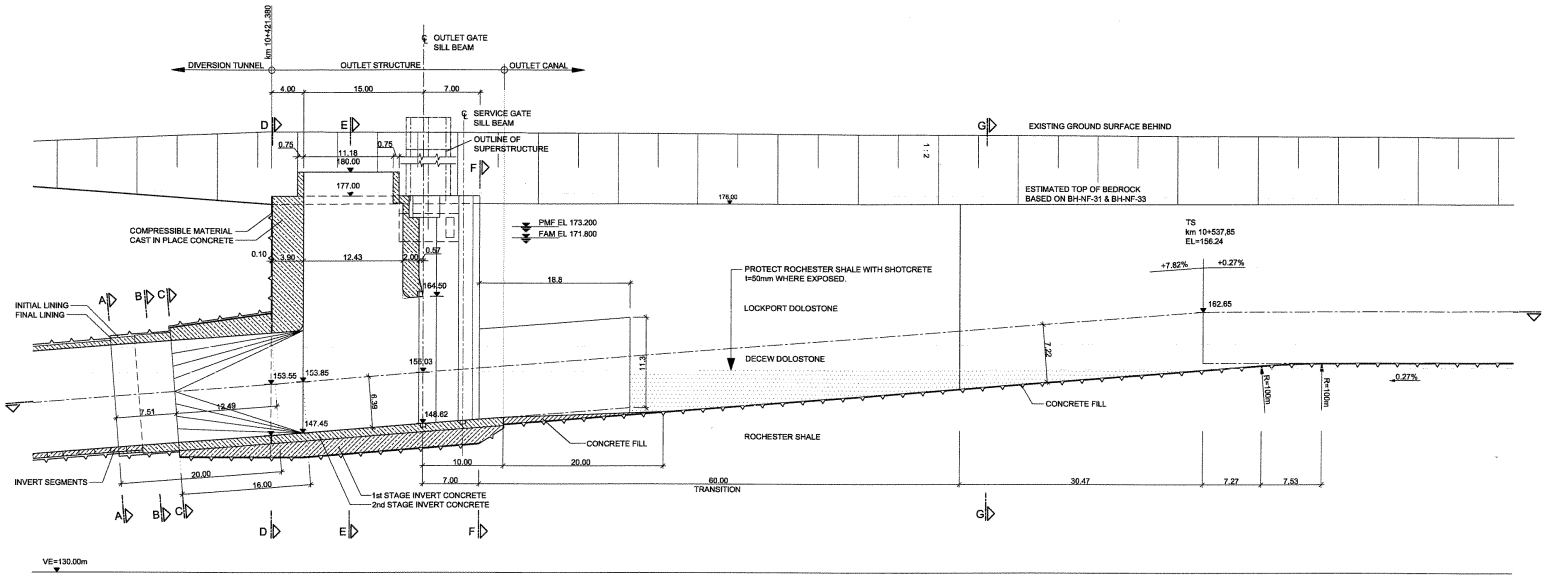
STRABAG — BLF CONSULTING ENGINEERS

drawn	designed by		
chkd			
date yr/mo/dd/day 05/08/12	design approved	DWG size A0	plot scale 1:1 M
scale 1:50, 1:10, 1:2	author/cad	DWG code	CAD file type DWG

drawing no PD-01-1031 — rev 00

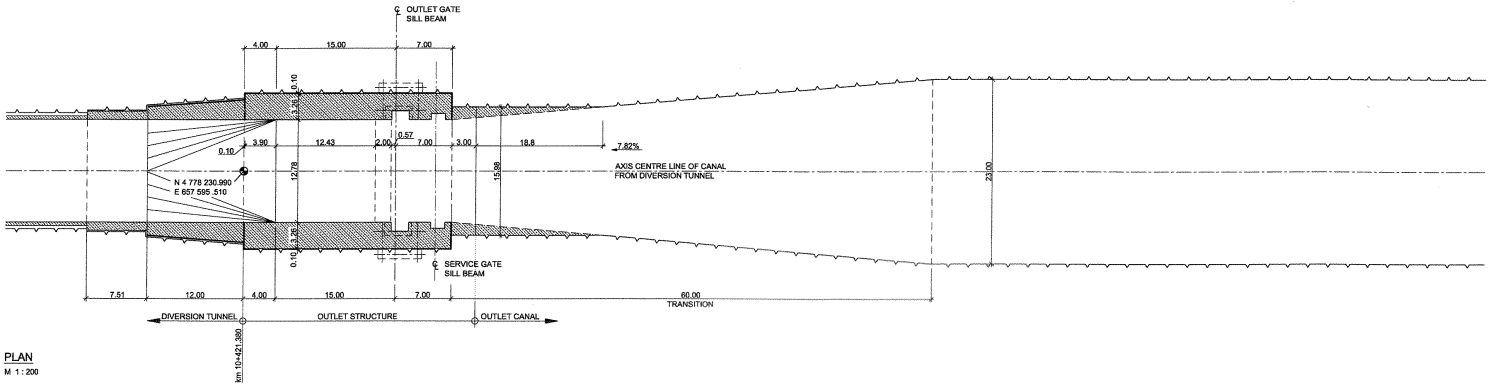
A0 (841 x 1189)

© BBF 2005, P:\1051\Niagara Tunnel\Planen\Detailzeichnungen\PD-01-1031-00.dwg



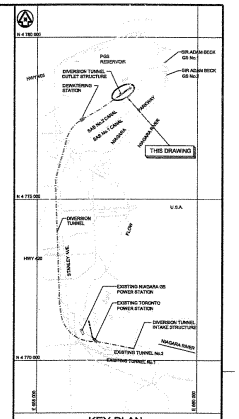
LONGITUDINAL SECTION

M 1 : 200



PLAN

M 1 : 200



KEY PLAN

SCALE 1 : 50000

NOTES:

1. INITIAL LINING CONSISTING OF:
   DIMPLE MEMBRANE DELTA MS OR EQUIVALENT IF REQUIRED
   STEEL WIRE MESH 150/150/6/6mm
   ROCK DOWELS L=3.60m, s/c=1.20/2.00m
   SWELLEX OR EQUIVALENT
   SHOTCRETE t=150mm
2. COMPRESSIBLE MATERIAL CONSISTING OF STYRODUR OR EQUIVALENT
3. SECTIONS A-A, B-B, C-C, D-D, E-E, F-F, G-G ON DRAWING PD-03-1012

LEGEND:

FAM ... FLOW ALLOWANCE MAXIMUM ELEVATION

PMF ... PROBABLE MAXIMUM FLOOD ELEVATION

BH ... BOREHOLE

01			
00	FIRST ISSUE		
ref no/ number	ver no.	date	particulars	chk	appd

NIAGARA TUNNEL FACILITY PROJECT

PROPOSAL
OUTLET STRUCTURE
PLAN AND LONGITUDINAL SECTION

ONTARIOPOWER GENERATION — Electricity Production - Hydroelectric Technical Services

STRABAG — AECOM CONSULTING ENGINEERS

drn	designed by		
chkd			
date 05/04/29	principal/dsg	design approved	plot scale 1:1 M
scale 1:200	scale/size		CAD file type DWG
dwg no PD-03-1011			ver 00

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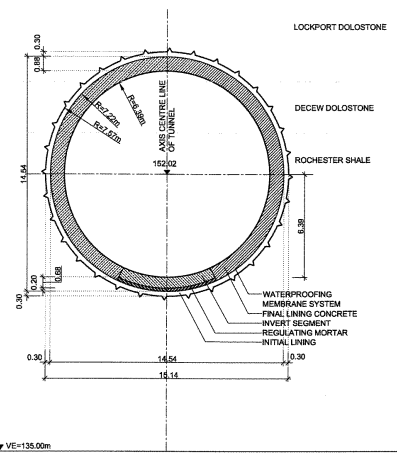
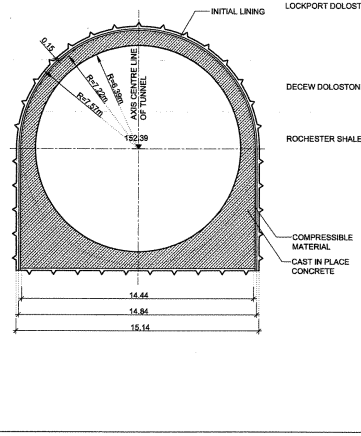
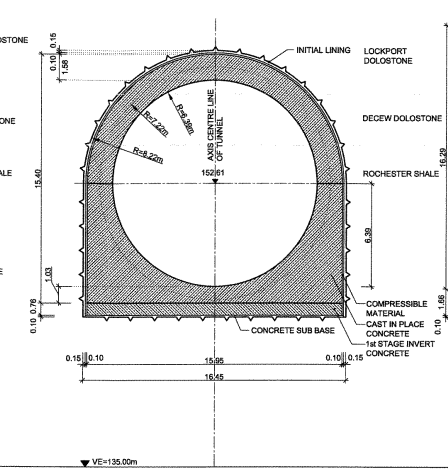
A0 (841 x 1189)



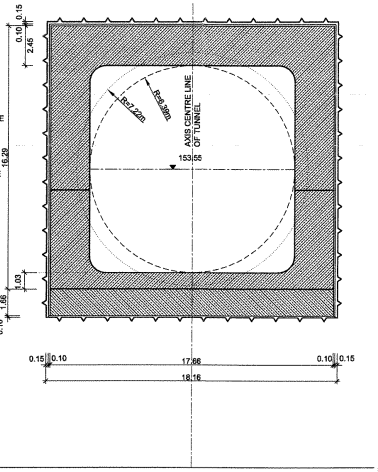
SECTION A - A
M 1 : 100



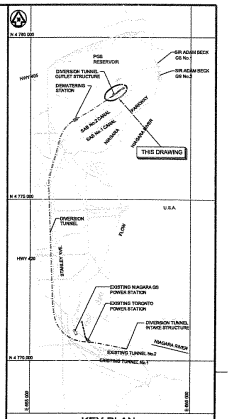
SECTION B - B
M 1 : 100



SECTION C - C
M 1 : 100



SECTION D - D
M 1 : 100



KEY PLAN
SCALE 1 : 50000

NOTES:

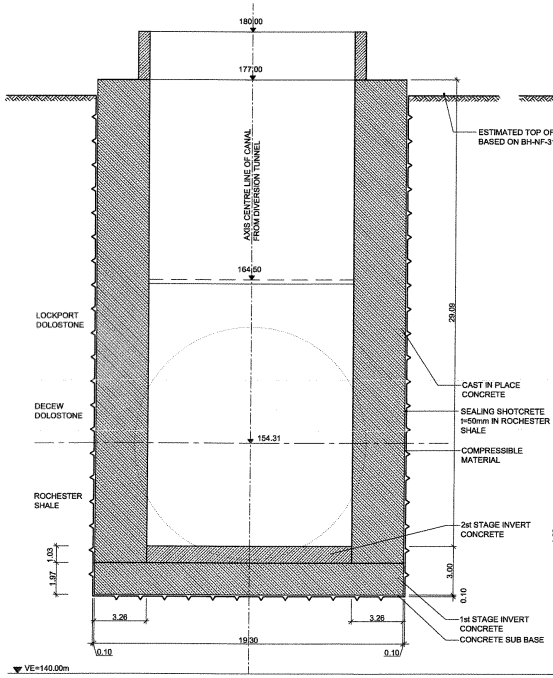
1. INITIAL LINING CONSISTING OF:
   DIMPLE MEMBRANE DELTA MS OR EQUIVALENT
   IF REQUIRED
   STEEL WIRE MESH 150/150/6/6mm
   ROCK DOWELS L=3.60m, e/c=1.20/2.00m
   SWELLEX OR EQUIVALENT
   SHOTCRETE t=150mm
2. COMPRESSIBLE MATERIAL CONSISTING OF STYRODUR OR EQUIVALENT

LEGEND:

FAM ... FLOW ALLOWANCE MAXIMUM ELEVATION

PMF ... PROBABLE MAXIMUM FLOOD ELEVATION

BH ... BOREHOLE



SECTION E - E
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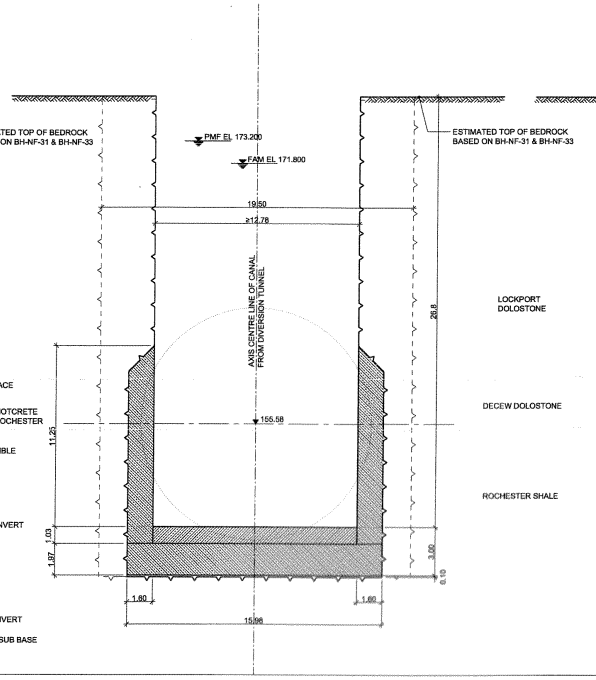
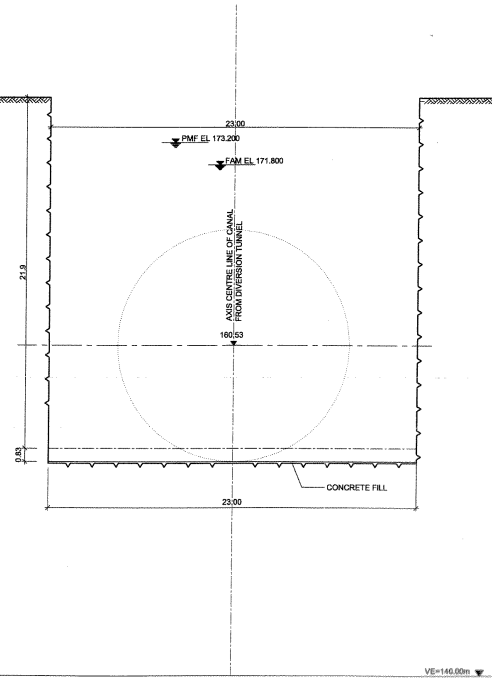


SECTION F - F
M 1 : 100



SECTION G - G
M 1 : 100

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	00	FIRST ISSUE	
not all number	rev no	date	description	chk	appd

NIAGARA TUNNEL FACILITY PROJECT

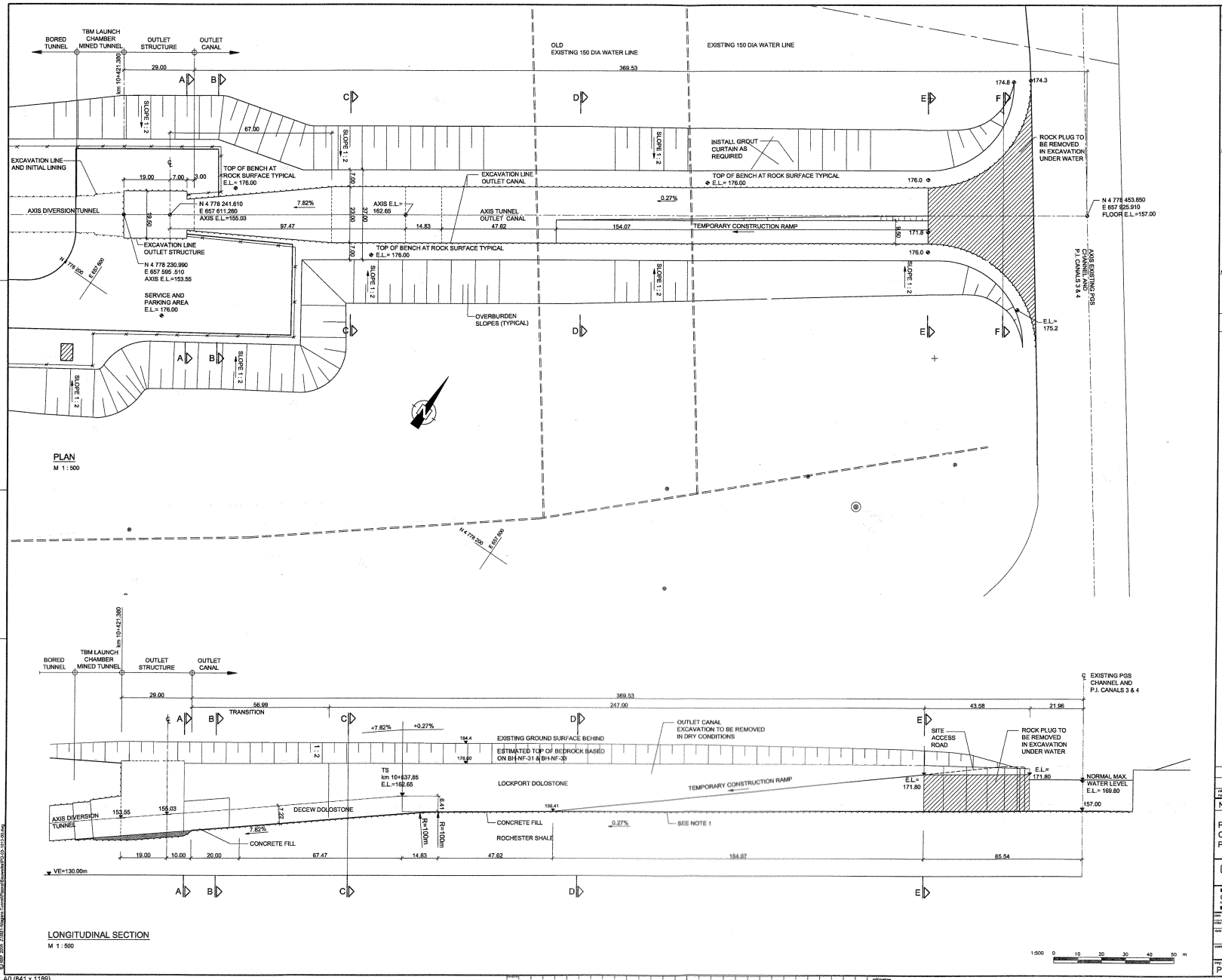
PROPOSAL
OUTLET STRUCTURE
CROSS SECTIONS

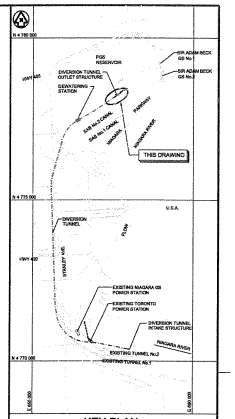
ONTARIOPOWER GENERATION — Electricity Production - Hydroelectric Technical Services

STRABAG — CONSULTING ENGINEERS

date 05/04/29	designed by	checked by	
scale 1:200	authorised	drawn DWG	print scale 1:1 M
drg no PD-03-1012			rev 00

A0 (841 x 1189)





KEY PLAN
SCALE 1 : 50000

NOTES:

1. LENGTH OF CANAL CONCRETE FILL TO BE ADJUSTED TO TBM ERECTION REQUIREMENTS IN THICKNESS AND EXTENTION
2. SITE ACCESS RAMP TO BE REMOVED BEFORE FINAL PROFILING OF GROUND SURFACE

rev no	rev date	chkd	particulars	app	chkd	expd
01						
00			FIRST ISSUE			

NIAGARA TUNNEL FACILITY PROJECT

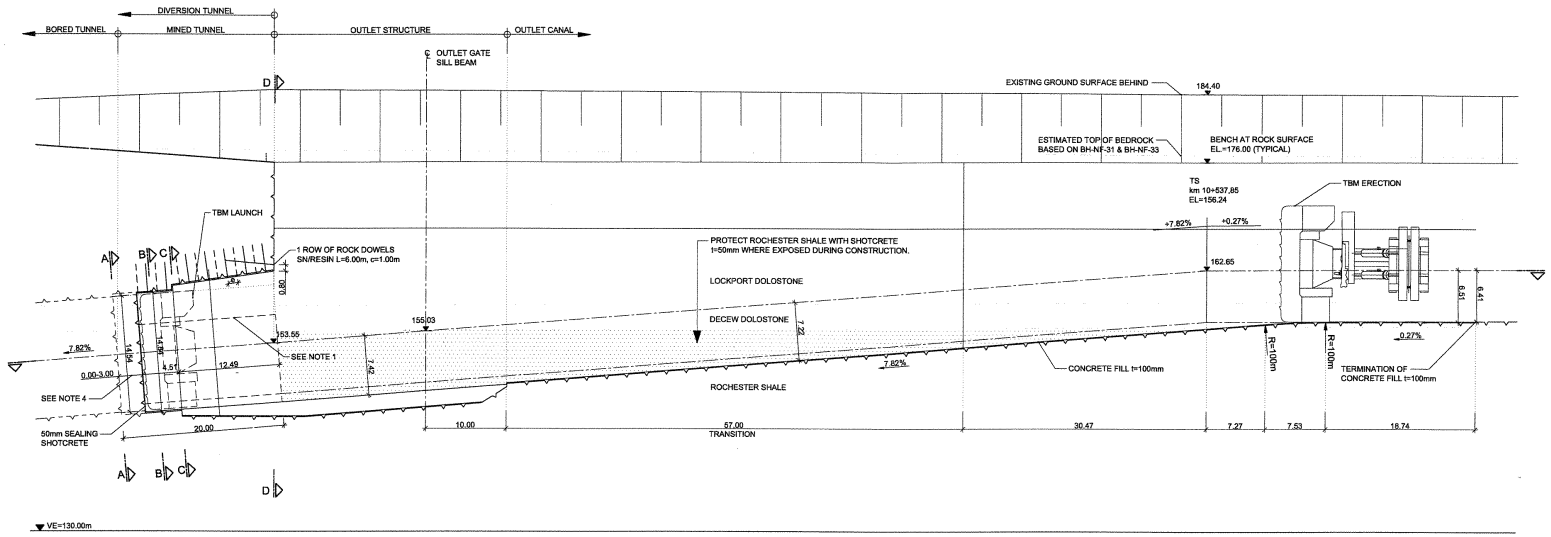
PROPOSAL
OUTLET CANAL TBM LAUNCH
PLAN AND LONGITUDINAL SECTION

ONTARIOPOWER GENERATION — Electricity Production - Hydroelectric Technical Services

STRABAG — HLF CONSULTING ENGINEERS

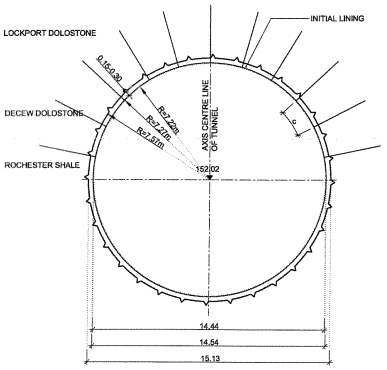
cons.	designed by		
chkd			
date yr/mth/day 05/04/29	drawn approved		2nd scale 1:1 M
			chk. ordr
scale 1:500	authorized		CAD file type DWG
orig no. PD-03-1013			rev 00

A0 (841 x 1189)



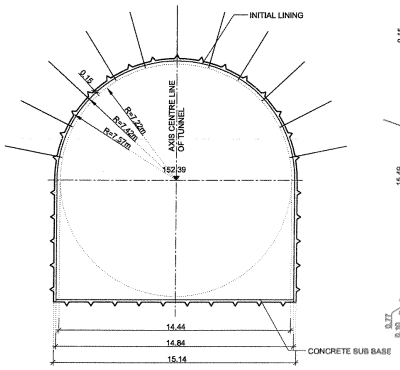
LONGITUDINAL SECTION

SCALE 1 : 200



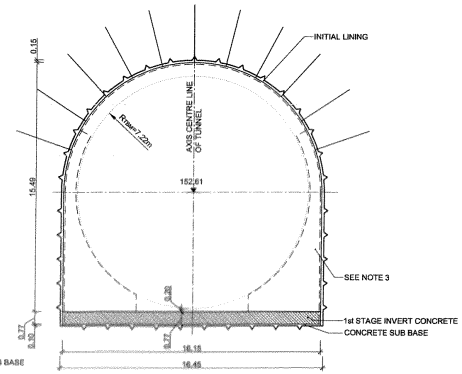
SECTION A-A

SCALE 1 : 100



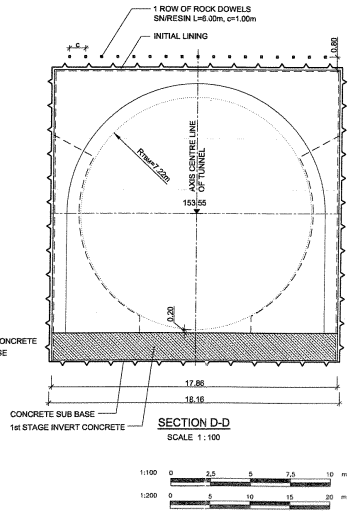
SECTION B-B

SCALE 1 : 100



SECTION C-C

SCALE 1 : 100



SECTION D-D

SCALE 1 : 100

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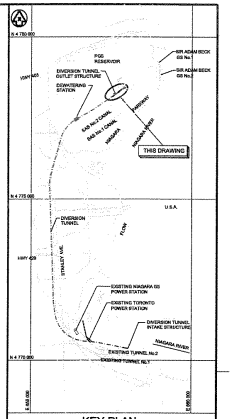
1:200 0 5 10 15 20 m



KEY PLAN

SCALE 1 : 50000

NOTES:

1. INITIAL LINING CONSISTING OF:
   DIMPLE MEMBRANE DELTA MS OR EQUIVALENT IF REQUIRED
   STEEL WIRE MESH 150/150/6/6mm
   ROCK DOWELS L=3.60m, e/c=1.20/2.00m
   SWELLEX OR EQUIVALENT
   SHOTCRETE t=150mm
2. COMPRESSIBLE MATERIAL CONSISTING OF STYRODUR OR EQUIVALENT
3. GRIPPER PADS IF REQUIRED TO BE REMOVED AFTER TBM LAUNCH
4. DIMENSION TO BE ADJUSTED ACCORDING TO REQUIREMENT FOR TBM-LAUNCH AND TBM - ERECTION
5. ADVANCE LENGTH OF ONE ROUND OF EXCAVATION AND SUPPORT INSTALLATION IN MINED TUNNEL SECTION TO BE RESTRICTED TO MAX. 1.50m

rev no/ number	rev no	date	particulars	chk'd	appr'd
	01				
	00		FIRST ISSUE		

NIAGARA TUNNEL FACILITY PROJECT

PROPOSAL
OUTLET STRUCTURE TBM LAUNCH SECTIONS

ONTARIOPOWER GENERATION — Electricity Production - Hydroelectric Technical Services

STRABAG — HLF CONSULTING ENGINEERS

drawn	designed by		
chkd			
date 05/04/29	prowability	design approved	plot scale 1:1 M
scale 1:100 / 1:200	authorised		plot date
			CAD file type DWG
orig no PD-03-1014			rev 00

A0 (841 x 1189)

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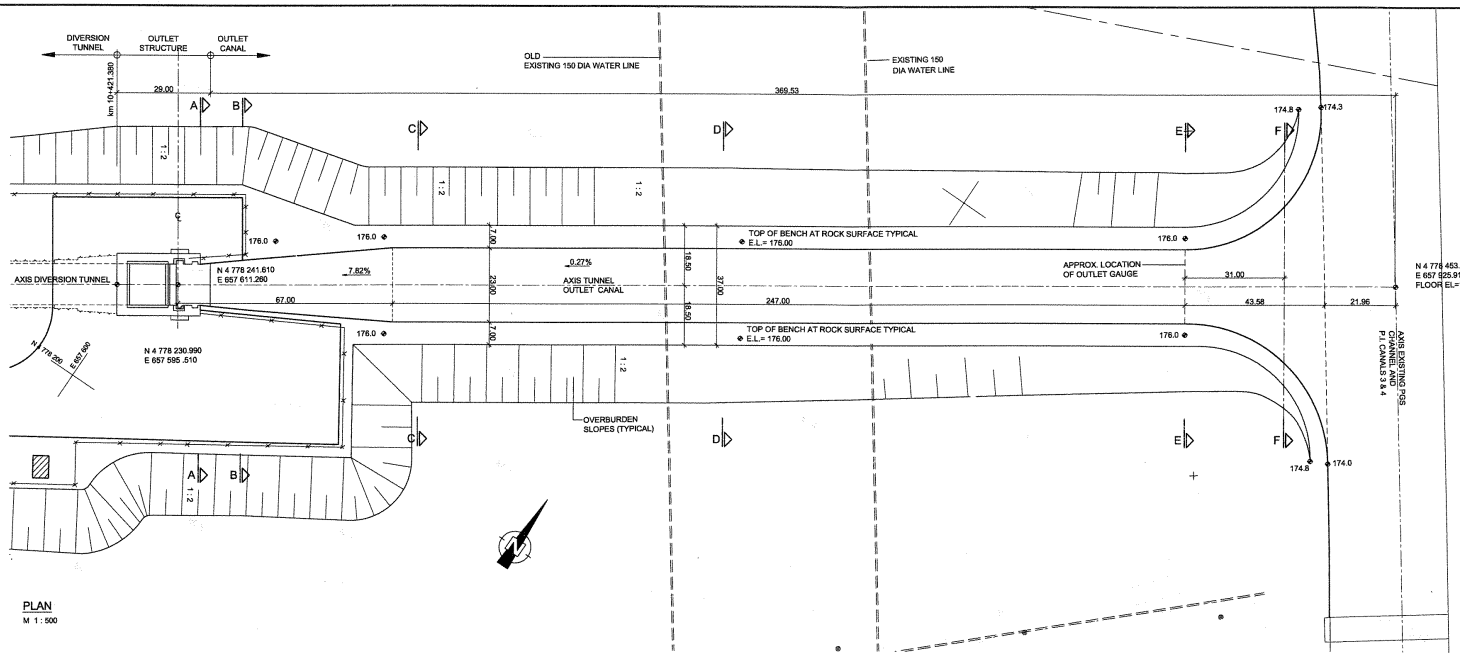
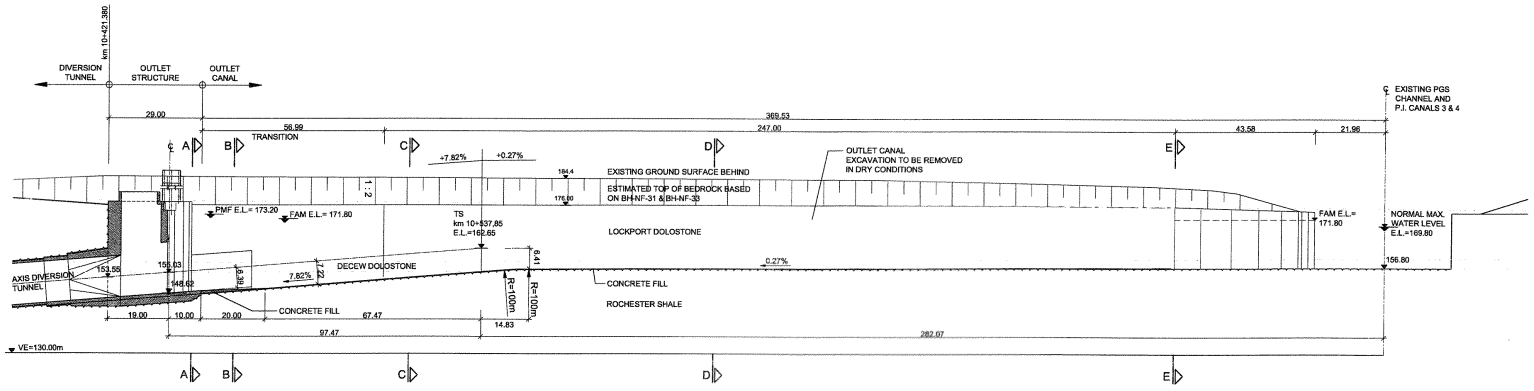
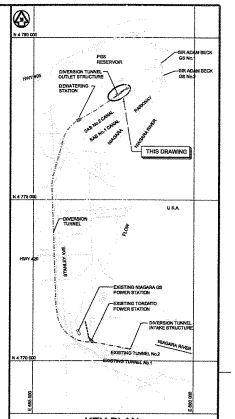


PLAN
M 1 : 500



LONGITUDINAL SECTION
M 1 : 500



KEY PLAN
SCALE 1 : 50000

LEGEND:

FAM ... FLOW ALLOWANCE MAXIMUM ELEVATION

PMF ... PROBABLE MAXIMUM FLOOD ELEVATION

E.L. ... ELEVATION

issue no.	revision no.	date	particulars	prepared	checked	approved
	01					
	00		FIRST ISSUE			

NIAGARA TUNNEL FACILITY PROJECT

PROPOSAL
OUTLET CANAL
PLAN AND LONGITUDINAL SECTION

ONTARIO POWER GENERATION — Electricity Production - Hydroelectric Technical Services

STRABAG — RJF CONSULTING ENGINEERS

date issued	designed by		
date	p/checked/date	design approved	std scale 1:1 M
	05/04/29		disc. code
scale	1:500	authorized	CAD file type DWG
dwg no. PD-03-1024			rev 00

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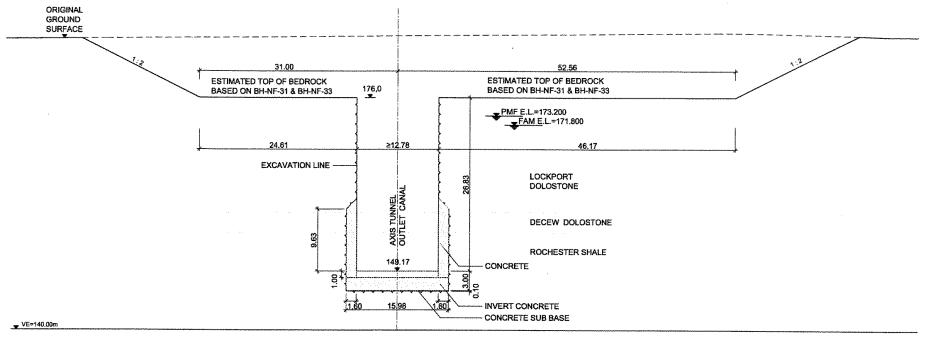
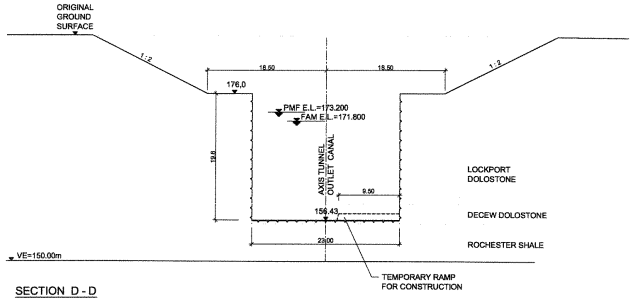
A0 (841 x 1189)

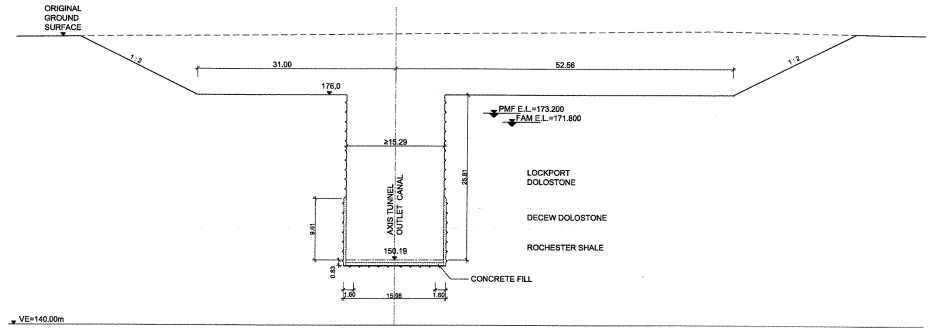
0 10 50 100 200 300 millimetres



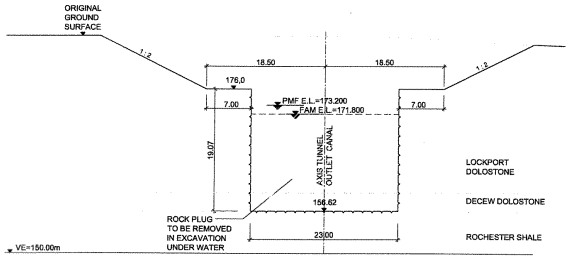
SECTION A - A
M 1 : 250



SECTION D - D
M 1 : 250



SECTION B - B
M 1 : 250



SECTION E - E
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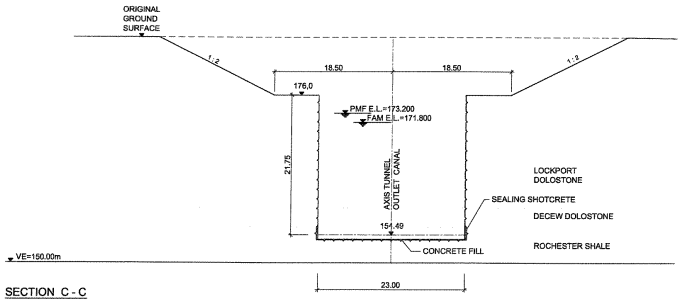

SECTION C - C
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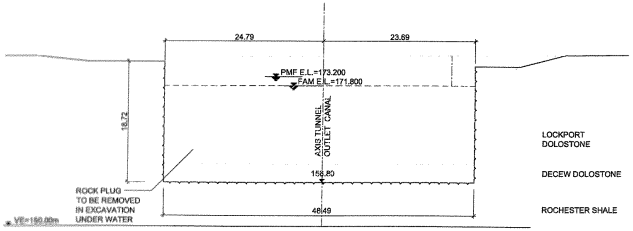

SECTION F - F
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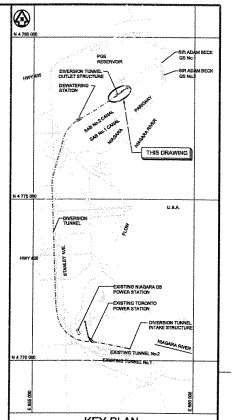

KEY PLAN
SCALE 1 : 60000

LEGEND:

FAM ... FLOW ALLOWANCE MAXIMUM ELEVATION

PMF ... PROBABLE MAXIMUM FLOOD ELEVATION

E.L. ... ELEVATION

revised number	rev. no.	date	01	00	FIRST ISSUE		
					particulars	by	approved

NIAGARA TUNNEL FACILITY PROJECT

PROPOSAL
OUTLET CANAL
SECTIONS

ONTARIO POWER GENERATION — Electricity Production - Hydroelectric Technical Services

STRABAG — HLP CONSULTING ENGINEERS

drawn	designed by		
checked			
date: yr/mo/dd/day 05/04/29	design approved	plot scale 1:1 M	
scale 1:250	redrafted	CAD file type DWG	
dwg no. PD-03-1025			rev 00

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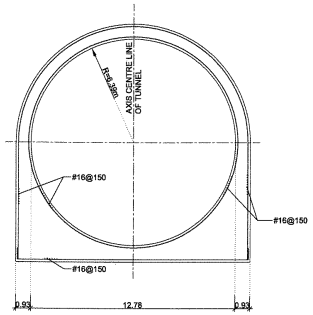
A0 (841 x 1189)

EE



SECTION B - B
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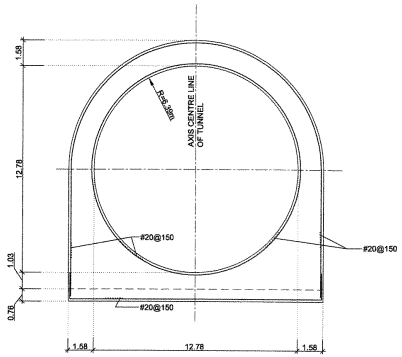
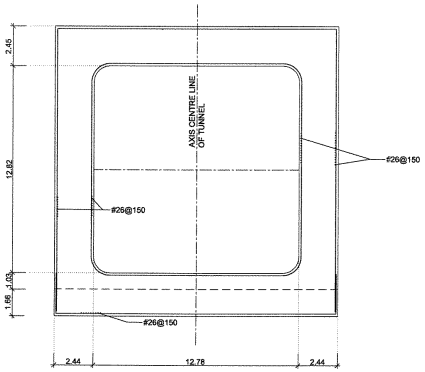


SECTION C - C
M 1 : 100



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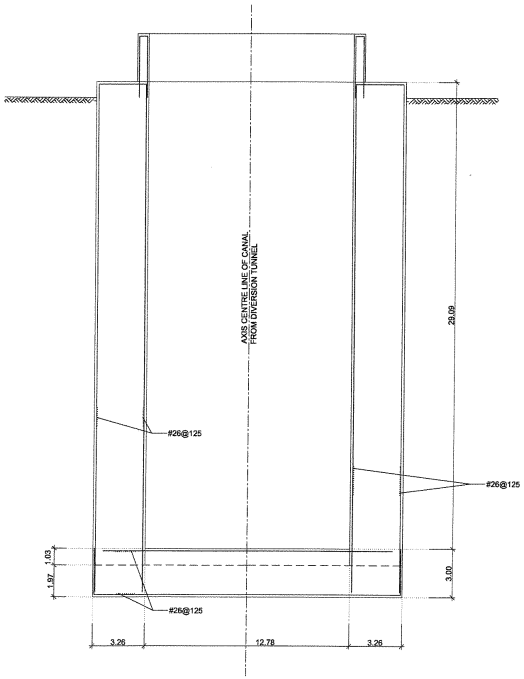

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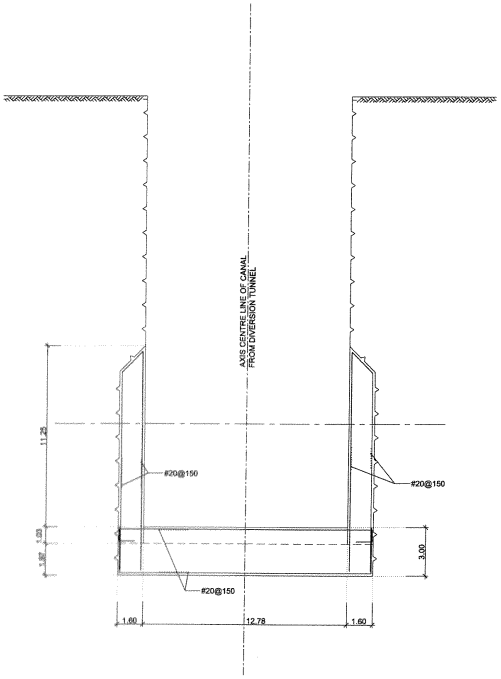

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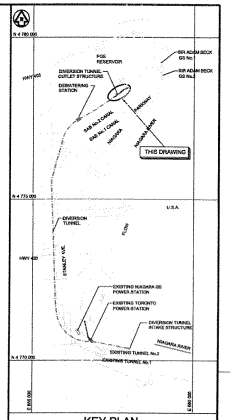


KEY PLAN
SCALE 1 : 60000

NOTES:

1. ARRANGEMENT OF BAR SIZE, SPACING AND LOCATION IS ONLY INDICATIVE
2. FOR AMOUNT OF STEEL 90kg/m³ ARE ASSUMED ON AVERAGE. INCLUDING MAX. 5 kg/m³ OF AUXILIARY REINFORCEMENT (I.E. CHAIRS AND SPACERS)
3. BAR SIZE AND SPACING OF REBAR MAY BE ADJUSTED SUBJECT TO THE RESULT OF DETAILED STRUCTURAL ANALYSIS.

	01		
	00	FIRST ISSUE	
of no/ number	ver sn	date	description	chkd	appr

NIAGARA TUNNEL FACILITY PROJECT

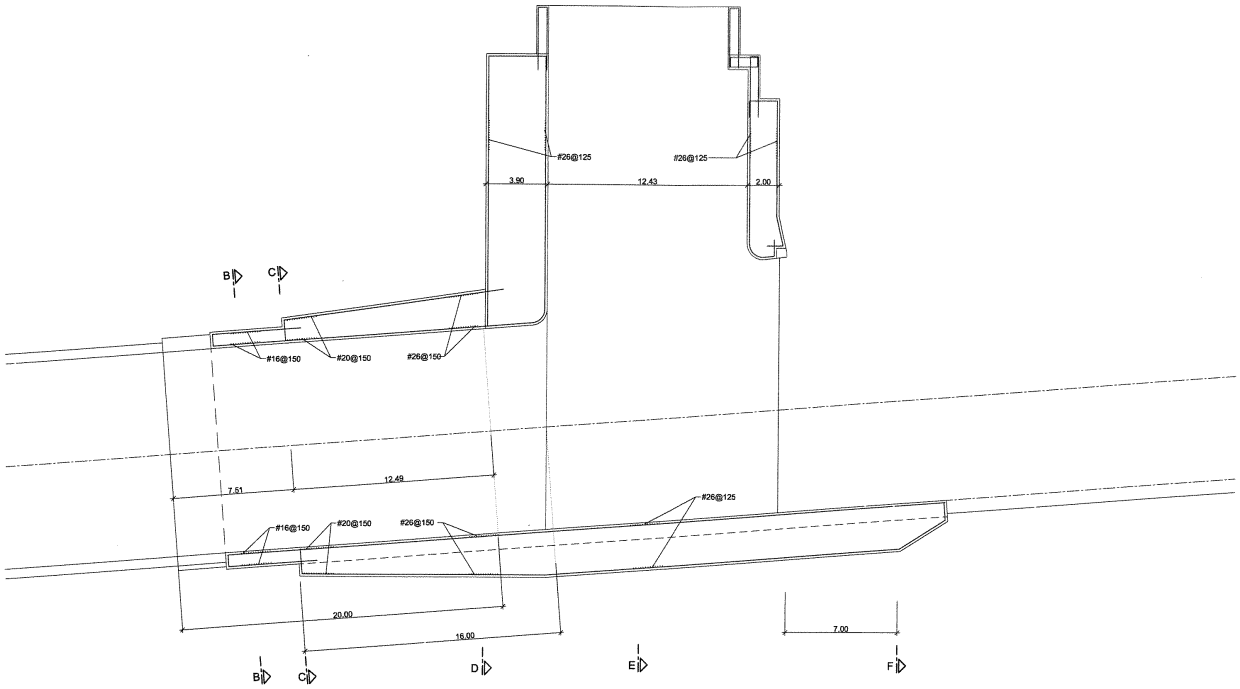
PROPOSAL
OUTLET STRUCTURE
REINFORCEMENT
CROSS SECTIONS

ONTARIOPOWER GENERATION — Electricity Production - Hydroelectric Technical Services

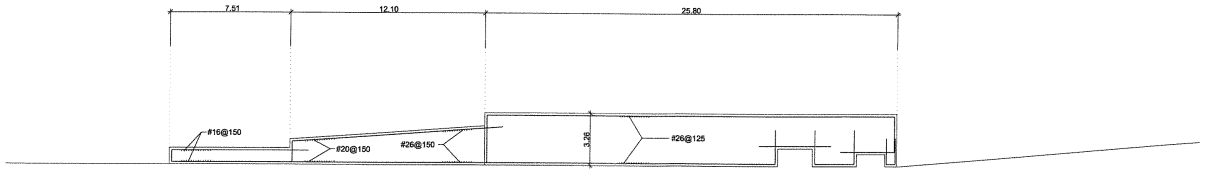
STRABAG — CONSULTING ENGINEERS

Chk.	designed by		
chkd			
date yr/mo/dd/day 05/04/29	design approved	plot scale 1:1 M	disc. code
scale 1:200	authorized	CAD file/type DWG	
dwg no PD-03-1026		ver 00	

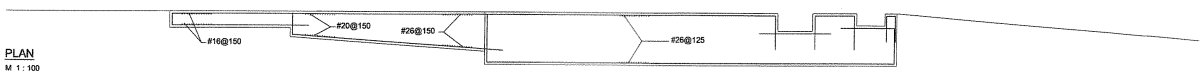
AO (841 x 1189)



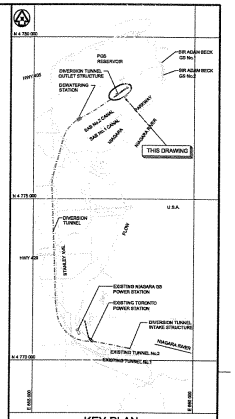
LONGITUDINAL SECTION
M 1 : 100



AXIS CENTRE LINE OF CANAL
FROM DIVERSION TUNNEL



PLAN
M 1 : 100



KEY PLAN
SCALE 1 : 50000

NOTES:

1. ARRANGEMENT OF BAR SIZE, SPACING AND LOCATION IS ONLY INDICATIVE
2. FOR AMOUNT OF STEEL 90kg/m³ ARE ASSUMED ON AVERAGE. INCLUDING MAX. 5 kg/m³ OF AUXILIARY REINFORCEMENT (I.E. CHAIRS AND SPACERS)
3. BAR SIZE AND SPACING OF REBAR MAY BE ADJUSTED SUBJECT TO THE RESULT OF DETAILED STRUCTURAL ANALYSIS.

	01				
	00		FIRST ISSUE		
REVISION NUMBER	REV. NO.	DATE	REVISIONS	REV. CHECK	REVIEW

NIAGARA TUNNEL FACILITY PROJECT

PROPOSAL
OUTLET STRUCTURE
REINFORCEMENT
PLAN AND LONGITUDINAL SECTION

ONTARIOPOWER GENERATION
Electricity Production - Hydroelectric
Technical Services

STRABAG
ILF CONSULTING ENGINEERS

date		designed by	
drawn			
date 05/04/09	design approval		date scale 1:1 M
scale 1:200	authorized		PCB No. scale (1:M)
			DWG
Dwg. no. PD-03-1027			00

A0 (841 x 1189)

Appendix 1.1(t)

Appendix 1.1(t) - Draft Specifications for the TBM

[See attached]

Appendix 1.1(t) - Draft Specifications for the TBM

[See attached]

2. HARD ROCK TBM – DESCRIPTION

Machine Diameter	
new cutters	14.44
(worn cutters)	14.41
Main Bearing Three Roller (3-axis)	
Bearing Life	>15,000 L10 Hrs. @ 224 kN cutter load
Cutters	
Number of cutters	(83) 17" (432mm) front/back loading
Individual Cutter Load	224kN
Average Cutter Spacing (Face)	89mm
Cutterhead	
Recommended Operating	18,426kN
Cutterhead Thrust	27,900kN
Maximum Thrust	71,500kN
Maximum Gripper Force	
Cutterhead Drive – Variable Frequency	
Cutterhead Drive	Electric motors/Gear reducers/VF Drive
Cutterhead Power	12 x 335 kW = 4,020 kW
Cutterhead Speed	
Constant Torque Range	0 – 2.4 RPM
Constant Power Range	2.4 – 5.0 RPM
Cutterhead Torque	
at 2.4 RPM	16,000 kNm
at 5.0 RPM	7,680 kNm
Breakout Torque	24,000 kNm
Thrust Cylinder Stroke	1.82m
Hydraulic System	
System Operating Pressure	225 bar
System Rated Pressure	345 bar
Electrical System	
Main Drive Motors	690V, 3 phase, 60 Hz
Electric Motors of Hyd & Lube System	480V/60Hz
TBM Lighting	220V, 60 Hz
TBM Control System	24V DC
Transformer (TBM Drives)	2 x 2500 kVA = 5000 kVA
Transformer Backup	1 x 1000 kVA = 1000 kVA
Backup Power	1000 kVA
Primary Voltage	20,000 V, 60 Hz
Secondary Voltage	690V, drive motors 480V, hydraulic pump motors
Specification	Class I – Div II
Essential services	Class I – Div I
Conveyor	
Capacity	1600 tph
Belt width	1400 mm
TBM Weight (approx.)	1900 t

62/62

2.2 Tunnel Boring Machine Special Features For the Niagara tunnel facility Project

- Cutterhead designed with an inner section and four (4) outer cutterhead sections with 17" front loading/back-loading cutter housings, and grill bars in bucket openings for blocky ground.
    - Cutterhead with minimum peripheral exposure
    - Cutterhead stand off 150mm
    - Cutterhead using replaceable abrasion resistant wear bars
    - Cutterhead with smooth low cutter profile and radial muck scoops with shallow relief, direct dump buckets for improved face control and reduced raveling at the gauge bucket lips are bolted on for easy replacement.
- High capacity 3-axis roller main bearing for sustained operation at high thrust with long life, L 10 $\geq$ 15,000 hours.
- Excess capacity to handle extreme ranges of hard and blocky rock, water conditions, and ground support installation.
- 17" cutters help to minimize the effects of hard abrasive rock while maintaining high production rates and allowing fewer cutter changes.
- Large open area behind cutterhead for ground support.
- Cutterhead is Variable Frequency Drive (VFD), is fully reversible and allows increased torque at startup. Muck pick-up is one direction.
- Large, articulated oversize gripper pads to reduce gripper ground pressure in areas of weak, fractured, unstable rock to reduce fallout of material.
- Slotted gripper pads to allow gripping over ring set.
- Large work area under main beam for cleaning and water draining.
- Continuous steering system, while boring, to maintain line and grade as required.
- Hydraulic roof support offers immediate rock support at the rear of the shield "fingers" with full support to protect the workers.
- Ring Beam Erector for preferred ring beams profile
- Wire Mesh - wire mesh handling and erection system
- Two sets roof drills with independent control and bolting while boring, coverage is 180° of crown.
- Two sets probe/grout drills dedicated to 360° probing and grouting mounted on a circular support.
- TBM muck removal system with excess capacity to allow high peak rates of advance.
- Water protection for electrical and hydraulic systems IP55.
- Dust control system to confine dust to the cutter face and maintain a good work environment.
- Data Logger with remote monitoring
- Dual laser target system to permit continuous steering control and monitoring of line and grade. Electronic guidance system allows precise guidance information, including interface unit + laser theodolite.
- Water spray system or foam for dust control.
- Equipment monitoring instrumentation displayed at the operator's console to allow speedy fault finding and correction actions.
- Methane gas monitor auto shut down of TBM if acceptable levels are exceeded.
- Class I – Div II electrical system and Class I – Div I for essential services.
- Ground fault protected electrical system standard on all Robbins TBMs.
- High powered proven TBM design, "classic" main beam open gripper.

Appendix 1.1(aa)

Appendix 1.1(aa) - Flow Verification Test

1. PURPOSE OF TEST

(1) A flow verification test (Test) shall be conducted to determine the as-constructed flow amount of the Tunnel Facility Project in order to determine if the Guaranteed Flow Amount is achieved.

2. TEST METHOD AND ACCURACY

(1) The Test shall be conducted using the tracer transit time method and a non-radioactive, non-salt tracer. The following test standards shall be used as the bases for the tests and as otherwise indicated in this Appendix:

(a) International Electrotechnical Commission IEC 41-"Field acceptance tests to determine the hydraulic performance of hydraulic turbines, storage pumps and pump-turbines"

(b) International Organization for Standardization ISO 2975-"Measurement of water flow in closed conduits-Tracer methods", Part 1 ("General") and Part 6 ("Transit time method using non-radioactive tracers").

(2) Locations for the tracer injection points are at the tunnel intake or at one of the tunnel piezometer wells. Tracer samples may be taken along the tunnel using the equipment installed in the piezometer wells, the dewatering shafts and/or at the tunnel outlet.

(3) The unique features of the new tunnel (*i.e.*, having very large cross sections and high water velocities) may make the use of multi-port tracer injection and detection frames impractical. Therefore, provision for adequate mixing of the dye prior to the first sampling location shall be made.

(4) Transit time measurements shall be determined from two sampling points.

(5) The maximum uncertainty (including the random and systematic errors) for the flow measurement shall be +/-2%.

3. PARTY TO CONDUCT THE FLOW TEST

(1) The Test shall be conducted by an independent third party, mutually acceptable to the Owner and the Contractor (the "Independent Tester") which has significant experience and has carried out flow testing using the tracer methods in closed conduits of similar complexity. The Independent Tester shall be retained by the Contractor as an independent tester for and on behalf of both the Contractor and Owner. The Independent Tester shall be impartial in all respects. Prior to entering into an agreement with the Independent Tester to perform the Test and the related matters described in this Appendix 1.1(aa) (the "Independent Tester Contract"), the Contractor shall deliver to the Owner a copy of the proposed

agreement for review and approval by the Owner. The Contractor shall be responsible for management of the Independent Tester and the Owner and the Contractor shall each be responsible for 50% of all of the costs and expenses properly incurred by the Independent Tester in accordance with the Independent Tester Contract. After receipt of an invoice from the Independent Tester, the Contractor shall be permitted to include 50% of such invoice amount as part of any Application for Payment submitted by the Contractor to the Owner.

(2) Within 6 months after the Start Date, the Independent Tester shall deliver to the Contractor and Owner:

(a) preliminary details of Test procedure;

(b) preliminary details of Test setup and proposed equipment descriptions; and

(c) preliminary details of Test uncertainties (i.e., expected random and systematic errors).

(3) Owner and the Contractor shall have the right to review the proposed preliminary details of Test procedure, preliminary details of Test setup and proposed equipment descriptions and preliminary details of Test uncertainties and, if necessary, make recommendations to the Independent Tester to modify the preliminary details of Test procedure, the preliminary details of Test setup and proposed equipment descriptions and the preliminary details of Test uncertainties.

4. TEST SCHEDULE

(1) The exact Test date and time of performance of the Test requires extensive planning among several parties and also depends on the water availability. Therefore, the Test date and time will be decided by the Owner at its sole discretion. The Owner will make all reasonable efforts to have the test conducted as soon as practically possible following Substantial Completion, preferably within 2 weeks. Prior to Final Completion, the Test must be performed and the final Test report must be delivered to the Owner and the Contractor, all as more particularly described in Section 10 of this Appendix 1.1(aa) 1.1(aa).

5. TECHNICAL BASIS OF TESTING

(1) During the Test, the Owner's operators at the existing SAB Control Room ("SAB Operations") will attempt to maintain the water levels at a steady state. The hydraulic head on the tunnel conveyance system will be defined as the difference between the elevations of the energy grade line (EGL) at Section 1 (at the intake water surface gauge, in the vicinity of the tunnel intake structure) and Section 2 (at the outlet water surface gauge, in the tunnel outlet canal, immediately upstream from the transition at the junction with the PGS channel). The locations of the gauges are generally as shown on the Concept Drawings.

(2) The Guaranteed Flow Amount (GFA) is specified for the following reference hydraulic head (H_{ref}) and the reference elevation of the energy grade line at Section 2 (EGL_{2ref}):

H_{ref} = 5.60 m

EGL_{2ref} = 165.20 m (NAD83)

(3) The reference elevation of the energy grade line at Section 1 (EGL_{2ref}) will be defined by Equation 1.

$$EGL_{1ref} = EGL_{2ref} + H_{ref} \quad (1)$$

(4) For the purposes of the Test, at Section 1, the velocity head will be assumed to be zero and the hydraulic and energy grade lines considered as equal.

(5) During the Test, the following three values will be measured to evaluate the hydraulic performance of the tunnel:

(a) the measured flow, Q_m (m^3/s) as determined by the tracer transit time method as specified in Section 2 of Appendix 1.1(aa)1.1(aa);

(b) the hydraulic grade line elevation at Section 1, HGL_{1m} (m) as measured at the intake gauge; and

(c) the hydraulic grade line elevation at Section 2, HGL_{2m} (m) as measured at the outlet gauge.

(6) The stipulated energy grade line elevation, EGL_{2ref}, will have a corresponding calculable hydraulic grade line elevation, HGL_{2ref}, corresponding to the guaranteed flow, GFA. During testing, an effort will be made to match the measured hydraulic grade line elevation, HGL_{2m} to the reference value HGL_{2ref}. However, it is recognized that there will be some difference between the level achieved and the reference level. During testing, the measured value must be within ±0.3 m of the reference value.

6. DETERMINATION OF REFERENCE TUNNEL FLOW

(1) The measured tunnel energy grade line elevations at Sections 1 and 2 will be calculated by the following formulae.

$$EGL_{1m} = HGL_{1m} \quad [2]$$

$$EGL_{2m} = HGL_{2m} + \frac{\left(\frac{Q_m}{A_{chan2}}\right)^2}{2g} \quad [3]$$

$$A_{chan2} = \left(HGL_{2m} - invert_2\right) \times w_{chan2} \qquad [4]$$

where

A_{chan2} = cross-sectional area of the channel at Section 2

$invert_2$ = invert elevation at Section 2

w_{chan2} = width of the channel at Section 2

(2) The discharge that would have been obtained, had EGL_{1ref} and EGL_{2ref} been obtained, is Q_{ref}, calculated as follows:

$$Q_{ref} = Q_m \times \sqrt{\frac{H_{ref}}{EGL_{1m} - EGL_{2m}}} \qquad [5]$$

7. **TEST PREPARATION**

(1) The Independent Tester shall submit the final detailed Test procedure to the Owner and the Contractor for review and acceptance, a minimum of one (1) year prior to the expected Test date.

(2) At least six (6) months prior to the Test, the Independent Tester shall design, prepare and complete an equipment verification test to ensure that the equipment and methodology meet the requirements of the Test. The Independent Tester shall provide sufficient notice to the Owner and the Contractor for their review and acceptance of the equipment verification test and to ensure their availability to witness the testing.

(3) The Contractor will obtain the necessary Approvals to conduct the test a minimum of three (3) months prior to the expected Test date.

8. **TEST SETUP**

(1) The Test setup shall be designed by Independent Tester and constructed and installed by the Contractor, with oversight by the Independent Tester.

9. **TEST PROCEDURE**

(1) The following list describes the main steps of the Test procedure. The Independent Tester may make prudent changes which reduce the uncertainty of the measurements, subject to the concurrence of the Owner and the Contractor.

(a) Prior to the Test time, the SAB water diversion system will be brought as close to a steady-state condition as practical by SAB Operations as indicated in Section 5 above and maintained as practically as possible at the steady-state water levels for a minimum of three hours. During this

period, the SAB PGS will not be operated and the gates of the INCW within the Ice Acceleration Channel will be in closed positions.

(b) The Test will start as soon as the Independent Tester is satisfied with the test conditions. The transit time of the tracer is expected to be about 40 minutes or less. The tracer will be injected a minimum of five times in accordance with ISO 2975, Part VI, Section 5.5 (*i.e.*, minimum of five test runs) under the same steady state flow conditions. The Independent Tester will record the test data for each Test run (*i.e.*, tracer time and tracer distributions at the injection and detection points).

(c) If the Independent Tester is not satisfied with any of the Test runs, he may cancel that Test run in his sole discretion. In this case, the Independent Tester shall exclude the results of such cancelled Test from the Test report and shall provide an explanation for the cancellation in his Test report.

(d) If the Independent Tester is not satisfied with any aspect of the execution of the Test, he shall submit a written request to the Owner and the Contractor within 24 hours of the test completion to repeat the Test. Upon receiving the request, the Owner will use all reasonable efforts to manage SAB Operations so as to allow the Test to be repeated as soon as possible.

(e) The Owner and Contractor each have the right to witness the Test at their own costs.

10. TEST REPORT

(1) The Independent Tester shall submit the preliminary Test results to the Owner and the Contractor within five (5) Business Days of the test completion. The Independent Tester shall submit copies of the final Test report to the Owner and the Contractor (three copies to each party) within the following 15 Business Days. The Test results shall be presented in the metric SI of units.

(2) The Test report will include the following:

(a) Test objectives

(b) records of all agreements pertinent to the Test

(c) personnel taking part in the Test

(d) description of the Test program

(e) description of the Test setup (including but not limited to the serial numbers and calibrations of the Test equipment)

(f) description of the Test procedure

(g) description of the Test results

(h) complete set of Test readings

(i) measured tunnel flow (Q_{Test}) for each Test run

(j) intake gauge and outlet gauge elevations (HGL_{1m} and HGL_{2m}) averaged over each Test run period

(k) an evaluation of the random and systematic uncertainties of each measured quantity and a calculation of the total uncertainty of data derived from combined measurements for each Test run

(l) statement regarding cancellation of any Test runs.

11. IMPACT OF WATER QUALITY AND WATER TEMPERATURE

(1) The Owner and the Contractor agree that the effects of the water quality, water temperature and seasonal flow variations on the flow Test results are negligible and will not be considered. The Owner and the Contractor also agree that the flow measurements will not be corrected to compensate for the temperature and pressure changes inside the tunnel when the tunnel is filled with water.

12. ANALYSIS OF TEST RESULTS

(1) The Test results shall be analyzed in accordance with the approach given in Section 6 above.

(2) The numerical average of the reference flows (Average Q_{Ref}) of all Test runs completed to the satisfaction of the Independent Tester shall be deemed to be the Performance Test Water Flow Amount (PTWFA) for the purposes of Section 8.3 of this Agreement.

(3) Calculations are to carry all significant figures. No rounding of values is to be done until the final calculation of Average Qref. This value should be rounded to the nearest 0.1 m^3/s based upon the following rules:

(a) when the digit to be dropped is less than five, write the number without the digit; example, 505.844 becomes 505.8

(b) when the digit to be dropped is greater than five, the preceding digit is increased by one; example, 505.86 becomes 505.9

(c) when the digit to be dropped is exactly five, then the nearest even number is used for the preceding digit; example, 505.85 becomes 505.8.

13. FINAL AND BINDING

Provided that the Independent Tester follows the procedures and standards set out in the Appendix 1.1(aa), the Test results, calculations and other determinations of the Independent Tester are final and binding on the Owner and the Contractor and not subject to review by or reference to the DRB or any appeal.

14. CORRESPONDENCE

All recommendations, acceptances and approvals provided to the Independent Tester shall be mutually agreed by the Contractor and the Owner. In the event that the Contractor and the Owner do not agree as to a recommendation, acceptance or approval, the Independent Tester shall consider the positions of each of the Owner and the Contractor and shall proceed in the manner it considers appropriate in the circumstances. To the extent that either the Contractor or the Owner provides the Independent Tester with written instructions or directions, a copy of such instructions or directions shall be concurrently provided to the other party.

Appendix 1.1(nn)

Appendix 1.1(nn) - INTENTIONALLY DELETED

Appendix 1.1(qq)

Appendix 1.1(qq) - OPG's Delegation Notice

DELEGATION OF AUTHORITY

(or change in delegation of authority)

To: Strabag AG (the "**Contractor**")

Contract: Design/Build Agreement dated •, 2005 between the Contractor and Ontario Power Generation Inc. ("**OPG**")

Delegation No.: •

Date: •

Defined terms used in this Notice have the same meanings given to those terms in the Agreement. In accordance with Section 3.2 of the Agreement, OPG hereby notifies the Contractor that OPG's Representative is ■. The duties of OPG's Representative are delegated to the individuals named below for the subject matters and subject to the limitations set out in this Notice. These delegations will continue in full force until revoked by OPG in another delegation of authority Notice.

Title	Delegate	Effective Date	Scope of Authority
■	■	■	•

ONTARIO POWER GENERATION INC.

By: _____

Name:
Title:

Appendix 1.1(uu)

Appendix 1.1(uu) - Outline Specifications

[See attached]

Ontario Power Corporation Inc.
(OPG)

Niagara Tunnel Facility Project

Proposal No.: Tunnel Facility Project-001

Document: MH-5002-00
Intake and Outlet Work Area – Specifications

May 11, 2005
Project No.: 1051006.00

MORRISON HERSHFIELD

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1.0 OPERATIONS – FOR OUTLET ONLY

Preliminary

1) The contractor will remove the overburden along the footprint of the outlet channel, as depicted in the drawings and cross sections. This overburden will be temporarily stored in the materials yards.

2) The contractor will construct the channel outlet to the rock plug limit by means of rock excavations. The rock that is found to be reusable (estimated at ~ 140,000 M3) will be crushed and reused in:

   - Access road construction
   - Backfill as required in the inlet structural drawings.

3) The overburden that is found to be reusable will be used in constructing the entrance road into the outlet opening. The excess overburden from note #1 above will be removed to the designated disposal site by truck.

Operational Stage

1) Excavated material from the Outlet area is to be loaded on Conveyor 1 and removed to the Temporary Stockpile[1]. This will facilitate initial aeration[2] and discharge of contaminants into the runoff pond. The excavated material will be inspected to ensure that no contaminants were introduced during the tunnel boring process. The size of the temporary stockpile will accommodate the material produced by 15 days of tunnel boring, or ~51,000 m3.

2) After it is determined that the material has no BTEX or other contaminants, it will then be transported to the Material Distribution Pile through Conveyor 2. Conveyor 2 will bridge across the HEPC Canal. This stretch of the conveyor has to be covered/protected to prevent any passage of material into the North HEPC canal.

3) The material will be distributed along the area between the two HEPC canals (designated disposal area), using rock trucks, and in accordance with the drawings and cross sections provided in the materials quantity sheets. The material will be compacted in order to minimize air voids, and in order to minimize the possibility of water infiltrating the bottom layers of the pile and destabilizing it[3].

4) Ground water will be pumped into a retention pond capable of holding ~45,000 m3 of water. The water will pass through a lamella clarifier before being discharged into the north HEPC canal. Water (either ground water trapped in rock or runoff) from the temporary stockpile runoff pond will be fed directly into the clarifier.

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[1] Conveyor belt to be constructed by STRABAG. It will be able to move 1,200t/hour of material as peak design load
[2] Certain rock formations (description given in OPG Baseline Geotechnical report) contain BTEX contaminants.
[3] Due to the characteristics of Queenston Shale – becomes a slippery clay like material when exposed to water

5) Storm water runoff from the material distributed in the designated disposal area will be collected via ditches in a settling pond (location depicted on OCA drawing). Disposal of runoff can be done in two ways (based on environmental approvals):

- Discharge the contents of the pond through filter cloth into the North HEPC canal (preferable)
- Pump the contents of the pond into tanker trucks and deliver the water to the ground water retention pond, where they will be treated by the clarifier.

Post Construction

1) The material berm at the designated disposal area will be top soiled, sodded and trees will be planted on it in order to prevent long-term erosion.

2) Materials yards, offices yards, retention pond will be restored to their pre-construction stage, including vegetation and trees.

3) The impervious liner of the temporary stockpile will be disposed of in an approved disposal site. The ground will be restored as noted above.

2.0 CONTINGENCY PLANS AND SUBSTITUTES

1) Break down of Conveyor Belt #1 – Material can be removed from the tunnel exit by trucks via Rd. "E" and Rd. "D" to the temporary stockpile.

2) Break down of Conveyor Belt #2 – Material can be removed from the temporary stockpile by trucks via access roads "C"/"B' and access 1. The temporary stockpile will be capable of retaining 15 days of spoils production.

3) Breakdown of Clarifier – Retention pond deemed capable of holding sufficient water volume pending repair. However, additional pond can be constructed adjacent to it in materials yard No. 2[4].

4) Exiting natural ravine unable to cope with increased storm water runoff quantities[5]. Excavate a retention pond in materials yard #1 to supplement the existing pond.

3.0 SPECIAL PROVISIONS

All clauses in all the relevant OPS Specifications and OPG Owner's Mandatory Requirements (Appendix 1.1 uu) are to be read in conjunction with this document except the BASIS OF PAYMENT, wherein the General Conditions pertaining to MEASUREMENT AND PAYMENTS shall be applicable.

[4] Increasing the size of the existing pond is not desirable, as the pond requires heating in winter.
[5] Due to the striping of topsoil and the increase in paved areas.

3.1 GENERAL ITEMS

G.1 Construction Facilities and Temporary Control

Before commencing construction operations, supply, erect and maintain hoarding around entire perimeter of Site as shown on the drawings. Mark with "POST NO BILLS" signs on the outside of the hoarding. Remove hoarding upon Contract completion unless as directed by the Commissioner.

Prevent unauthorized entry to the Site. Barricade, guard, or lock access points to the satisfaction of the Engineer and post "NO TRESPASSING" signs.

Provide barriers around trees and plants designated to remain. Protect from damage.

Provide secure, rigid guide rails and barricades around deep excavations, open shafts, open stair wells, open edges of floors and roofs as required for protection of Work, workers, and the public.

Provide Utilities including lighting and water supply to the construction site. The Contractor shall be responsible for payment of these services including the installation/removal of meters and work associated with connection and disconnection. Washroom facilities shall also be provided by the Contractor.

Protect surrounding private and public property from damage during performance of the Work. Take precautions to prevent fires. Provide and maintain temporary fire protection equipment of a type appropriate to the hazard anticipated in accordance with authorities having jurisdiction, governing codes, regulations, by-laws and to the satisfaction of the Engineer and insurance authorities.

Workers shall comply with the Occupational Health and Safety Act and Regulations for construction projects.

Supply and install offices at the site for the duration of the Work in locations as indicated on the drawings. Provide offices with electric light, heat, air conditioning, telephone and first aid equipment as required by the Workplace Safety and Insurance Board and the Ontario Ministry of Labour. Office shall have adequate electric heating, air conditioning and lighting; washroom and water closet with hot and cold running water and supplies; and labour for daily cleaning of the washrooms and offices. Equip the offices with the following: desks and chairs, tables with drawers, plan table and drafting stool, aluminum wall mounted plan racks and lockable fireproof fire cabinets. Provide and pay for the telephone services with “call answering” and a paper facsimile machine on a separate dedicated phone line for the facsimile machine. Also provide a photocopier capable of making multiple copies up to 11” x 17” in size, complete with sorting capabilities. Provide regular service for fax and photocopy machine for the duration of the Work. All trailer windows must be protected with metal bars and all doors to have metal plate with padlock capability. For all trailers and temporary buildings, provide wood stairs, platform and boardwalk, painted and repainted as required with non-skid abrasive paint.

Remove temporary offices (buildings) upon Contract Completion. Restore area(s) to match the existing surrounding areas.

Maintain the Site and adjacent areas in a clean and orderly condition, free from debris and other objectionable matter. Remove rubbish and surplus material, equipment and structures immediately. If the Site is not cleaned within 48 hours after the Contractor has been instructed to do so, the Engineer may clean the Site and retain the cost from monies due, or to become due, to the Contractor.

Keep haul routes free at all times from materials spilled on street surfaces and maintain streets in clean condition to the satisfaction of the Engineer and the street authorities.

During the progress of the Work, afford access to visitors duly authorized by the Engineer and facilitate inspections or tests they may desire to make. Ensure Site visitors wear appropriate safety apparel.

The Contractor shall provide water trucks for dust control as where required.

G.2 Examination, Protection and Restoration of Property

The Contractor shall examine, protect and restore if damaged by the execution of the Work, all property adjacent to the Work or that may be affected by the Work, including all equipment and services within the properties.

The Contractor, the Commissioner and the structure owner shall jointly examine each of these properties prior to the start of construction. Amendments to the inspection reports, if required, will be carried out by the Commissioner. The reports shall then be signed by all three parties.

The Contractor, the Commissioner and the structure owner shall jointly re-examine each of these properties after construction is completed to record condition differences.

The restriction of joint examination to specific properties does not relieve the Contractor of its responsibility for the examination, protection and restoration of all property adjacent to the Work or which may be affected by the Work.

Locate, protect, support and maintain all equipment and services affected by the Work.

The Contractor shall fully secure the integrity of the foundation of the INCW prior to any blasting work.

On completion, restore equipment and services to their original condition, and relocate where necessary, to the satisfaction of the Engineer.

Repair and restore any part of the property including equipment and services broken or damaged by operations performed under the Contract.

G.3 Safety

For the purposes of the Contract, the term "constructor", as defined in the Occupational Health and Safety Act, shall mean the Contractor who shall be responsible for ensuring that the provisions of the statutes, regulations and by-laws pertaining to the duties, obligations and safe

performance of the Work in accordance with the obligations of the "constructor" as set out in the Occupational Health and Safety Act are to be observed.

Regardless of whether the Commission or the Contractor pursuant to the Occupational Health and Safety Act as the "constructor", the Contractor's representative shall be responsible for ensuring that the provisions of statutes, regulations and by-laws pertaining to safe performance of the Work are observed and that the methods of performing the Work do not endanger the personnel employed thereon and the general public, and are in accordance with the latest edition of the Occupational Health and Safety Act.

Prior to the Contractor's representative being absent from the Site, the Contractor's representative will name another person, in writing to the Commissioner, who is competent to assume these responsibilities. The Contractor shall advise the Engineer of any change in the individual identified as the Contractor's representative.

The Contractor's representative shall ensure that all measures and procedures prescribed by the following Acts and Regulations are carried out on Site and every employer and every worker performing work on the Site complies with all of the requirements:

- The Occupational Health and Safety Act;
- The Regulations for Construction Projects;
- WHMIS Regulations;
- The Environmental Protection Act and regulations,
- Dam Safety Regulation under the Lakes and Rivers Improvement Act;
- All other legislation, regulations and standards as applicable.

During underwater construction, in-service inspection and maintenance of the structures, safety of the divers or personnel shall ensured.

G.4 Traffic

Conduct the Work in such a manner as to ensure the least interference with pedestrians, cyclists and vehicular traffic. Comply with arrangements made with traffic and police authorities and as directed by the Engineer.

Give the Engineer seven (7) calendar days written notice of desire to restrict or close any street or lane permitted under the Contract. Do not put any restriction or closure into effect without the approval of the traffic and police authorities and the Engineer's written approval.

Under the direction of the police and traffic authorities and in accordance with the Manual of Uniform Traffic Control Devices, supply, erect, maintain, and subsequently remove signs, signals, flasher beacons and delineators, which are required by the traffic authorities for the diversion and guidance of vehicular and pedestrian traffic.

Haul routes and the location of any ramps which enter onto any street are subject to the written approval of the Engineer, traffic and police authorities prior to the start of any Work. No ramp may be placed in an area where future construction is planned.

Keep haul routes free at all times from materials spilled on street surfaces and maintain streets in a clean condition to the satisfaction of the Commissioner and authorities having jurisdiction.

The Commissioner may inspect haul routes, the Site and adjacent premises daily and may halt operations, withhold payment or carry out such additional operations as necessary, deducting the cost from monies due, or to become due.

Access and egress to and from the Site shall be at the locations shown on the Contract Drawings.

Maintain access roads, sidewalks, ramps, construction runways and decked areas adjacent to the Site in a safe condition throughout the Contract.

Take precautions to avoid tracking and depositing materials, debris and mud on roads and on the Owner's property from vehicles and equipment operating to and from the construction Site, and be responsible for removal of such deposits by brooming and washing to the satisfaction of the Commissioner.

Maintain access routes, sidewalks, Site roads, trailer area, storage areas as well as Work areas free of ice and snow to maintain safe operating conditions and to maintain progress of the Work. Cleared snow shall be removed from the Site within 12 hours of a snow fall or as directed by the Commissioner.

4.0 ELECTRICAL AND MECHANICAL WORKS ITEMS

4.1 E&M.1 INTAKE AND OUTLET GATES

Under this item, the Contractor shall supply, deliver and install new Intake Gates including all hardware, inserts in concrete, trial operations and delivery to storage as prescribed by OPG. Also included in this item is New Outlet Gates including all hardware, inserts, fabrication, delivery and installation including all lift and full scale trials as requested.

This item also included New Outlet Gates supporting structures are as part of the outlet gate installation.

4.2 E&M.2 SITE ILLUMINATION (TEMPORARY)

4.3 E&M.3 SITE ILLUMINATION (PERMANENT)

4.4 E&M 4 PROVISIONS OF POWER TO SITES

5.0 CIVIL WORKS ITEMS

C.1 CHAIN LINK FENCE

Under this item, the Contractor shall supply and install new approved chain link fence, foundation and associated components (fence, posts, connection hardware, etc) at the following locations:

1. At the Intake Site Area where around possible addition of construction/stockpiling areas as shown on the drawings.
2. Various locations at the Outlet Site Area at specified on the drawings including site offices, restricted woodlands, restricted meadow, Area North of HEPC canals, Adjacent to Whirlpool Rd and Materials Yard 1.

The chain link fence shall meet the requirements of OPSS No. 541 except as specified herein.

The total height of the chain link fence shall not be lower than 2.50 m and the height of the chain link fence on grade shall not be lower than 2.30 m. Lockable gates shall be provided as shown on drawings.

C.2 CLEARING AND GRUBBING (150 MM THICK)

Under this item, the Contractor shall clear and grub the existing ground areas as required to gain access for equipment, materials and personnel, to the work area at both Intake and Outlet Site Areas.

This item shall meet the requirements of OPSS No. 201 and 206 except as specified herein.

This item will be deemed to have included for the removing, carting away and disposing of all vegetation including removal of topsoil from the work zone except for mature trees, which have to be identified prior to the commencement of this operation and relocated as per the directions and sole discretion of the Project Manager. Also prepare the surface ready to commence the permanent works. Mature trees are to be relocated to pre-determined locations. Topsoil is to be stockpiled in a predetermined location for future use.

Prior to any clearing and grubbing, a professional arborist shall be retained to review any tress that the Contractor deemed necessary for relocation. Trees relocation shall be paid elsewhere.

Under this item, the Contractor shall regrade all surfaces affected by construction to original condition or better.

C.3 SILT FENCE

Under this item, the Contractor shall supply and install new silt fence barrier and associated components along the southern edge of the access road adjacent to North Canal and Final Disposal Area at the Outlet Area to prevent passage of material into the waterway as shown on the drawings.

This item shall meet the requirements of OPSS No. 577 and as specified herein.

The specification should be read with particular emphasis on Clauses 577.07.02 and 577.07.03 for construction of the Silt Fence and Clause 577.07.12 for sediment removal and management. Throughout the period of the contract the fence should be serviced and maintained as to fulfill the purpose of its erection.

A 100m stand-by supply of prefabricated silt fence barrier shall be maintained at the site throughout the duration of the contract.

C.4 IMPERVIOUS LAYER IN CERTAIN AREAS

This item shall meet the requirements of OPSS No. 1205 and as specified herein.

In the Temporary Stockpile and Run-Off Pond locations, an impervious membrane has to be provided to prevent percolation of contaminants into ground water. The layer used can be built up or be off the market with the prior approval of the Project Manager.

C.5 EXCAVATION

Under this item, the Contractor shall carry out all required excavation to profiles, specified in the respective drawings, stockpile and disposal of the excavated material (rock and earth) at both Intake and Outlet Site Areas including the Access Ramps to Intake Elevation and to Outlet Entrance during Construction as indicated on the drawings. Excavated material to be used as 'fill' wherever applicable or removed to the designated disposal area.

The sides of the intake channel excavation shall be line-drilled and controlled blasting shall be employed to ensure that the rock beyond the excavation limits is not damaged or destabilized.

Ground water retention pond to be excavated and the excavated material to be placed and compacted in lifts all around to form the water retaining structure as per details provided in the drawings.

The Run-off pond will be excavated as shown in the drawings and will be lined with an impervious layer/membrane to prevent percolation of contaminants into the ground.

The overburden along the path of the outlet channel will be excavated as shown in the drawings and cross sections. Some of the overburden will be reused in constructing the access road into the outlet shaft. The rest will be removed to the designated disposal area via trucking.

The designated disposal area will be surrounded by a ditch and a silt fence, in order to trap sediment and prevent it from accessing the HEPC canals.

This item shall meet the requirements of OPSS 102, 206, 212 and 1010.

Side slopes of the excavation areas shall be keep to 2H:1V or provide stabilized structure such as roadway protection, earth retaining systems otherwise.

Any damaged rock beyond the excavation limits shall be removed and backfilled with concrete adequately tied back to sound rock at Contractor's own expense.

All the excavation limits datum was based on the information and drawings supplied by the OPG.

As part of the work, the Contractor shall indicate the location of any buried utilities by stakeouts prior to any excavation and those utilities shall be protected/relocate at all time during excavation and construction.

C.6 NATIVE FILL

Under this item, the Contractor shall pick-up, transport, place, and compact the stockpiled material that was selected and removed from the site at both Intake and Outlet Areas as indicated on the drawings.

This item shall meet the requirements of OPSS 902, 1010 and 1501.

The Contractor shall confirm the top of backfill material elevations to the required elevations for the Commissioner to review prior to the work.

C.7 GRANULAR 'B'

C.8 GRANULAR 'A'

Under Item C.8, the Contractor shall supply, deliver, place and compact granular materials 'B' at the following locations to the extent shown on the drawings.

1. Access roads at both Intake and Outlet Areas to the depth as indicated.
2. Areas behind the East and West Approach Walls to the elevations as indicated.

Under Item C.9, the Contractor shall supply, deliver, place and compact granular materials 'A' at the following locations to the extent shown on the drawings.

1. Access roads at both Intake and Outlet Areas to the depth as indicated.
2. Platform and construction area at Intake Area.

Granular Materials shall comply with the requirements of OPSS 501, 902, 1010.

All access roads are to be constructed as per cross-sections in the drawings. Sub-base, out of native material, is to be well compacted and ready to receive base course of granular material.

Submit all delivery tickets to the Commissioner. The Contractor shall confirm the top of backfill material elevations to the required elevations for the Commissioner to review prior to the work.

C.9 ASPHALT

Under this item, the Contractor supply, deliver and place the hot mix asphalt on the access roads and platform at Intake and part of main access roads at the Outlet Areas as shown on the drawings. Also included in this item is the all access roads will have ditches in order to control storm water runoff. The water flow in the ditches will be directed towards the existing grounds' natural drainage – roughly in the area of the new dewatering structure.

Work shall be performed in accordance with OPSS 311, 313 except as modified herein.

Work shall be done by an approved asphalt contractor.

Compaction equipment can be by small roller or the use of vehicle roller. The asphalt material shall be 75 mm HL3 mix.

C.10 TREE PLANTING

Under this item, the Contractor shall plant the trees at both the Intake and Outlet Areas. Also included in this item is the tree planting at the Intake disturbed areas including shrubs and evergreens. Each trees shall be planted in every 100 m2 area.

The Contractor shall retain a Professional arborist to review any tress that the Contractor deemed necessary for removal. Trees designated for removal or pruning shall first be approved b the Commissioner before performed by the Contractor using a qualified tree-removal Sub-Contractor. The Contractor shall remove all debris resulting from cutting or pruning.

All work shall be in accordance with OPSS 565 and Canadian Standard for Nursery Stock.

All plant materials are to be bolled and burlapped.

No cutting of tress permitted between May 1st to June 15th unless by owner's permits.

C.11 CULVERTS

C.12 CONCRETE PIPES

Under item 11, the work includes supply, deliver and place pipe culverts under the access roads at both the Intake and Outlet Site Areas as indicated on the drawings.

The size of the culverts varies from 675 mm – 900 mm diameter.

Under item 12, the Contract shall supply, deliver and place concrete pipes from the ground water treatment plant to the HEPC canal.

The size of the concrete pipes varies from 1500 mm – 2000 mm diameter.

All work for these items shall be in accordance with OPSS 421 and OPSS 1820 except as specified herein.

Depth of excavation and placing of culverts and pipes to be governed by the Frost Line – Pipes to be placed below Frost line and to be on granular bedding.

C.13 SANITARY SEWER

This item will be deemed to have included for all works for the connection to the existing sewer at both the Intake and Outlet Site Areas.

All work shall be in accordance with OPSS 406.

C.14 SANITARY SEWER MANHOLE

This item will be deemed to have included for all works for the construction of sanitary sewer manholes at the connection to existing sanitary sewer Line at the Intake Area as well as to Stanley Ave at the Outlet Site Area.

All work shall be in accordance with OPSS407.

C.15 WATERMAIN

This item will be deemed to have included for all works to construct watermain and all associated components for the connection from the Intake Area and the Outlet Site Area to Stanley Avenue to feed offices area.

All work shall be in accordance with OPSS 701.

C.16 LANDSCAPING AT FINAL DISPOSAL AREA

This item will be deemed to have included for all works to landscape the Final Disposal Area at the Outlet Site Area.

All work shall be in accordance with OPSS 570 and 571.

C.17 CONVEYOR BRIDGE

Please refer to the specification item prepared by Strabag.

C.18 NOISE BARRIER

This item will be deemed to have included for all works to design, supply and construction of noise barrier by Durisol Retained Soil System (RSS) or equivalent at the Intake Site Area as shown on the drawings.

Reference:

- OPSS 206, OPSS 501, OPSS 609, OPSS 1350, OPSS 1352
- SGSB 1-GP-181-M1977 & March 1978 Amendment – Coating; Zinc Rich, Organic, Ready Mix
- CSA Z107.9-00 Standard for Certification of Noise Barriers February 2000
- CAN/CSA-S6-00 Canadian Highway Bridge Design Code
- CSA G164-M1981 Hot Dip Galvanizing of Irregularly Shaped Articles
- CSA W 47.1-1983 Certification of Companies for Fusion Welding of Steel Structures
- CSA W 59.1-1982 Welded Steel Construction (Metal-Arc Welding)
- CAN3-A23.2-M77 Method of Test for Concrete
- CAN3-A5-M 1983 Portland Cement/Masonry Cement/Blended Hydraulic Cement

The Contractor shall submit to the Commissioner of all shop drawings for noise barriers at least four (4) weeks prior to the commencement of construction. The shop drawings shall show full

details of noise barrier related items, erection procedures and if applicable, connections to structures. All shop drawings shall bear the seal and signature of an Engineer.

The Contractor shall construct a noise barrier with the following minimum design features:

- Reference wind pressure: 380Pa.
- The minimum acoustical characteristic of the noise barrier shall be such that the noise barrier is sound absorptive on the construction side.
- Final colour selections will be determined by the Contract Administrator at the point of manufacture from samples prepared by the Manufacturer.

Noise barriers shall be supplied in accordance with OPSS 128. All welds shall conform to CSA W59.1 and CSA W47.1.

Steel posts to which special attachments are welded shall be hot dip galvanized after fabrication according to the requirements of CSA Standard G164-M. Silicone sealant shall be CGE SILPRUF 2000 Series. Concrete in post footings shall be 20 MPa according to the requirements of OPSS 1350.

Where footings are to be installed in earth,concrete for drilled footings shall be cast entirely against undisturbed soil. If other than drilled footings are necessary, the footing shall be formed and the excavation shall be backfilled with granular materials and compacted to at least 95% Proctor. For concrete posts, the concrete working slab below the construction joint in the footing shall be placed a minimum of 4 hours prior to installing the post. Where required, the tops of all footings are to be shaped to provide for full horizontal seating of panels, the remaining surface area is to be sloped away from the post so as to shed water. Stepped footings are to be constructed to suit grade changes.

The concrete in the footings shall be cured for a minimum period of 5 days before the noise panels can be installed.

When rock is encountered within the specified excavation depth for footings in earth, the footing shall be constructed in accordance with the "Footings in Earth" design down to a minimum of 300 mm into the solid rock or 1.5 m below the top of footing grade, whichever is the greater depth.

All excavations into rock shall be backfilled entirely with concrete. The excavation above the top of rock may be formed to the required dimensions and the remainder of the excavation backfilled with granular material.

C.19 TRAIL RELOCATION

This item will be deemed to have included for all works to relocate the existing recreation trail at the Intake Site Area as shown on the drawing. Also included in this item is to connect the relocated portion of recreation trail to the existing trail at both ends. Relocate the recreation trail back to the original position upon the completion of the work.

All work shall be in accordance with OPSS 128.

The new trail layout and material used shall be match the existing recreation trail or to a better condition.

C.20 TOP SOIL AND SODDING

This item will be deemed to have included supply and place topsoil and sodding to the following areas:

1. Reapplying topsoil to the disturbed areas at the Outlet Site Areas including construction offices, materials yard, Final Disposal area, Temporary Stockpile Area for restoration.
2. Applying 150 mm depth topsoil and sodding to the embankment slope behind the East and West Approach Walls at the Intake Areas.
3. Reapplying seeding at all other disturbed Areas.

Also include in this item is to water the placed sod over the warranty period. Any dead sod spots shall be replaced at the Contractor's own expense.

It is noted that the salt content of the rock from the tunnel may make it difficult to get seed growth.

Work to be done by an approved sodding Contractor.

C.21 Remove and Relocate Existing Watermain

This item will be deemed to have included remove, dispose all material off-site and relocate the existing OPG Watermain at the Outlet Area. All work shall be performed by a qualified Subcontractor.

Two relocation options are proposed:

1. Install approximately 1000 m of new pipe adjacent to the pumping station and bridge the new canal (23 m)
2. Erect a new structure over the existing canal (43 m) adjacent to dewatering structure.

All work shall be in accordance with OPSS 510.

Prior to commencing removal of the existing watermain pipe, the Contrctor shall notify the owner of the watermain and also to ensure that the existing watermain has been by-passed, disconnected and/or unoperated.

C.22 REMOVE EXISTING DEWATERING STRUCTURE AT PGS

This work will encompass the removal and disposal all material off-site the existing dewatering structure at the Outlet Area.

The structure will be removed to the bottom of canal bed elevation

All work shall be in accordance with OPSS 510.

C.23 SURFACE PROTECTION FOR GROUND WATER RETENTION POND

This item will be deemed to have included surface protection for the ground water retention pond at the Outlet Area.

Protection can be provided through by the following material:

- Riprap
- Impervious synthetic material
- Clay layer

All work for riprap and impervious synthetic material shall be in accordance with OPSS 511.

C.24 CRUSH STONE

This item will be deemed to have included supply and place crush stone at the following areas:

1. Embankment behind the East and West Approach Walls to the depth as shown on the drawings at the Intake Area.

The crush stone size shall be 150 mm diameter. Stones shall consist of sound, natural, round stone.

No backfill of crush stone shall be placed behind the approach walls until rockfill has been placed up to the desired top level and capped with concrete cover slab.

The depth of the stone shall be placed and layout as shown on the drawings.

C.25 UTILITIES RELOCATION (IF REQUIRED)

This item will be deemed to have included relocate the existing Utilities if required. Prior to the commencement of any work, the Contractor shall stake out and verify all Utilities locations to determine if there are Utilities needed to be relocated at both Intake and Outlet Areas. Upon the completion of the work, the Contractor shall reinstate the Utilities as directed by the Utilities Companies or Agencies.

Any damage to the existing pipe and all associated components / supports that are not specified to be removed shall be repaired by the Contractor to the satisfaction of the Commissioner.

C.26 RESTORATION

The item will be deemed to have included the removal of all temporary installations at both Intake and Outlet Areas (temporary buildings, fences, and all other items deemed removable by OPG), reapplication of topsoil to disturbed areas and to the material berm, providing seeding and cover, and tree planting. The reapplying of topsoil and tree planting is paid under other items elsewhere.

C.27 STRAW BALE

This item will be deemed to have included supply and place straw bale at theboth sides of the ditch for the following areas:

1. At the intersection of the access roads at the Intake Area and Outlet Area.
2. Along all access roads at every 250 m internal.
3. At the approach of the culverts.

The straw bale is to slow down the flow and to prevent erosion.

6.0 STRUCTURAL WORKS ITEMS

S.1 TEMPORARY DOCK AND ACCESS

Under this item, the Contractor shall provide temporary dock at the Niagara River Shoreline at the location as indicated on the drawings for the transportation and access to the Intake Area Site. The item shall also include other temporary installations/structures for facilitate the removal and deliver material to the intake structure/channel including stairs platform/or construction elevators/tower crane.

Also included in this item is the removal of the temporary dock and installations/ structures upon the completion of the Intake Area Work.

All docks must be constructed and designed with engineering certification as to structure durability and effectiveness for the river location. The dock must be completed by a Certified Dock Builder or the owner of the property where the structure is located.

All construction docks must have the plans, specifications, and required calculations submitted and signed by a Professional Engineer experienced in dock design with boat/batch size, wind conditions, and anchorage design equal to or greater than the design being submitted.

American Society of Civil Engineers (ASCE) Manuals and Reports on Engineering Practice No. 50, Planning and Design Guidelines, is a recognized standard and may be used along with the requirements herein. The requirements provided in this specification shall govern over the ASCE No. 50 standard.

All docks shall be constructed with environmentally safe materials.

Structural framing members shall provide corrosion resistance and strength as required by a Professional Engineer.

Anchorage shall be designed with a minimum working load safety factor of 3.0 for cables and 2.0 for chains. Anchorage shall also be galvanized or stainless steel. Anchor design shall be completed with sound engineering practice and the soil properties assumed (if soil testing was not completed) shall be shown on the plan documents. Submerged anchors must be positioned to accommodate low water levels, as not to present a navigational hazard.

S.2 COFFERDAM AND ICE PROTECTION GROYNE

The requirements of OPSS 517 shall apply to this tender item except as modified herein.

Under this item, the Contractor shall design, provide and maintain a cofferdam system including anchors, rip rap and crush stones to the limits at the Intake Area as shown on the drawings. Also included in this item is the removal of Cofferdam including all bracing after the completion of the structure work, care being taken not to disturb or otherwise damage the finished structure.

Cofferdams shall be carried to adequate depths and heights, and be safely design and constructed, and be made as watertight as is necessary for the proper performance of the work which must be done inside them. Cofferdams shall provide sufficient clearance for the construction of forms and shall permit pumping outside the forms.

Cofferdams shall be designed by a Professional Engineer and the plans bearing the Professional Engineer's stamp and submitted to the Commissioner for approval 10 weeks after the work commencement. These plans shall also contain information as to the design loads and the de-watering and excavation sequence.

S.3 GROUTING

Under this item, the Contractor shall provide a continuous, durable and effective grout zone at the Intake area to the limits as shown on the drawings, appropriate and suitable for the existing subsoil and site conditions, to control all seepage of groundwater and re-grouted where necessary until water ingress is controlled by monitoring.

The Contractor shall be responsible for the design of the multiple grout curtains design. Submit grouting procedures in accordance with the site conditions, working window, and schedule, including the layout of the grout plant and accessory equipment, material storage, fume and dust exhaust and ventilation, access equipment, and other pertinent details, particularly designed to address the space limitation, time restriction, confinement of the tunnel, power supplies, etc. Also submit manufacturers product data, recommended handling and mixing instructions, recommended installation instructions, site conditions which would affect installation procedures, and site conditions which would impose performance limitations.

Monitoring work will be the responsibilities of the Contractor supervised by representatives of the Commissioner.

S.4 SANDBAGS

Under this item, the Contractor shall supply and place cemented sandbags for the precast unit support for the following as shown on the drawings:

1. Leveling the locations of East and West Approach Walls.
2. Leveling the locations of the New Acceleration Wall.

S.5 ROCKFILL

The requirements of OPSS 511 shall apply to this tender item except as modified herein.

Under this item, the Contractor shall supply and place rock for the following as shown on the drawings:

1. Rock fill within the concrete precast units up to the level at the East and West Approach Walls.
2. Rock fill within the concrete precast unit up to the level at the New Acceleration Wall.
3. Rock fill on the overburden slopes for the outlet channel.
4. Rockfill at the ice protection groyne at the Intake Area.

The size of the rock shall be 500 mm diameter. Rocks shall consist of round and natural shape. It shall consists of clean rock gragments and shall be free from organic material. Rockfill shall be reasonably uniformly graded in size up to a maximum of 500 mm and such that not more than 10% by weight shall be less than 150 mm and more than 50% by weight shall consist of particles 300 mm or larger in size.

S.6 REMOVE GUARDRAIL AND POSTS (AS REQUIRED)

Under this item, the Contractor shall remove and salvage the existing guardrail and posts at the Intake Site Area as required to the limit as indicated on the drawings.

Any damage caused to the guardrail and posts by the Contractor's operation shall be repaired or replaced to the Commissioner's satisfaction at the Contractor's expense.

Included in this item is reinstating the guardrail and posts to original details upon the completion of work.

S.7 REMOVE EXISTING ACCELERATION WALL

Under this item, the Contractor shall remove and dispose off site, the acceleration wall system including concrete cap, timber bracing, rock fill and all associated components in stages and sequences to the limit as indicated on the drawings. As part of the removal operation, the Contractor shall supply all necessary equipment and operators to load, haul and dispose of material and debris resulting from the removal work.

The demolition method of the wall shall be undertaken to minimize impact on the operation of the INCW and the environmental impact. Prior to all in-river activities, the Contractor shall coordinate with and obtain approval from Ontario Power Generation.

The Contractor shall ensure that no debris from the removal operations enters into the Niagara River watercourse.

S.8 REMOVE PARTIAL EXISTING PIERS FOR WIDENING

The requirements of OPSS 904, 928 and 929 shall apply to this tender item except as modified herein.

Under this item, the Contractor shall remove and the existing concrete piers including reinforcement to the limit as indicated on the drawings. As part of the removal operation, the Contractor shall supply all necessary equipment and operators to load, haul, and dispose of material and debris off site resulting from the removal work.

Removal method shall be selected to ensure no detriment to the structural integrity of components that will remain during and after the work. Extreme care must be taken not to overbreak the concrete beyond the limits of removal.

No debris and water resulting from removal operations will be permitted to enter the watercourse of the Niagara River unless complying with applicable Municipal by laws and with relevant MOE Standards.

The use of hoe-rams or large impact hydraulic breakers is strictly prohibited. The explosives or implosion procedures is also prohibited.

S.9 CONCRETE – MASS CONCRETE

S.10 CONCRETE – TREMIE CONCRETE

S.11 CONCRETE – CAST-IN-PLACE CONCRETE

Under these items the Contractor shall supply and place concrete for the structure components to the dimensions, shape, thickness, elevations and depths shown on the contract drawings, except for the precast units which will be described and paid under separate items. These components are defined below pertinent to each individual item. The provisions of OPSS 904, 919 and 929 shall apply unless otherwise specified below. All properties of the mix are as describe below, and in accordance with CSA Standard 23.1-00 depending on the exposure of the component.

Under Item S.9, the Contractor shall supply, deposit and compact mass concrete at locations necessary for the construction of the West Approach Slab at the Intake Area (Section C) as shown on the Drawing 2.

Under Item S.10**,** the Contractor shall supply, deposit tremie concrete at the following locations:

1. Areas necessary for the base of the both East and West Approach Walls construction that are not in dry condition.
2. Areas between the Existing gravity wall and the East Approach Wall.
3. Head and tip of the new Acceleration Wall.

Prior to the placement of mass concrete, the area shall be cleaned of silt and debris. When the mass concrete area cannot be kept water free, procedures for underwater concreting shall be established to include concrete mix design, appropriate admixtures, placement schemes,

inspection plan, and concrete sampling plan to ensure competent concrete is achieved. When the concrete surface has been brought above the water line, regular concrete shall be placed in the dry after all laitance has been removed from the surface of the concrete.

Under Item S.11, the Contractor shall supply, place concrete for the following work as shown on the Drawings:

1. In-fill between the turning area at the West Approach Wall.
2. Concrete cover slab at both East and West Approach Walls, as well as New Acceleration Wall.
3. Extensions at Piers 1 and 2.

The Contractor is also responsible for design of any temporary shoring, and the steel casing with associated strut systems as required for the bridging components and the nose section of the accelerating wall.

Construction activities must not hinder the efficient movement of ice in the vicinity of the INCW.

Work also includes the provision for construction of expansion joints as well as filling, caulking and other accessories shown, sandblasting and roughening of existing concrete surfaces and application of bonding agent where necessary for the proper bonding of new concrete with existing concrete. Compressible filler over existing deck, vent and weep holes at the pier extensions are also part of this item and will not be measured separately. The dowels are not part of this item and will be measured elsewhere.

All concrete work and field testing shall conform to the requirements of CSA Standard A23.1-00 and A23.2-00.

The Contractor shall supply the details of the proposed mix, test results of trial batches of the proposed mix, and bagged samples of the mix constituents for testing by the Region. No concrete shall be placed until the proposed mix has been proven by test results and written authorization to proceed has been issued by the Commissioner.

Calcium chloride shall not be used in the mix under any circumstance. Construction joints other than those shown on the Contract Drawings are not permitted. Construction joints shall be formed as follows:

- Joints shall be neat and properly formed and well bonded
- The exposed face of the concrete at construction joints shall be formed and prepared as shown on the Contract Drawings.
- All faces shall be cleaned prior to placing concrete or cement paste so that all dirt, grease, dust or debris is removed. An excessively rough concrete surface shall not be permitted.
- The surface film laitance and mortar shall be completely removed from the joint face of the hardened concrete to present a clear, sound concrete face that has the aggregate particles exposed.

- After completion of the above preparation, the joint face of the hardened concrete shall be thoroughly wetted (free standing water will not be permitted) and covered with a 10 mm thick brush coating of neat cement paste (1 part cement, 1 part sand and water) immediately before placing fresh concrete.

All dust and loose particles shall be removed from inside the forms using compressed air just prior to placing of concrete. Any surface against which concrete is to be placed shall be pre-wetted just prior to placing the concrete. No standing water shall be permitted in the formwork.

Concrete shall not be placed until all reinforcement and formwork has been inspected by the Commissioner. Access for such inspection shall be provided by the Contractor.

Concrete shall be cured by covering exposed, fresh concrete with at least one layer of wet burlap covered with opaque white plastic sheets for a period of at least seven (7) days. The white filter fabric shall be kept continuously soaked with clean water. Strips of wet burlap shall overlap by at least 150 millimetres. Plastic sheets shall be at least 4 mil thick and shall be of standard commercial quality, free from snags, tears or other flaws in order to provide a tough, pliable moisture barrier. The plastic sheets shall overlap by a minimum of 300 mm and shall be held in place against displacement by wind.

Removal of the forms shall be subject to the following conditions:

- Forms shall not be removed until the concrete has reached a strength of 20 MPa
- Joint faces of hardened and fresh concrete shall be prepared in accordance with the requirements as specified elsewhere in the contract

The Contractor shall remove and dispose of off site all formwork at the completion of the work.

Cold and hot weather concrete shall be in accordance with A23.1-00. No additional payment will be made for cold and hot weather concrete operations.

Formwork and falsework are deemed to be included in the concrete items and will not be measured for payment.

Concrete shall conform to the requirements of A23.1-00 except as noted in this special provision. The Contractor will be responsible for the concrete mix design as specified in CSA Standard A23.1-00 and for providing concrete of the required properties.

When submitting the mix proportions, the Contractor shall specify the source of the coarse and fine aggregate and the manufacturer of the cement.

Structure	Intake- mass concrete, In-fill	Intake – Pier Extensions	Intake - Concrete Cover Slab	Intake – Precast Modules	concrete subbase - tremie concrete
Dimension (thickness)	refer to drawings	refer to drawings	0.5 m to 0.8 m	refer to drawings	refer to drawings

strain		freezing and thawing severe sulphate attack (C.S.A.)	freezing and thawing severe sulphate attack (C.S.A.)	freezing and thawing	freezing and thawing severe sulphate attack (C.S.A.)	no special requirements
Additional requirements		water tight concrete structure				
Aggregates	coarse aggregates, form	rounded or cubic crushed	rounded or cubic crushed	rounded or cubic crushed	rounded or cubic crushed	
	range of size	0 / 32 mm	0 / 75 mm	0 / 32 mm	0 / 32 mm	0 / 20 mm
Cement	Type	portland cement	portland cement	portland cement	portland cement	portland cement
	Type	10	10	10	10SF	10
	Description	sulphate resitent, low heat of hydratation property	sulphate resitent, low heat of hydratation property	low heat property	sulphate resitent, low heat of hydratation property	no special requirements
	recommended volume	270 kg / m^3	270 kg / m^3	270 kg / m^3	270 kg / m^3	400 kg / m^3
Cementing materials	type	fly ash	fly ash	fly ash	fly ash	
	Specifiaction acc. to CSA 23.1	F	F	F	F	
	recommended volume	50 kg / m^3	50 kg / m^3	30 kg / m^3	50 kg / m^3	
Water	type	potable	potable	potable	potable	potable
	water / cement ratio (maximum)	0.45	0.45	0.55	0.45	<0.60
Admixtures	type	water reducing admixtures, plasticizer				
Requirements (minimum values)	release strength					
	28 days strength	25 MPa	35 MPa	30 MPa	50 MPa	
	final strength (reached after 90 days)					25 MPa
	Youngs modulus	32 GPa	32 GPa	32 GPa	32 GPa	
	air content acc. to CSA 23.1	3 - 6 %	3 - 6 %	3 - 6 %	3 - 6 %	

water tightness	water infiltration depth acc. to German Standard 1048 testing method	30 mm	30 mm	30 mm	30 mm	
Exposure Class		F-1	F-1	F-1	F-1	N

S.12 CONCRETE – PRECAST CONCRETE

The requirements of OPSS 919 shall apply to this tender item except as modified herein.

Under this item, the Contractor shall fabricate, supply, deliver, store and install precast concrete units to lines and level and construction details at the Intake Area as shown on the drawings. The work includes:

- 4500 mm x 4270 mm precast concrete box units for the East and West Approach Walls including special units as specified on the Drawings.
- 6000 mm x 2000 mm precast concrete box units for the Acceleration Wall.

Shop drawings shall be submitted within 6 weeks from Contract Commencement which shall include detailed calculations, reinforcing steel schedule, concrete mix design and trial mix result, location of concrete plant and unit manufacturing plant, curing information, storage and transportation details. A plan showing the methodology of lifting the precast units into position shall also be submitted. No manufacturing of the units shall commence until approval to proceed is issued by the Commissioner. The Contractor shall allow a review period of 4 weeks by the Commissioner for the initial submission, and 10 working days for subsequent revisions.

The Contractor shall also place smooth bar at corners for docking as shown on the Contract Drawings. Other features such as grouting, joint fillers, and other as shown on the drawings, shall be deemed to be included in the lump sum bids for this item.

Before the work commencement of the Acceleration Wall and Approach Walls construction, the Contractor shall carry out field survey including hydrographic surveys.

for the alignment of the walls for every 5 m interval to verify all dimensions and position for the placement of Walls.

S.13 REINFORCEMENT – UNCOATED REINFORCEMENT

The requirements of OPSS 905 shall apply to this tender item except as modified herein.

Under this item, the Contractor shall supply and place all uncoated reinforcing steel including dowels as shown on the Contract drawings. Reinforcement shall be Grade 400 unless otherwise specified.

All reinforcing steel shall be conform to CAN/CSA Standard G30.18M92 (R1998).

The Contractor shall be responsible for the preparation of the bar schedule and shall submit the bar schedule for approval to the Commissioner at least 14 days prior to ordering the coated reinforcing steel. Fabrication shall not commence until the Contractor has received the Commissioner's written approval.

S.14 DOWELS INTO CONCRETE

This item specifically refers to the provision and installation of uncoated dowels, for the construction of the pier extensions, approach walls and acceleration wall at the Intake Areas.

Included in the construction of the dowels are the drilling of correct diameter holes into existing concrete mass to the depths shown, supply and placement of approved epoxy grouts, and the supply and installation of steel dowels.

Reinforcing steel used for the dowels are deemed to be included in this items and will not be measured under reinforcing steel items. Additionally, no separate payment will be made for the drilling and grouting for these dowels.

Prior to the construction the Contractor shall submit for the Commissioner's approval literature and samples of the proposed epoxy grout to be used for the anchoring of the dowels. The materials shall be one selected from the list of Designated Source of Materials of the MTO. All work in this item shall meet the requirements of OPSS No. 904 and 905. All reinforcing steel shall be conform to CAN/CSA Standard G30.18M92 (R1998).

Dowels shall be free from dirt, oil or paint, and shall be installed according to the provisions of OPSS 904.07.10. Drilling though existing reinforcing steel for the installation of dowels is not permitted. Positions of dowels may be slightly shifted to adjust for physical difficulties.

All dowels shall be capable of developing the full yield strength of the steel after installation and cured. The Commissioner will carry out pull-out test to confirm the capacity of each dowel. All dowels which fail to meet the requirement shall be reinstalled at the Contractor's expenses.

S.15 DOWELS INTO ROCK

This item specifically refers to the provision and installation of rock reinforcing dowels, for the construction of the pier extensions at the Intake Areas as shown on the Drawings.

Included in the construction of the dowels are the coring of correct diameter holes into existing concrete mass to the depths shown, supply and placement of approved epoxy grouts, and the supply and installation of steel dowels.

All dowels in rock shall be installed using either cementitious or resin-type grout with procedures recommended by the manufacturer.

Reinforcing steel (Dywidag bars) used for the dowels are deemed to be included in this item and will not be measured under reinforcing steel items. Additionally, no separate payment will be made for the coring and grouting for these dowels.

Prior to the construction the Contractor shall submit for the Commissioner's approval literature and samples of the proposed epoxy grout to be used for the anchoring of the dowels. The materials shall be one selected from the list of Designated Source of Materials of the MTO. All work in this item shall meet the requirements of OPSS No. 904 and 905. All reinforcing steel shall be conform to CAN/CSA Standard G30.18M92 (R1998).

Protect rock reinforcing dowels at all times from damage and corrosion. Corrosion, pitting or damage to the dowel may be cause for rejection. Damage includes, but is not limited to, abrasions, cuts, nicks, welds, and weld splatter. Dowels shall be free from dirt, oil or paint, and shall be installed according to the provisions of OPSS 904.07.10. Additionally, all rock reinforcing dowels, accessories, and hardware shall have an approved corrosion protection coating. Core holes to the diameter and depth recommended by the manufacturer. Unless otherwise directed, align core holes normal to the rock face or as specified. Positions of dowels may be slightly shifted to adjust for physical difficulties.

All dowels shall be capable of developing the full yield strength of the steel after installation and cured. The Commissioner will carry out pull-out test to confirm the capacity of each dowel. All dowels which fail to meet the requirement shall be reinstalled at the Contractor's expenses.

S.16 REINFORCEMENT – MECHANICAL COUPLERS

Under this item, the Contractor shall supply and install mechanical couplers to connect reinforcing steel at the West Approach Wall (Section C) as well as at the Pier extension for the rock dowels as indicated on the contract drawings. Mechanical couplers required arising from the Contractor's chosen method of construction or fabrication mistakes shall be borne by the Contractor. All work in this item shall meet the requirements of OPSS No. 905. All reinforcing steel shall be conform to CAN/CSA Standard G30.18M92 (R1998).

All mechanical couplers shall be of approved type by the Ministry of Transportation and named in the list of "Designated Source of Materials" and shall be appropriate for the type of construction encountered in this project.

S.17 SEALING FOR DOWNSTREAM CLOSURE

Under this item, the Contractor shall supply, install and maintain the sealing system at the downstream closure between Pier 1 and Pier 2 at the intake area during the construction as shown on the Drawings. This item also includes removal of the sealing system upon the completion of the work with the approval of the Commissioner.

S.18 GEOTEXTILE

Under this item, the Contractor shall supply and place geotextile behind the East and West Approach Walls at the Intake Location as well as on the overburden slopes for the outlet channel as shown on the Drawings. Placement of the geotextile shall be limited to the length as shown on the Section C of Drawing 1. This item also includes surface preparation for existing ground necessary for the proper installation of the geotextile.

Geotextile shall be Class 1, non-woven geotextile FOS 75-150 µm or approved equal. All work in this item shall meet the requirements of OPSS No. 1860.

S.19 MISCELLANEOUS STRUCTURAL STEEL

Under this item, the Contractor shall fabricate, deliver, and install miscellaneous structural steel including, but not limited to:

1. Steel nosing at the Pier 2.
2. Steel cover at the Piers 1 and 2.
3. Steel casing at end panel of new acceleration wall.
4. Access opening floor door with including ladder and safety post at Piers 1 and 2.

The work shall be done using structural steel Grade 400 and in accordance with the requirement of OPSS 906.

All steel shall be atmosphere corrosion resistant weldable steel, CSA G40.21-350A and hot-dip galvanizing shall be to CSA G164-92, OPSS 911 and double-dipped. A company certified in Division 1 or Division 2 of CSA Standard W47.1-92 shall complete all welding. All field welds to galvanized steel shall be painted with two coats of zinc rich paint.

S.20 ARMORING BOULDERS

The requirements of OPSS 511 shall apply to this tender item except as modified herein.

Under this item, the Contractor shall supply and place armouring boulders at the ice protection/deflection groyne as shown on the drawings.

The size of the boulder shall be 2 m x 2 m x 1m. Boulders shall consist of round and natural shape. It shall consists of clean rock fragments and shall be free from organic material.

S.21 SHOTCRETING

Under this item, the Contractor shall provide and place shotcreting at the Outlet area to stabilize the rock above the elevation 165.5.

Shotcrete shall be produced by wet mix process achieving a minimum compressive strength of 18 MPa in 7 days and 30MPa in 28 days. Shotcrete will be accepted based on 28-days strength. The Contractor shall submit a proposal for expediting the work. The contract's proposal shall detail methods to ensure that the minimum required 28-days strength is attained.

Provide equipment capable of delivering the premixed material accurately, uniformly and continuously through the delivery hose. Follow recommendations of the equipment manufacturer on they type and size of nozzle to be used and on cleaning, inspection and maintenance of the equipment. Ready mixed shorcrete shall be delivered in transit mixers.

Provide undisturbed gun finish of shotcrete as applied from nozzle without hand finishing. A clean area at base of each lift is required to ensure good bonding interface between lifts.

After each stage of cut, in anticipation of shotcreting, clean surfaces of all loose material, mud, rebound from previously placed shotcrete and other foreign matter that will prevent bonding of shotcrete shall be removed from the cut surface and dampen surface before shorcreting.

The shotcrete shall be applied from the bottom up to prevent accumulation of rebound shotcrete deposited on the surface still to be covered. Shotcrete shall emerge from the nozzle in a steady uninterrupted flow.

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1. Introduction

1.1 Subject of Technical Specification

This Technical Specification (TS) shall define the requirements for the execution and commissioning of the steel ribs forming part of the support measures for the tunnel excavated at the Niagara Tunnel Facility Project

1.2 Range of Technical Specification Application

This TS is a bid and contract document used in the execution and commissioning of the works referred to in Item 1.1.

The provisions contained in this Specification refer to the working methods to be adopted for the:

a) delivery of steel ribs incl. all the components and the entire equipment to the site

b) installation and fixing of steel ribs

c) quality control for material and workmanship.

The Scope of Work is defined for the crown and the sidewalls of the main tunnel during the excavation and support period.

1.3 Definitions

The basic definitions given in this TS are in conformity with the relevant standards in force.

1.3.1 ROLLED STEEL RIBS

Steel ribs shall be installed as a means of immediate support at the working face over the entire length of the last excavation advance to prevent spalling, to improve the load distribution and to enhance the effectiveness of the rock dowels.

The steel ribs are produced of rolled steel and delivered in segments. They will be assembled on site to the complete arch required. Each steel rib segment has welded steel plates at both its ends for connection with others. The segments are prefabricated.

1.3.2 CONNECTIONS

The steel rib segments will be connected on site to their complete form. The connection will be done by linking the steel plates at the ends of the segments with screws or bolts. The type of connection, hinge or stiff, has to be arranged in line with the design. Bolts have to be secured against dropout by split pins.

Hinge connections shall be capable of transferring the full section axial compressive forces and shear forces. The adequacy of connections may be demonstrated by calculation or by load test.

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Stiff connections shall be capable of resisting the full sectional bending moments, axial forces (tension and compression) and shear forces. The adequacy of these and other more complex connections shall be proven by testing.

The connections shall be designed to allow complete covering with shotcrete or surrounding by concrete, so that no voided areas are created behind the connections.

1.3.3 WELDING

Welding is used to connect the steel segments. The welded segments shall be of the same steel type and quality. The welded connections shall satisfy the same requirements as the original steel profiles. All welding works shall be carried out in accordance with the corresponding standards in force.

Welding on site, in the tunnel should be avoided due to the danger of fire.

1.3.4 FIXING

Steel rib supports shall be fixed to the excavation surface with rock dowels, or shall be supported by shim wedges on sound undisturbed rock or soil base. Timber wedges or blocks shall not be permanently incorporated in the lining.

Adjacent ribs shall be tied and braced as necessary for stability.

1 General Work Requirements

The Contractor shall be responsible for the quality of material and workmanship and for their conformity with the Design Documentation, other corresponding Specifications and Method Statements and the Engineer's instructions.

The Contractor shall provide his personnel with the equipment necessary in accordance with the Specification and shall grant them access to the works to carry out their work in a safe and proper way.

2. Materials

Steel ribs are made of rolled steel according to CSA G 40.20 and G 40.21. Rolled steel ribs and attachments thereto, ties, spreaders and collar braces shall consist of weldable structural steel and shall have a minimum characteristic strength of 240 MPa.

The steel ribs shall be cold worked to the required radii. The rolled profiles shall comply with the required dimensions and masses shown on the drawings and shall be within a tolerance of 2.5 % of the mass per unit length and within a tolerance of + 3 mm and - 1 mm of the required depth. The shape of the rib shall conform to the true design templates at the ends of the segments, while intermediate points may depart by up to 10 mm from the true templates, provided that no point shall depart more than 3 mm from a template section 1 m long.

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The steel ribs shall be free of cracks and flaws and shall be well finished, without rough or jagged edges or other imperfections. The ends shall be clean, smooth and, where necessary, dressed before despatch.

The blocking shall be hardwood unless otherwise specified. Foot plates shall have adequate bearing capacity.

3. Equipment

The works may be performed using any type of equipment approved by the Engineer.

The entire equipment must have a valid quality control certificate and is to be inspected within regular inspection periods.

4. Transport

All components of the steel ribs shall be transported by suitable means of transport and in accordance with industrial safety and road traffic regulations to avoid any damage.

5. Workmanship

The Contractor shall present an organisational chart and time schedule of the works to the Engineer for approval. These documents shall give due consideration to all conditions accompanying the execution of the works.

The type, size and spacing of the rolled steel ribs shall be as shown on the Drawings. The steel ribs shall be erected within the specified tolerances and shall be firmly set off the rock or the shotcrete by spacers arranged around the periphery of the rib as shown on the Drawings.

Fully detailed fabrication drawings and specifications for all steel rib components shall be prepared prior to any manufacturing. The manufacturing process shall be in accordance with these drawings and specifications.

At the time the steel ribs are encased in shotcrete or concrete, they shall be free of mud, oil, paint, concrete retarders, loose rust, loose mill scale, grease or any other substance which could adversely affect the steel or concrete chemically, or reduce the bond.
Rust can be tolerated subject to approval by the Engineer.

Each rib set, when assembled with the connections fully and tightly bolted, shall lie within $\pm$ 25 mm of a true plane. The ribs shall be erected within $\pm$ 150 mm of the positions shown on the drawings unless otherwise approved by the Engineer and shall not deviate by more than $\pm$ 50 mm from the profiles shown on the drawings.

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6. Quality Control

All components must have a valid quality certificate and a valid permission for the intended use.

To achieve a sufficient quality of the installed product, suitability tests and work tests have to be carried out for the individual components as well as for the installed products.

The strength of the steel ribs shall be demonstrated by calculations or by load tests. Where tests are necessary, they shall be performed in accordance with the test procedures approved by the Engineer.

Tests shall be in conformity with the following requirements:

(a) The test piece shall consist of a straight steel rib with a length of 4.5 m restrained by a pinned support at one end, and a pinned roller support at the other end.

(b) A uniformly distributed vertical loading of 5.0 kN/m shall be applied over the entire length of the girder. At the same time a horizontal compressive load of 125 kN shall be applied at the roller support. The rib shall not collapse under the combined loading.

Where the strength of the ribs is demonstrated by calculation, an ultimate limit state check shall be carried out using the loads specified in Subchapter 3 above with a partial safety factor for loads of 1.0. The partial safety factor for material strength shall be 1.15.

7 Units

The quantity survey unit of the steel ribs shall be ton. The numbers and types of the steel ribs depend on the individual excavation and the support type executed. The respective numbers and types are documented in the corresponding drawings.

8. Acceptance

8.1 Conformity of Work with Design and Technical Specification

The works shall be carried out in accordance with the design, the Technical Specification(s) and the written instructions of the Engineer.

8.2 Acceptance of Works To be Removed or Covered

8.2.1 DOCUMENTS AND DATA

The acceptance of works which are to be removed or covered shall be based upon:

- a written statement by the Engineer entered into the Site Book that the works have been executed in accordance with the design and the Technical Specification,
- other written statements by the Engineer commenting on the execution of the works.

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8.2.2 SCOPE OF WORKS

The scope of works to be removed or covered shall be determined by written statements of the Engineer and by other documents confirmed by the Engineer.

9. Applicable Regulations

9.1 Standards

Canadian Standards

CSA G 40.20/ G 40.21- 98	General requirements for rolled or welded structural quality steel / structural quality steel

American Standards

ASTM Standard A 992 / A 992M	Standard specification for steel for structural shapes for use in building framing

German Standards

DIN 17100	Common structural steel, quality of material
DIN 4100	Connections in steelworks

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1. Introduction

1.1 Subject of Technical Specification

This Technical Specification (TS) shall define the requirements for the execution and commissioning of reinforcement, wire mesh and reinforcement bars forming part of the support measures for the Diversion Tunnel, as well as for the pits of the intake and outlet structures at the Niagara Tunnel Facility Project.

1.2 Range of Technical Specification Application

This TS is a bid and contract document used for the execution and commissioning of the works referred to in Item 1.1.

The provisions contained in this Specification refer to the working methods to be adopted for the:

a) delivery of reinforcement incl. all components and entire equipment to the site

b) installation and fixing of wire mesh and reinforcement bars,

c) quality control for material and workmanship.

The Scope of Work is defined for the crown and the sidewalls of the main tunnel during the excavation and support period.

1.3 Definitions

The basic definitions given in this TS are in conformity with the relevant standards in force.

1.3.1 WIRE MESH

The wire mesh is used for:

- reinforcement required in the shotcrete lining
- first protection against breakout (in combination with steel ribs or rock dowels)
- improvement of shotcrete's composite behaviour

The wire mesh shall have a square pitch pattern of 100 mm in both directions. The wire diameter shall range between 5 mm and 8 mm. Standard sizes shall be preferred. If the required reinforcement area can not be covered with standard sizes, the above mentioned criteria have to be considered. Twin bars in the bearing direction are admissible.

1.3.2 REINFORCEMENT BARS

Reinforcement bars are generally used to connect the reinforcement of the individual excavation stages (starter bars). Adequate measures have to be taken to ensure that the bars will be protected against damage during the excavation of the next phase.

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Bars can also be added to the wire mesh in case the required reinforcement exceeds the wire mesh dimensions locally.

1.4 General Work Requirements

The Contractor shall be responsible for the quality of material and workmanship and for their conformity with the Design Documentation, other corresponding Specifications and Method Statements and the Engineer's instructions.

The Contractor shall provide his personnel with the equipment necessary in accordance with the Specification and shall grant them access to the works to carry out their work in a safe and proper way.

2. Materials

The wire mesh should be of high-tensile steel quality with a characteristic strength of 500 MPa and a yield strength of 550 MPa. The steel should be classified as weldable.

The reinforcement bars should be of high-tensile steel quality with a characteristic strength of 500 MPa and a yield strength of 550 MPa. The steel should be classified as weldable.

If lower quality steel is used (e. g. characteristic strength = 420 MPa, yield strength = 500 MPa), the conversion of the required reinforcement shall be made with the ratio of the characteristic strength.

3. Equipment

The works may be performed using any type of equipment approved by the Engineer.

The entire equipment must have a valid quality control certificate and is to be inspected within regular inspection periods.

4. Transport

All components of the reinforcement shall be transported by suitable means of transport and in accordance with industrial safety and road traffic regulations to avoid any damage.

5. Workmanship

The Contractor shall present an organisational chart and time schedule of the works to the Engineer for approval. These documents shall give due consideration to all conditions accompanying the execution of the works.

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The wire mesh shall be installed in such a way that it follows the contours of the excavated and sealed excavation surface as closely as possible. The spacing between the excavation surface and the wire mesh should not exceed 10 cm.

The wire mesh shall be placed firmly, shall securely be held in position and shall be cleaned from rebound before shotcreting. It shall be fastened with short bolts, reinforcement bars, length approx. 30 cm, which are drilled and fixed in the surrounding rock mass, or supported by installed steel ribs.

Larger overbreak shall be filled with shotcrete before wire mesh is installed.

The wire mesh shall be installed in the longest practical length. Adjoining pieces shall be overlapping:

Radial overlap: minimum 30 cm.

Longitudinal overlap: minimum 15 cm.

The steel bars, used as connection bars between the heading and bench reinforcement shall be covered and protected against damage in the case of bench excavation.

6. Quality Control

All components must have a valid quality certificate and a valid permission for the intended use.

The correct construction, in accordance with the corresponding drawings, specifications and method statements shall be checked by visual inspection.

7. Units

The quantity survey unit of the reinforcement (wire mesh and steel bars) shall be ton (weight).

8. Acceptance

8.1 Conformity of Work with Design and Technical Specification

The works shall be carried out in accordance with the design, the Technical Specification(s) and the written instructions of the Engineer.

8.2 Acceptance of Works To Be Removed or Covered

8.2.1 DOCUMENTS AND DATA

The acceptance of works which are to be removed or covered shall be based upon:

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- a written statement by the Engineer entered into the Site Book that the works have been executed in accordance with the design and the Technical Specification,
- other written statements by the Engineer commenting on the execution of the works.

8.2.2 SCOPE OF WORKS

The scope of works to be removed or covered shall be determined by written statements of the Engineer and by other documents confirmed by the Engineer.

9. Applicable Regulations

9.1 Standards

Canadian Standards

CSA A23.1-94	Concrete materials and methods of concrete constructions

German Standards

DIN 1045 (EC 2)	Concrete structures: design and construction

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1. Introduction

1.1 Subject of Technical Specification

This Technical Specification (TS) shall define the requirements for the execution and commissioning of the rock dowels forming part of the support measures for the tunnel excavation and other cavities or pits at the Niagara Tunnel Facility Project

1.2 Range of Technical Specification Application

This TS is a bid and contract document used for the execution and commissioning of the works referred to in Item 1.1.

The provisions contained in this Specification refer to the working methods to be adopted for the:

a) delivery of rock dowels with all components and equipment to the site

b) installation of rock dowels,

c) quality control for workmanship and material.

The Scope of Work is defined for the crown and the sidewalls of the excavation of the main tunnel and for the excavation of pits for the corresponding adjacent structures (e. g. intake, outlet).

1.3 Definitions

The basic definitions given in this TS are in conformity with the relevant standards in force.

1.3.1 ROCK DOWELS SWELLEX TYPE OR SIMILAR

This type of rock dowel is manufactured from a mechanically reshaped steel tube. Bushings are pressed onto the ends, which are sealed through welding. The lower bushing has a flange to hold a face plate in place. High-pressure water (300 bar) is injected into the steel tube through a hole in the lower bushing. This causes the steel tube to expand and to adjust to the irregularities of the drilled hole. A 200 mm long sleeve tube made of steel prevents the dowel from swelling at the drillhole mount. As the swelling process occurs, the lower part of the steel tube shortens, pulling the face plate firmly against the rock face. The water pressure is released after installation and the water is allowed to drain out of the expanded steel tube. The drillhole diameter has to be adjusted to suit the size of the rock dowel.

1.3.2 ROCK DOWELS SN TYPE – RESIN OR RESIN GROUTED

This type of rock dowel is an untensioned rod inserted into a drilled hole and grouted along its entire length using cement grout and resin capsules or resin capsules exclusive. The rock dowel consists of a high-yield steel deformed ribbed bar with cut or rolled threads at one end, a face plate, shim plates and a nut.

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1.3.3 ROCK DOWELS SELF-DRILLING TYPE - GROUTED

This type of dowel is equipped with a drill bit on one end and is made from high tensile steel tubes. The rock dowel is directly drilled in the borehole and afterwards grouted "under pressure" through the tube to the end of the rod and on the outside back through the borehole. These dowels shall be used in very weak soil and rock formations. If the required dowel length is longer than the diameter of the tunnel, couplings shall be used to adjust the length of the dowel.

1.3.4 GENERAL WORK REQUIREMENTS

The Contractor shall be responsible for the quality of material and workmanship and for their conformity with the Design Documentation, other corresponding Specifications and Method Statements and the Engineer's instructions.

The Contractor shall provide his personnel with the equipment necessary in accordance with the Specification and shall grant them access to the works to carry out their work in a safe and proper way.

2. Materials

1. A detailed statement of the types and sources of manufacture of the rock dowels proposed for use in the works, shall be prepared.
2. The characteristic strength / yield strength of the steel should not be less than 420 / 500 MPa. The steel plates, washers and nuts should have the corresponding quality and shall comply with the requirements of the corresponding standards.
3. The characteristic load F of rock dowels is defined with the bearing capacity of the dowel at failure. The safety against failure should be 1.3.

   The design load is defined with:
   100 kN for dowels with a length up to 4 m (type I)
   200 kN for dowels with a length of more then 4 m (type II)
4. For rock dowels of the SN type, the minimum steel cross-section should not be smaller than:

   250 mm^2 for rock dowels - type I
   450 mm^2 for rock dowels - type II
5. Face plates shall be of dished shape in steel and shall have a hemispherical seating and a centralized slot to suit the dimensions of the different rock dowels. The dimensions of the face plates shall be (length / thickness)

Ø 60 / 6 [mm]	for rock dowels of the Swellex type
100 / 100 / 6 [mm]	for rock dowels of the SN type (type I)
150 / 150 / 8 [mm]	for rock dowels of the SN type (type II)
6. Cement for cement grout shall be ordinary Portland or rapid hardening Portland cement.

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7. Aggregates for cement grout shall contain high-quality quartz sand with a particle size of up to 1 mm.
8. Cement grout shall achieve such a characteristic strength that the dowel will be able to bear 40% of its capacity after 6 h and 100% of its capacity after 12 h.
9. Admixtures shall be plasticizers and expanding agents. The admixtures used shall have no detrimental effect on the performance of the rock dowels. Admixtures containing chlorides shall not be used.
10. Resin capsules shall be of the fast setting type conforming to the manufacturer's specification and compatible with the cement grout, in case they are used as a hybrid doweling system.

3. Equipment

The works may be performed using any type of equipment approved by the Engineer.

The entire equipment must have a valid quality control certificate and is to be inspected within regular inspection periods.

The mortar pump must be capable of producing a minimum pressure of 3 MPa at its mouth.

4. Transport

All components of the dowels shall be transported by suitable means of transport and in accordance with industrial safety and road traffic regulations to avoid any damage.

5. Workmanship

The Contractor shall present an organisation chart and time schedule of the works to the Engineer for approval. These documents shall give due consideration to all conditions accompanying the execution of the works.

In addition, further issues have to be considered:

1) The rock dowels shall be installed in the positions, the sequence and at the spacing shown on the drawings. The exact locations of the dowels shall be adapted to suit the prevailing geological conditions. When necessary to ensure the safety of the works, rock dowels shall be installed at and immediately behind the excavation face.
2) The holes for the installation of the rock dowels shall be drilled into the ground to the lengths indicated or stated on the drawings and shall be inclined in such a way that the dowels are generally installed perpendicular to the designed surface of the excavation. The holes shall be drilled with an accuracy of ± 15°.

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3) The holes shall be drilled using sharp bits to produce straight holes of the required length. On completion of each drillhole and prior to the installation of each dowel, the drillholes shall be cleaned removing debris. In clay formations, sensitive to water, flushing the drillhole with water shall be avoided (auger drilling technique). The drillhole diameter shall be within the range recommended by the rock dowel manufacturer to match the particular rock dowel diameter and any couplers required for extending the dowel. It shall be not less than 2 times the rod diameter.

4) The installation shall be carried out in accordance with the rock dowel manufacturer's recommendations, generally adopting the following procedure:

   (a) A regular surface, normal to the drillhole, shall be provided to seat the face plate. Some preparation of the ground or shotcrete surface in the vicinity of the drillhole / dowel location may be necessary, involving trimming local surface irregularities or forming pads of quick-setting mortar. Where mortar pads are required they shall be larger than the face plates and the edges shall be chamfered at 45°.

   (b) The dowels shall be installed in accordance with the drawings and site instructions given by the Engineer. 24 hours after installation, nuts shall be screwed tightly so that the face plates are held firmly against the surface using hand wrenches.

   (c) With cement grouted dowels, the grouting material shall be injected starting from the furthest end of the drilled hole such that the dowel rod is completely encased in grout. Tremie and vent pipes shall be provided as necessary for grouting and the open ends of holes shall be sealed to prevent grout loss. Any grout on the exposed threads of the dowels shall be cleaned off.

   (d) The cement mortar grout shall be chosen to be of such consistency that it does not flow out of the borehole even if the borehole is vertical upward. Dowels installed in overhead positions shall be supported where necessary until the grout has set.

6. Quality Control

All components must have a valid quality certificate and a valid permission for the intended use. To achieve a sufficient quality of the installed product, suitability tests and work tests have to be carried out for the individual components as well as for the installed products.

6.1 Testing of Components

6.1.1 TESTING OF CEMENT GROUT

Sets of six cubes of cement grout shall be taken once every month when installation of grouted rock dowels is in progress. Sampling, preparation, curing and testing shall be in accordance with EN 196-1.

Half of the cubes shall be tested at 1 day and the remainder at 28 days. The average compressive strength determined from any group of four tests shall be at least the specified characteristic strength.

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The strength determined from any single test result shall not be less than the specified characteristic strength minus:

1 N/mm^2 for cement grout tested after 1 day

3 N/mm^2 for cement grout tested after 28 days

6.1.2 TESTING OF THREADED BARS

Tensile tests shall be carried out on a number of steel dowel bars, covering the threaded length of each batch of bars. At least three bars in every 1000 shall be tested to destruction. Tests may be carried out at the manufacturer's works or on site. Test certificates shall be provided.

6.2 Trials and Testing of Dowels

6.2.1 SUITABILITY TESTS

1. Prior to the installation of the dowels, 10 trial rock dowels of each type of dowel to be used in the works shall be installed and tested. 5 of the trial Swellex-type rock dowels shall be tested immediately at 60 % of the characteristic load and 5 of the resin-grouted rock dowels shall be tested after 1 hour. The remaining dowels shall be tested at the characteristic load between 3 and 21 days after installation.
2. Trial dowels shall be installed in similar rock conditions to those which are likely to be encountered during installation in the works and shall be in accordance with this Specification.
3. Additional rock dowel tests shall be carried out if the procedures adopted for the installation of the dowels do not match those adopted for the preconstruction suitability tests. If the test results on dowels used in the works when compared with the results of the original trial tests show inadequacies in the load-carrying capacity, a detailed investigation and further tests to identify and rectify the inadequacies shall be carried out.

6.2.2 WORKS TESTS

1. Five percent of the installed dowels shall be tested to the characteristic load between 3 and 21 days after installation. The quality control criteria are met, if the design load is reached within a maximum deformation (tension) of about 10 mm.

   The proportion of the dowels tested to characteristic load may be varied, if consistent test results were obtained for the previous 50 dowels tested, subject to approval by the Engineer.
2. The in-situ tests shall in general be carried out by pull-out tests or in accordance with a method for determining the strength of a rock dowel proposed by the Contractor.
3. The rock dowels shall be deemed to be acceptable provided the working load is sustained for at least 10 minutes.

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6.2.3 EVALUATION

Records shall be kept for each dowel tested in accordance with the procedures agreed with the Engineer, and copies of all records shall be maintained on site after installation of the dowel or completion of the testing, as appropriate.

The number of dowels which do not reach the quality criteria is extrapolated to the total number of the testing cycle. The Engineer together with the Contractor will have to decide on an additional installation of dowels or adequate substitute measures.

7. Units

The quantity survey unit of the dowels shall be piece. The numbers and types of dowels depend on the individual excavation and the support type executed. The respective numbers and types are documented in the corresponding drawings.

8. Acceptance

8.1 Conformity of Work with Design and Technical Specification

The works shall be carried out in accordance with the design, the Technical Specification(s) and the written instructions of the Engineer.

8.2 Acceptance of Works To Be Removed or Covered

8.2.1 DOCUMENTS AND DATA

The acceptance of works which are to be removed or covered shall be based upon:

- a written statement by the Engineer entered into the Site Book that the works have been executed in accordance with the design and the Technical Specification(s),
- other written statements by the Engineer commenting on the execution of the works.

9. Applicable Regulations

9.1 Standards

Canadian Standards

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German Standards	
DIN EN 196-01	Testing of cement, testing of the strength
DIN 21521	Rock dowels for mining and tunneling
DIN 21522	Plates for rock dowels for mining and tunnelling

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1. Introduction

1.1 Subject of Technical Specification

This Technical Specification (TS) shall define the requirements for the execution and commissioning of the shotcrete lining forming part of the support measures for the excavated tunnel and other cavities or pits at the Niagara Tunnel Facility Project

1.2 Range of Technical Specification Application

This TS is a bid and contract document used for the execution and commissioning of the works referred to in Item 1.1.

The provisions contained in this Specification refer to the working methods to be adopted for the:

a) delivery of all the components and the entire equipment to the site

b) execution of shotcrete works

c) quality control for material and workmanship.

The Scope of Work is defined for the crown, the sidewalls and the invert of the excavated main tunnel and for the excavation and support of pits for the corresponding adjacent structures (e. g. intake, outlet).

1.3 Definitions

The basic definitions given in this TS are in conformity with the relevant standards in force. Special definitions shall be presented below.

1.3.1 SHOTCRETE

Shotcrete is a mixture of cement, aggregate and water, which may contain admixtures, projected from a nozzle into place to produce a dense homogeneous mass.

1.3.2 DRY METHOD

A method of producing shotcrete, in which a mixture of cement, aggregates, and admixtures (if required) is weight batched, thoroughly mixed in a dry condition and fed into a purpose-made machine in which the mixture is pressurised, metered into a dry air stream and conveyed through hoses or pipes to a nozzle, where water as a spray is introduced into the mix which is projected without interruption into place.

1.3.3 WET METHOD

A method of producing shotcrete, in which cement and aggregates are weight batched and mixed with water at the shotcreting location or in mixer trucks prior to being pumped through a

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pipeline to a nozzle where air, and admixtures are injected - if necessary - and the mix is projected into place without interruption.

1.3.4 LAYER

A term used for a discrete thickness of shotcrete built up from a number of passes of the nozzle and allowed to set.

1.3.5 REBOUND

A term used for all the material having passed through the nozzle which does not adhere to the surface on which shotcrete is being applied.

1.3.6 BASE CONCRETE

A term used for all the concrete of a design intended for use in shotcrete, but produced without admixtures.

1.3.7 CEMENT AND LATENT HYDRAULIC BINDERS (LHB)

Hydraulic cement is an active hydraulic binder formed by grinding clinker.

Latent hydraulic binders are added to the cement in two forms:

- as hydraulic binder, manufactured by a controlled process in which Portland cement clinker or Portland cement is combined in specified proportions with a latent hydraulic binder consisting of pulverized fuel ash (pfa).
- as hydraulic binder, manufactured in the concrete mixer by combining Portland cement with a latent hydraulic binder consisting of pulverized fuel ash and/or silica fume.

1.3.8 ADMIXTURES

A term used for materials which are added to the base concrete such as accelerators, plasticizers and retarders.

1.4 General Work Requirements

The Contractor shall be responsible for quality of material and workmanship and for their conformity with the Design Documentation, other corresponding Specifications and Method Statements and the Engineer's instructions.

The Contractor shall provide his personnel with the equipment necessary in accordance with the Specification and shall grant them access to the works to carry out their work in a safe and proper way.

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2. Materials

2.1 Water

The water shall be clean and free of harmful matter in such quantities as would affect the properties of shotcrete in the plastic or hardened state.

2.2 Cement

It is of particular importance to use cement of uniform chemical composition and uniform fineness. The required characteristic values shall be approved by the Engineer. For the entire cement delivered, the manufacturer shall make the cement analyses and the standard test results available. Quality control measures are detailed below.

The cement shall comply with the following requirements:

- Only cement with a suitable fineness of grinding shall be used.
- Chrome content (Cr^{6+}): not more than 2 mg/kg.
- Fineness: not less than 340 m^2/kg.
- Bleeding: not more than 20 cm^3.

2.3 Aggregates

Aggregates shall comply with the following requirements:

The maximum particle size shall not exceed 11 mm.

Single size aggregates shall be combined in the proportions determined during the site trials.

Fine and coarse aggregates shall be clean. The grading shall remain within the acceptable range and wherever possible within the desired range according to the grading curve - Figure 1

- The coarse fraction of the aggregate shall not exhibit excessive fragmentation during delivery. The percentage of particles smaller than 0.075 m shall not exceed 3 %.
- Frozen aggregates shall not be used.
- For the dry method, at the time of mixing, the moisture content of the combined aggregates shall not exceed the saturated surface dry value by more than 5% unless otherwise approved by the Engineer.

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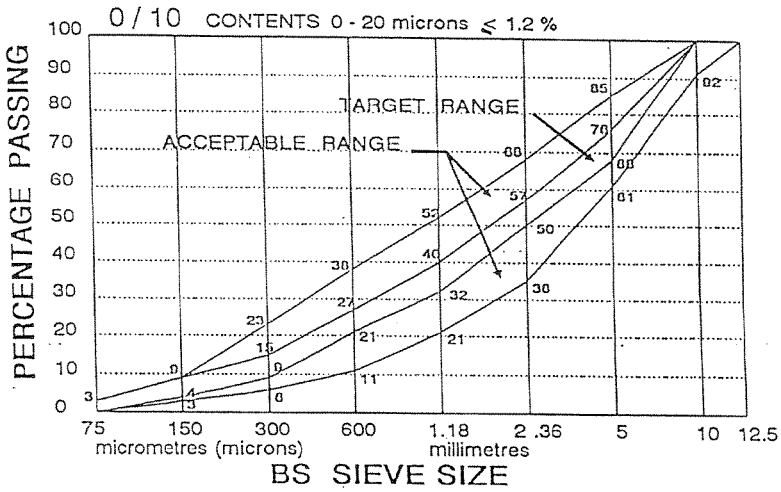

Figure 1 - Aggregates for Shotcrete - Grading Curve

2.4 Admixtures

2.4.1 GENERAL

The Engineer shall consider any potential for admixtures contaminating groundwater by giving or withholding approval for their use.

Retarding and plasticizing admixtures shall comply with ENV 206 or the corresponding Canadian Standards.

The compatibility of all admixtures with each other and with all other shotcrete constituents shall be verified during the site trials (reference is made to Subchapter 5.1.3, Shotcreting Trials)

2.4.2 ACCELERATORS

Only the minimum quantity of accelerators necessary shall be permitted in normal shotcreting operations, and this quantity shall be determined by trials as specified herein.

Testing of accelerators, with regard to setting time and strength decrease at a later age (28 days), shall take place in due time before commencement of shotcreting. For this purpose the method specified in Subchapter 6.2.2, Testing of Accelerators shall be used. All components - unless otherwise specified in the test method - shall be fully representative of those which will be used in the works.

If the sulphate (SO_4) content of the groundwater is more than 600 mg/l, the water-soluble aluminate in the accelerator shall not be greater than 0.6 % by weight of the cement content.

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The accelerators delivered to the site shall be tested in accordance with this Specification not less than once every two months for their reaction with the cement used (setting behaviour and strength decrease). In the case of accelerators in liquid form, their stability during storage shall be visually inspected and checked for crystallisation at similar intervals. Storage times and working temperature ranges shall be in accordance with the manufacturer's recommendations. The manufacturer's safety instructions shall be observed.

The required characteristic values and the regularity of delivery shall be agreed with the accelerator manufacturer before commencement of the shotcreting works.

Provided the characteristic strength requirements are met, accelerators can be dosed up to a maximum of:

10 % by weight of cement for accelerators in powdered form

9 % by weight of cement for accelerators in liquid form

15 % by weight of cement for water glass

2.4.3 PLASTICIZERS AND RETARDERS

With the wet method, plasticizers and retarders may be used to reduce the quantity of the mixing water and to improve the pumpability of the concrete. The effects of the plasticizers shall be determined in site trials. Shotcrete made by using plasticizers and retarders shall be checked regularly for setting time, water reduction and the development of strength as compared with the base concrete.

2.5 Shotcrete Requirements

Shotcrete shall be capable of being applied in layers of up to 150 mm in thickness with good adhesion to the ground or to the previous layer of shotcrete, with a good bond to the reinforcement and without sagging.

The characteristic strengths shall be:

0.5 MPa	after 30 minutes
6 MPa	after 24 hours
22 MPa	after 28 days

Strength requirements shall be based on core samples taken in both directions from the test panel for site trials and on cores drilled in the direction of shotcrete application for quality tests.

Shotcrete shall be dense and homogeneous without segregation of aggregates or other visible imperfections.

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3. Equipment

3.1 General

The works may be performed using any type of equipment approved by the Engineer.

The entire equipment must have a valid quality control certificate and is to be inspected within regular inspection periods.

All transport pipes consisting of hoses or pipes of uniform diameter that carry shotcrete ingredients shall be laid straight or in gentle curves and protected so that the flow of ingredients through them is not restricted.

The shotcrete machine shall be adjusted to suit the length of the pipe that carries the shotcrete mix. The equipment shall be leak-proof. Residual deposits of materials shall be removed after each usage.

The air and water supply system shall be capable of supplying the delivery machine and hose at the pressures and volumes recommended by the manufacturer of the machine. No air supply system shall be used that delivers air contaminated by oil.

The shotcreting equipment shall be capable of feeding materials at a regular rate and ejecting shotcrete from the nozzle at velocities that will allow adherence of the materials to the surface being shotcreted and compaction of those materials with a minimum of rebound and maximum adhesion and density.

The placing equipment shall be arranged in such a way that the nozzleman may use air and water in any combination to prepare raw surfaces or to clean completed works.

Equipment shall be provided to allow application of shotcrete to all surfaces with the nozzle at the distances from the work specified in Subchapter 5.3, Shotcrete Application.

A boom mounting (robo-jet) or similar device shall be provided for the spray nozzle for use in conditions where manual spraying is unsafe or otherwise, unsuitable or undesirable.

3.2 Equipment for Dry Method

The nozzle shall be capable of controlling the quantity of water to be added and of ensuring effective mixing of all shotcrete ingredients.

Admixtures in powder form shall be added by means of mechanical batching devices located at the shotcrete machine. The batching device shall be capable of ensuring continuous accurate batching of the admixture. If necessary, it shall be possible to adjust the batches mechanically or manually for a larger or smaller quantity of admixture. The batching devices shall be protected against water, dust and weather and shall be cleaned at regular intervals.

Liquid accelerators shall be metered uniformly into the water. If this is carried out by pumps adding a specified quantity of accelerator to the water, special screens shall be incorporated to eliminate foreign substances.

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3.3 Equipment for Wet Method

The equipment for the wet method shall be set up according to the recommendations of the manufacturer.

Pumping shall ensure a continuous conveyance of base concrete including any admixture except accelerators. The equipment shall incorporate a suitable metering device for liquid admixtures.

The accelerator shall be added close to the nozzle through an individual pipe.

4. Transport

All components shall be transported by suitable means of transport and in accordance with industrial safety and road traffic regulations to avoid any damage.

For shotcrete produced using the dry method, the dry mixture may be delivered by truck mixers or non-agitating transport units. The dry mixture shall be effectively protected against any influence exerted by weather.

For shotcrete produced using the wet method, the base concrete including any admixtures except accelerators shall be transported by any suitable means providing complete mixing during transportation such that segregation of the mix components is prevented. The mixture shall be effectively protected against any influence exerted by weather.

5. Workmanship

5.1 Site Trials

5.1.1 GENERAL

Site trials shall be started early enough to ensure that the required shotcrete mix is developed and all trials are completed satisfactorily by the time shotcreting commences in the works. Shotcreting shall not commence until the trials and the laboratory tests have been completed satisfactorily.

The site trials shall employ the equipment which will be used in the works and constituent materials shall be fully representative of those to be used in the works.

5.1.2 DEVELOPMENT OF MIX DESIGN

The design of the shotcrete mix shall be developed in two stages:

(a) Production of a suitable base concrete

(b) Production of shotcrete from the base concrete

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The target mean strength for the base concrete shall be such that the strength reduction specified in Subchapter 2 is not exceeded for shotcrete with accelerator and that the specified strengths are achieved.

5.1.3 SHOTCRETING TRIALS

1) A trial mix shall be designed and prepared with the constituent materials in the proportions proposed for use in the works. Sampling and testing procedures shall be in accordance with the relevant specifications. A clean dry mixer shall be used and the first batch shall be discarded.

2) From the trial mix, an experienced nozzleman shall prepare sufficient test panels. Each panel shall be at least 600 x 400 mm in size and shall be 200 mm thick. The panels shall be prepared by shotcreting into vertical rigid plywood boxes. The shotcrete in the panels shall adhere well to the backform, be properly compacted and exhibit no sagging.

3) Cylindrical test specimens shall be cored from each test panel and tested as listed below. Drilling and dimensions of test specimens shall be in accordance with the relevant specifications. The drilling of cores shall be performed at locations, avoiding areas of possible rebound.

4) Cores to be tested at different ages (1 day (24 hours) and 28 days) may come from the same panel. For each test at least one spare specimen shall be provided.

   (a) Compressive strength in spray direction after 1 and 28 days on 4 cores each. The test cores shall be 100 mm in diameter and 100 mm in length.

   (b) Compressive strength perpendicular to spray direction after 1 and 28 days on 4 cores each. The test cores shall be 100 mm in diameter and 100 mm in length.

5) Target workability values shall be determined for the wet method.

6) Each cored cylinder shall be provided with a reference mark and the date and time of shotcreting.

7) The panels shall be stored without disturbance at a temperature between 10°C and 25°C covered by a polythene sheet until the time of coring. Cores for 1 and 28 days compressive strength tests shall be obtained from the panels at the same day. The cores for 28 day strength test shall be stored in water.

8) The testing for compressive strength shall be in accordance with the relevant specifications.

9) Additional test panels shall be prepared as necessary to calibrate indirect test methods approved by the Engineer or his delegated personnel. For the purpose of calibration, a minimum of four tests shall be carried out at each age for each indirect test method and shotcrete mix.

10) The strength of shotcrete cores from test panels shall be acceptable if both the compressive strength results for samples with their axes parallel to the direction of spraying and the compressive strength results for samples with their axes perpendicular to the direction of spraying comply with the following requirements.

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(a) The average strength determined from the 4 cores from a particular trial shall be at least the specified characteristic strength.

(b) Any individual core strength result shall not be lower than the specified characteristic strength by more than:

2.0 MPa for 1 day strength
3.0 MPa for 28 day strength

11) The test results shall be passed to the Engineer or his delegated personnel responsible for the design of shotcrete structures.

12) The site trials shall be repeated if the source or quality of any of the materials or the mix proportions are changed.

5.1.4 PROFICIENCY OF OPERATIVES

The nozzleman shall have had previous experience in the application of shotcrete, or shall work under the immediate supervision of the foreman or instructor with such experience. Production shotcrete shall be applied only by nozzlemen who have successfully demonstrated their competence and their ability to produce shotcrete complying in all respects with this Specification and have been issued a certificate indicating their competence.

5.2 Batching and Mixing

The individual components for the production of shotcrete shall be measured by weight with an automatic batching device, except liquid admixtures. They may be measured by volume. The batching accuracy shall be within 3% for cement, water and aggregates and within 5% for admixtures. The method of batching used shall ensure that the accuracy can be easily checked. The accuracy shall be checked at least once a month.

Mixing shall be carried out in a mixer suitable for the efficient mixing and discharge of dry or wet batched materials as appropriate. Regular checks shall be made to ensure that complete mixing is consistently achieved.

The mixing time for the dry method shall be sufficient to produce complete mixing and shall be not less than 1 minute. The mixture shall be delivered by means of appropriate equipment and segregation shall be avoided.

Mixed materials for the dry method may be used up to 3 hours after the addition of cement, provided that the shotcrete can be applied satisfactorily. After this time, any unused material shall be discarded. Testing according to Subchapter 6.1.1, Strength Tests to verify the strength of shotcrete used more than 2 hours after batching will be required.

Accelerators for the dry method shall not be added until immediately prior to depositing the materials in the placing equipment, or, if in liquid form shall be accurately proportioned into the water supply at the shotcreting equipment. The mixed base concrete for the wet method shall be applied within three hours, depending on the type of cement used and the temperature of the base concrete and the atmosphere. Retarders may be used to extend the time for placing. Accelerators for the wet method shall be added immediately prior to the application of shotcrete at the application nozzle

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5.3 Shotcrete Application

Before the application of shotcrete, the excavated surfaces shall be cleaned with compressed air and, as far as the local conditions permit it, with an air-water mixture as necessary to remove all material which may prevent proper adhesion of the shotcrete to the ground surface. Loose rock shall be cleared from behind the steel mesh. The surface to receive shotcrete shall be damp and where possible without free water prior to the application of shotcrete.

Action shall be taken where necessary to control groundwater and to prevent that it affects the shotcrete lining adversely. Water inflows which might cause deterioration of the shotcrete, or prevent adherence, shall be diverted by channels, chases, pipes or other appropriate means to the invert or to the groundwater drainage system.

Where necessary, pressure relief holes shall be provided through the lining to ensure that no hydrostatic pressure develops behind the lining.

Shotcrete shall only be applied by experienced nozzlemen. The preferred distance between the nozzle and the surface being shotcreted shall be 2.0 m with the dry method and 1.5 m with the wet method. The nozzle shall, as a general rule, be held perpendicular to the application surface. However, when shooting through reinforcing bars, the nozzle shall be held closer and at a slight angle in order to permit encasement and to minimise rebound.

No rebound material is to be covered with shotcrete and incorporated in the works. The rebound material shall be removed from the tunnel and shall not be reused in the works.

Each layer of shotcrete shall be built up by making several passes of the nozzle over the working area. The shotcrete shall emerge from the nozzle in a steady uninterrupted flow. Should the flow become intermittent for any cause the nozzleman shall direct it away from the work until it becomes constant again.

Where a layer of shotcrete is to be covered by succeeding layers, it shall first be allowed to set and loose material and rebound shall be removed. The surface shall be finally cleaned and wetted using a blast of air and water.

For vertical and near vertical surfaces, application shall commence at the bottom. The thickness of the layer shall mainly be governed by the requirement that the material shall not sag. Where thick layers are applied, the top surface shall be maintained at a slope of approximately 45 degrees.

Shotcrete may not be applied through two or more layers of wire mesh except for laps between mesh panels, unless approved by the Engineer.

5.4 Shotcrete Thickness

The inner surface of shotcrete may follow the contours of the rock surface, with the necessary rounding of the edges and corners, provided that protruding, sound blocks of rock still firmly linked to the ground mass have a minimum shotcrete cover of the thickness specified in the drawings.

Steel arches, steel mesh and the like shall be surrounded with at least 30 mm of shotcrete unless otherwise shown on the drawings.

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Any sealing shotcrete layer or flash coat shall be at least 20 mm thick, or as otherwise shown in the drawings or directed on site by the Engineer.

5.5 Reinforcement

Reinforcement mesh shall be securely fixed in place. The reinforcement shall be cleaned of any previously deposited material which might prevent a proper bond.

Ties, anchors and supports for the mesh shall be of steel and suitable spacers shall be provided where necessary. Timber packings shall not be used. The method of fixing the mesh shall be such that shotcrete can be compacted soundly behind the reinforcement at all points.

5.6 Application of Shotcrete in Cold Weather

When shotcrete is placed at air temperatures of less than 5°C, measures shall be taken to maintain shotcrete temperature above 3°C for at least 1 day after application.

No frozen materials, ice or snow shall be allowed to enter the mixer.

Cement shall not be heated. If water is introduced at the nozzle, it shall not be heated above 20°C.

5.7 Curing

Measures shall be taken to ensure that shotcrete exhibits proper strength gain and a minimum of cracking. Curing measures shall be applied as necessary to achieve these requirements.

6. Quality Control

All components must have a valid quality certificate and a valid permission for the intended use.

6.1 Works Tests

6.1.1 STRENGTH TESTS

Compressive strength tests shall be performed on cores taken from shotcrete in the works. The time of coring shall be as close as possible to 24 hours after placing. Cores required for 28 day strength tests may be obtained at the same time as those for 1 day strength tests and stored in the laboratory.

The frequency of coring shall be such as to obtain 3 cores each for 1 and 28 day tests for every 200 m^3 of shotcrete used in the works. Depending on the compliance of test results with this Specification, the circumstances of application and the importance of construction, the frequency of work tests and the amount of test sets may be reduced (to every 500 m^3, 1 and 28 day strength respectively) or increased (to every 100 m^3) subject to previous approval of the Engineer or his delegated personnel. The cores shall be drilled through the whole thickness of

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the shotcrete and visually inspected to verify that the shotcrete is dense and homogeneous without segregation of aggregate or other visible imperfections.

Reinforcement incorporated in the in-situ shotcrete may lead to improper test specimens (e. g. too much wire mesh, rebound traps), which must not be used for testing. Samples should therefore be taken at different points of the in-situ shotcrete. Individual values deviating by more than 15% from the arithmetic mean must be disregarded. For computing the arithmetic mean, at least three proper samples must be available.

Instead of testing cores taken from shotcrete placed in the works, indirect penetration and pull-out test methods may be used to determine the 1 day strength of shotcrete as approved by the Engineer. Tests for 1 day strength shall be carried out between 22 and 48 hours preferably at 24 hours $\pm$ 2 hours. Individual calibration has to be developed specifically for the test equipment used. The test results shall be related to the characteristic strength of one day. Mechanical rebound hammers shall not be used to determine the indirect compressive strength of shotcrete.

Where the nominal required shotcrete thickness is less than 100 mm, the cores for compressive strength testing shall be taken from areas where the actual thickness is greater than 100 mm. Alternatively, additional shotcrete thickness shall be applied in selected areas for subsequent test coring as directed by the Engineer.

The strength of shotcrete measured by cores taken from the works (or by indirect test methods as specified above) shall be acceptable if the compressive strength results comply with the following requirements:

(a) The average strength for any group of four consecutive test results shall be at least the specified characteristic strength.

(b) Any test result (mean of 3 core strengths) shall not be lower than the specified characteristic strength by more than:

2.0 N/mm^2 for 1 day strength
3.0 N/mm^2 for 28 day strength

If the shotcrete fails to meet the compliance requirements specified herein, the validity of the test results shall be checked prior to implementing one of the following courses of action:

(a) Confirm the requirements for remedial action by assessing the results of geotechnical measurements and/or back-analyses.

(b) Make good deficiencies by the application of additional shotcrete thickness at past or future works until compliance with the requirements is confirmed.

(c) Following an approved procedure, remove the defective shotcrete and replace by new shotcrete.

(d) Install additional rock dowels – if needed

The course of action to be adopted shall be approved by the Engineer.

The hardening of young shotcrete shall be checked by penetration tests and / or Kaindl Meyco tests at timely intervals.

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6.1.2 STABILITY TESTS

Tests shall be carried out once, at the beginning of works with a new shotcrete design mix, to assess the load-bearing capacity of the shotcrete in the works under site conditions. These tests may be carried out on cores taken from panels.

One set of tests shall be carried out for each mix type.

These panels shall be produced in the works under site conditions. The panels shall be stored underground in the works (with the same climatic conditions as the shotcrete placed in situ). Core samples shall be taken from the panels just before testing, or at least on the same day as testing.

Cylindrical test specimens shall be cored and tested as listed below. The dimensions of the test specimens and the testing procedure shall be in accordance with Subchapter 5.1.3, Shotcreting Trials.

(a) Compressive strength in the spray direction after 1 and 28 days on 3 cores each.

(b) Modulus of elasticity in the spray direction after 1 and 28 days on 3 cores each. The core shall be 100 mm in diameter and 200 mm in length. The strain shall be measured on the central part of the sample, the upper test limit being [redacted] and the lower test limit being [redacted] of the compressive strength.

The modulus of elasticity at different ages shall be determined on the same sample, the compressive strength being measured after 28 days.

If the stability of the tunnel is endangered because shotcrete does not meet the specified strength requirements, the affected shotcrete shall be replaced carefully or where practicable the deficiencies shall be compensated by the application of additional shotcrete or rock dowels as approved by the Engineer.

6.1.3 WORKABILITY TESTS

The workability of shotcrete produced by the wet method shall be measured by slump tests following the addition of plasticizer. Samples shall be tested for every 50 m^3 produced.

The target workability values shall be determined during site trials.

The workability of wet method shotcrete shall be within $\pm$ 25 mm or $\pm$ one third of the target value, whichever is the greater.

6.1.4 THICKNESS TESTS

The thickness of placed shotcrete shall be checked using studs, double headed nails, or steel mesh bars bent perpendicular to the surface. Where closely spaced lattice girders (< 1.6 m) are used, no other routine shotcrete thickness check will be required.

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5.2 Testing of Materials

5.2.1 TEST PROCEDURE FOR BLEEDING OF CEMENT

Put exactly 98 g of water with a temperature of 20°C into a 250 ml glass beaker with a small magnetic stirring rod. At medium stirring rate add 115 g of cement little by little within 20 seconds. Combine the mixture for 2 minutes until a homogeneous, relatively thin cement paste (water/cement ratio = 0.85) has been achieved.

Fill the homogenised mass into a 100 ml measuring cylinder up to the 100 ml index mark by means of a glass rod (do not pour directly into cylinder). It is absolutely necessary that the measuring cylinder be kept in a higher glass beaker filled with water of 20°C during the entire period of testing. Fluctuations in temperature shall not exceed ± 2°C.

After 120 minutes the amount of cement that has settled can be read from the scale, i.e. the amount of supernatant water may be determined. The reading is in ml corresponding to % by volume of repelled water.

6.2.2 TESTING OF ACCELERATORS

Setting Time

The dosage of accelerator, as % by weight of cement required to provide an initial setting of 60 sec ± 20 sec and a final setting of 150 sec at a maximum shall be determined in accordance with the following procedure.

(a) The temperature of the cement and water shall be 20°C ± 1°C.

(b) 1200 g of cement shall be placed in the mixing bowl of a mortar mixer (Hobart 5 litre mixer).

(c) When testing powder accelerators, the powder shall be weighed and then added to the cement in the mixing bowl and mixed on speed no. 1 for 2 minutes to ensure even distribution. Liquid accelerators shall be added to the mixing water.

(d) 420 ml of water shall be added to the mixture in the bowl within approximately 2 sec with the mixer on speed no. 1. After 5 sec the mixing speed shall be changed to no. 2 for a further 15 sec.

(e) The cement paste shall be taken from the mixing bowl by means of a spatula and placed in a vicat mould and lightly tamped to ensure no entrapped air is present in the sample. The top surface shall be struck off level and the mould shall be placed on the vicat apparatus within 20 sec upon completion of mixing (i.e. 40 sec upon addition of water).

(f) The initial set shall be determined in accordance with EN 196-3 and the final set shall be determined by continuing the use of the initial set method and recording the time at which the needle penetrates the top surface by less than 1 mm. The times shall be measured from the moment of water addition.

(g) If the initial set is less than 40 sec or more than 80 sec or the final set is more than 150 sec, the test shall be repeated using a smaller or higher dosage of accelerator.

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Strength Decrease

The testing of the strength decrease for the selected type(s) of accelerator shall be carried out at the following dosages to establish the variability with dosage:

Dry Method

- accelerators in powder form: 3.0, 5.0, 7.0%
- accelerators in liquid form: 2.0, 4.0, 6.0%

Wet Method

- water glass: 8.0, 12.0, 15.0%
- accelerators in liquid form: 2.0, 4.0, 6.0%

The above percentages are by weight of cement.

At the dosage chosen for use in the works, the decrease in strength at an age of 28 days, as determined in Subchapter 2.9.2 - Testing of Accelerators, shall not exceed the following:

- accelerators in powder form maximum 45%
- accelerators in liquid form maximum 30%

The decrease in strength shall be determined according to the following procedure:

Mortar cubes shall be used in accordance with EN 196-1.

A comparison of the 7-day and 28-day strengths of mortar shall be carried out as follows:

- The strength shall be determined without accelerator (A)
- The strength shall be determined with accelerator adopting the dosage used for the setting time tests (B)

  The decrease in strength is $\frac{A-B}{A} \times 100$

Mortar Tests - With Accelerator

The mortar strength with accelerator shall be determined in accordance with the following procedure:

(a) The temperature of the mortar constituents shall be: 20° ± 1°C.

(b) 370 g of mix water shall be poured into the dry mortar mixing bowl.

(c) Accelerator shall be added to and blended with the mix water at the dosage determined in accordance with 2.9.2, Item 1 - Setting Time.

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(d) 1,710 g of standard sand shall be added to the water in the mixing bowl with the mixer running at low rotation speed.

(e) 570 g cement shall be poured into the bowl within 5 sec and the mortar mixer shall immediately be switched to high speed for a mixing time of 30 sec.

(f) The moulds shall be filled with mortar as quickly as possible. The mortar shall be compacted by vibration for a period of 15 seconds only.

(g) The bulk density of the compacted mortar cubes shall be determined and compared with the bulk density of mortar cubes prepared without accelerator in order to check whether the appropriate compaction has been achieved. (The maximum admissible difference of bulk density to cubes prepared without accelerator shall not exceed $\pm$ 5 %).

(h) The cubes shall be removed from the moulds at an age of 4.5 hours and stored in a moist curing chamber at 20°C.

(i) Compressive strength testing of the specimens shall be undertaken after 7 and/or 28 days.

Mortar Test - Without Accelerator (Basic Mortar Mix)

The compressive strength of mortar cubes without accelerator shall be determined. The following mix ratio shall be used:

370 g water

570 g cement

1,710 g sand

7. Measurements

The quantity survey unit of the shotcrete shall be m^3. The volume (thickness) depends on the individual excavation and support type executed. The respective values are documented in the corresponding drawings.

8. Acceptance

8.1 Conformity of Work with Design and Technical Specification

The works shall be carried out in accordance with the design, with the Technical Specification and the written instructions of the Engineer.

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8.2 Acceptance of Works To Be Removed or Covered

8.2.1 DOCUMENTS AND DATA

The acceptance of works which are to be removed or covered shall be based u:

- a written statement by the Engineer entered into the Site Book that the works have been executed in accordance with the design and the Technical Specification(s),
- other written statements by the Engineer commenting on the execution of the works.

8.2.2 SCOPE OF WORKS

The scope of works to be removed or covered shall be determined by written statements of the Engineer and by other documents confirmed by the Engineer.

9. Applicable Regulations

9.1 Standards

Canadian Standards

CSA 23.1-94	Materials and method of concrete construction

German Standards

DIN 267	Fasteners and similar parts, technical specifications, generalities
DIN 1045, ENV 206	Structural concrete
DIN 1164	Portland - blast furnace - pozzolanic cement, definitions, components, requirements, delivery
DIN 18200	Control (quality control) of construction materials, construction components, and construction designs; general principles
DIN 18851	Shotcrete – fabrication and testing

European Standards

EC 2	Design of concrete structures
EN 196	Methods of testing cement

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1 Introduction

1.1 Subject of Technical Specification

This Technical Specification (TS) shall define the requirements for the execution and commissioning of all monitoring measures at the Niagara Tunnel Facility Project.

1.2 Range of Technical Specification Application

This TS is a bid and contract document used for the execution and commissioning of the works referred to in Item 1.1.

The provisions contained in this Specification refer to the working methods to be adopted for the:

a) delivery of all the components including the entire material and equipment required to the site

b) installation of all the components within the construction sequences

c) measuring of individual parameters as required

d) evaluation and interpretation of the results obtained

e) quality control for material and workmanship.

The Scope of Works is defined for the construction period in both the main tunnel and the corresponding adjacent structures (e. g. intake, outlet) as well as for the monitoring activities during the operation period.

1.3 Definitions

The basic definitions given in this TS are in conformity with the relevant standards in force. The monitoring measures are separated into measures executed during construction and measures performed during operation.

1.3.1 Monitoring during Construction Period

The monitoring objectives during construction are:

a) To check the adequacy of ground support in tunnels and excavations and to determine any support modifications required.

b) To determine the effects exerted by the construction work on the existing structures below ground, forming part of the works.

c) To check the adequacy of initial and final tunnel linings, and of various structural elements of underground structures.

Monitoring shall continue throughout the life of the contract with the objective to evaluate whether the behaviour of the underground structures and the ground conditions actually

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complies with the design expectations, to ensure that safety is maintained, and to assist in defining the scheduling and implementation of necessary maintenance tasks.

The following monitoring activities shall be carried out throughout the works as a minimum requirement:

a) Deformations of tunnel linings and junction openings

b) Deformations of adjacent structures

c) Ground movements adjacent to the tunnel

d) Groundwater pressure adjacent to the tunnel

1.3.2 Monitoring during Operation Period

The monitoring during operation shall meet the following objectives:

a) to evaluate the adequacy of ground support in tunnels and excavations

b) to verify the long-term loadings and the long-term underground behaviour

c) to monitor the load-bearing capacity of the structure

Monitoring shall continue throughout the facility's life cycle to ensure that the load-bearing capacity of the structures is maintained and to assist in defining the scheduling and implementation of necessary maintenance tasks.

The following monitoring activities shall be carried out as a minimum requirement:

a) Ground movement adjacent to the tunnel

b) Groundwater pressure adjacent to the tunnel

1.4 General Work Requirements

The Contractor shall be responsible for the quality of material and workmanship and for their conformity with the Design Documentation, other corresponding Specifications and Method Statements and the Engineer's instructions.

The Contractor shall make suitable allowance in his overall work programme for the installation, testing, calibration, reading, and maintenance of instruments, the interpretation of field readings and the implementation of appropriate corrective measures. The monitoring program shall extend over the entire construction and maintenance period.

Notwithstanding any other provisions in the contract in respect of the Contractor's staff, the personnel responsible for the installation, testing, calibration, reading, maintenance and surveying of the instruments, shall be qualified and experienced in the field of instrumentation, geotechnical monitoring and survey, as appropriate.

The Contractor shall provide his instrumentation personnel with all the equipment necessary in accordance with the Specification and shall grant them access to the works to enable them to carry out their work in a safe and proper way at the appropriate time intervals stipulated in this Specification.

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1.4.1 PROVISION OF MEASURING DEVICES

The Contractor shall present an organisation chart and time schedule of the works to the Engineer for approval. These documents shall give due consideration to all the conditions accompanying the performance of the measurements and the presentation of results.

All equipment and installation accessories, required for the operation of the instrumentation system and the recording of measurements, shall be supplied by the Contractor and shall be available on site prior to any construction works being performed in the area in which they are to be installed and shall be stored securely where they will not suffer any physical damage or any damage arising from excessive moisture, temperature extremes or other adverse conditions.

All measuring devices shall be as specified and shall be manufactured by companies with a proven record of experience in the field of tunnel and/or geotechnical instrumentation. All materials, designs and constructions shall be of the highest quality to provide robust, corrosion and vibration resistant instruments. Instruments embedded in concrete linings shall be capable of withstanding vibrations from compacting equipment (e.g. shotcrete application). The accuracy and dependability of the equipment shall not be significantly affected by changes in temperature, humidity, stray currents or other adverse conditions that may be encountered. Calibration certificates, where appropriate, shall be provided by a reputable testing company.

1.4.2 INSTALLATION AND MAINTENANCE OF INSTRUMENTS

The location and type of instruments shall be as shown on the Drawings or as otherwise specified.

The location and arrangement of the instruments shall be planned so that monitoring can continue, if specified, after completion of the works with all electrical and mechanical equipment etc. in place. Adequate access for maintaining and reading the instruments shall be provided. Remote control instruments should be capable of being read without interruption to other site activities.

A stock of additional instruments shall be available and installed as found necessary in the event of unforeseen conditions being encountered, for which more extensive monitoring might be required.

The Contractor shall install the equipment according to the manufacturer's recommendations. Testing shall be undertaken as necessary to ensure satisfactory functioning of the equipment at each stage of the installation. In particular, adequate precautions shall be taken to protect the instruments against harmful effects resulting from construction works and groundwater seepage. Instruments found to be malfunctioning at any time shall be replaced at the earliest opportunity.

All instruments shall be securely fixed in accordance with the Drawings and their Specifications including any attendant wiring and terminal panels, and shall be adequately protected against mechanical damage and ingress of water and dirt.

As far as practicable, instruments and terminal boxes built into concrete linings shall be kept clear of reinforcement.

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The installation of instrumentation in underground excavations shall be carried out at the earliest opportunity, following the advance of the tunnel face, consistent with the needs to ensure safe working methods and adequate equipment protection.

The Contractor shall take every practical measure to prevent damage to the instruments and ancillary equipment during handling, installation and subsequent operation. The Contractor shall maintain all the instruments required for long-term monitoring in a satisfactory working order for the entire duration of the monitoring program.

The readout boxes shall be capable of being placed at adequate distances to their associated transducers without the specified accuracy of the instrumentation being impaired.

Measures shall be taken to ensure that electrical instruments will not be adversely affected by other temporary or permanent electrical services.

1.4.3 INSTRUMENT READING AND RECORDS

A logical reference system for all instrumentation equipment shall be established by the Contractor so that records for any particular location can easily be recovered for interpretation or review.

Instruments shall be read as soon as possible after installation to obtain datum readings, which shall be established from a minimum of two independent reading operations producing consistent results. Datum readings and reading frequencies specific to a particular instrument are stated in the relevant chapter describing the details and the use of the instrument.

Readings shall continue to be taken once each day until the rate of change in the readings falls off sufficiently to allow a lower frequency to be adopted with confidence that the safety of the works is not in doubt and that the amount of data retrieved will allow trends with time to be clearly identified and evaluated.

In the event of any change in circumstances, for example the influence of the construction on other structures nearby or of junctions and openings, the reading program shall be resumed.

In particular during excavation of a tunnel in the vicinity of an instrumented ground section, daily readings shall be resumed not later than four days before the working face reaches the instrumentation section and in any event once the working face is within 50 m of the instrumented section.

Where seasonable considerations are expected to influence the instrument readings, at least four readings per year shall be taken.

When recording instrumentation readings, all site conditions that may affect the results shall be recorded, including temperature, air pressure and humidity, temperature of recently placed concrete, progress of excavation, progress of other construction activities such as lining erection and grouting, time lapse between construction and taking of first readings, tunnel air movements, machinery vibration, activity and progress in adjacent tunnels. Instrument type, location reference, data and time of reading, personnel carrying out the readings, measuring instruments or readout unit references shall also be recorded.

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Instrument readings shall be recorded on record sheets designed for this purpose or preferably directly on tape, disc or any other digital storing device for subsequent computer analysis. Corrections shall be made for temperature difference or other factors as appropriate. Immediately after the readings have been taken, the measurement results shall be entered into time-deformation and time-stress diagrams respectively, to evaluate the stability behaviour of the underground structure.

The diagram used shall also show:

a) the project title

b) the type of measurement, e. g. deformation, extensometer, piezometer.

c) the diagram page reference

d) the location and chainage of the measuring points

e) a sketch of the tunnel cross-section, clearly marking the position of the measuring points.

f) the details of the excavation process such as:

- distance of measuring point from the face
- excavation of crown, bench and invert in relation to the measurements
- location of adjacent openings

g) the duration shall be recorded between the excavation and the datum reading taken at the measuring section

h) new datum readings shall be clearly indicated.

i) the scale of diagrams shall be uniform and shall not be changed with the magnitude of measurement results.

The same recording devices, e.g. tape extensometers, pressure gauges, digital readouts, etc. shall be used at any given location throughout the monitoring program. If for any reason this becomes impractical, due to instrument breakage for example, new datum readings shall be taken immediately with a replacement instrument, i.e. the new instrument used for the future readings. Similarly, should a monitoring location become unavailable, the instrument previously read from this point shall, as soon as practicable after becoming unavailable, be read from an alternative point, the latter than being used for subsequent readings.

Readings shall, wherever possible, be taken by the same personnel. Should the person need to be replaced for any reason, a series of duplicate readings shall be carried out by the out-going person and his replacement.

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2 Materials

2.1 General

A detailed statement of the types and sources of manufacture of the geotechnical measurement components, proposed for use in the works, shall be prepared.

The instrument manufacturer shall provide drawings and data describing the principal features, the mode of operation, the measuring range and the degrees of accuracy of the equipment. The manufacture of all items shall be in accordance with the Drawings and the Specification(s) provided.

Where instruments shall be capable of being monitored remotely by portable remote readout units, the readout units and the appropriate plug-in leads shall be compatible with the instruments being monitored. The readout units shall plug into appropriate readout boxes.

2.2 Technical Requirement of Instrumentation

2.2.1 GENERAL

The instruments to be used for the monitoring of underground structures shall include but shall not be limited to:

a) Theodolite and targets to measure the lining deformations (for general use)

b) Levelling studs and geodetic levelling equipment (if theodolite for optical measurements is not used)

c) Tape extensometer (if theodolite for optical measurements is not used)

d) Rod extensometers

e) Piezometers

2.2.2 CONVERGENCE MEASURING INSTRUMENTS

The convergence measuring bolts shall be made of high-yield tensile steel with a quality corresponding to the reinforcement quality. The top shall have a screw thread for a target or geodetic levelling stud or the pin of a tape extensometer to be fixed to it.

The tape extensometer to be used shall be made of corrosion-proof metal and fitted with a dial gauge and tensioning device. It shall be suitable for measuring over the required lengths and in any direction from a measuring bolt. It shall have a resolution of 1 mm and shall be capable of measuring absolute lengths to an accuracy of ± 1 mm.

Levelling studs shall be manufactured from stainless steel and fixed to the tunnel linings in the same manner and to the same standards as convergence reference points. Geodetic levels shall have robust tripods. They shall be designed in such a way that their use in conjunction with the appropriate geodetic instruments allows precision levelling to an accuracy of ± 1mm.

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The theodolite used for convergence measurements shall have an accuracy of ± 1 mm.

2.2.3 ROD EXTENSOMETER

Rods shall be fabricated from aluminium alloy or glass-fibre reinforced resin. The cross-sectional dimensions of the tunnel shall not be a restriction to the maximum extensometer length to be installed.

Extensometers shall be designed in such a way that the measurement of both elongations and reductions in the length between anchorage point and measuring head are possible. The head of the extensometer shall be exchangeable.

Reading facilities shall be either:

- portable mechanical measuring devices which shall include a dial depth gauge and a calibration device. The accuracy of the device shall not exceed 0.1 mm and the measuring range shall be ± 15 cm.

or

- electric displacement transducers for remote reading from a terminal box with an overall accuracy of 0.1 mm and a measuring range of ± 15 cm. The transducers shall be waterproof to full hydrostatic head.

The cabling terminal box shall be capable of accepting up to four extensometers. A battery-operated digital readout device capable of reading to the required overall accuracy shall also be provided. The readout equipment shall be compatible to the measuring system and shall ensure an automatic data acquisition throughout the operation period.

2.2.3 PIEZOMETER

The piezometer shall be of a type and manufacture approved by the Engineer. The piezometer used shall be of the vibrating wire (vw) type. It shall be made of stainless steel and shall include a stainless sintered filter.

The piezometer shall be installed in such way that it will be exchangeable throughout the facility's life period. The readout equipment shall be compatible to the measuring system and shall ensure an automatic data acquisition throughout the operation period.

The piezometer shall be capable of measuring the water head at the piezometer tip to a repeatability of ±0.1 m.

3 Equipment

The works may be performed using any type of equipment approved by the Engineer.

The entire equipment must have a valid quality control certificate and is to be inspected within regular inspection periods.

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4 Transport

All components of the monitoring equipment shall be transported by suitable means of transport and in accordance with industrial safety and road traffic regulations to avoid any damage.

5 Workmanship

5.1 General

This section relates to the instrumentation to be provided to aid in determining the support necessary for the excavation in accordance with the use of the New Austrian Tunnelling Method (NATM) and the use of the Tunnel Boring Machine (TBM).

The instrumentation shall be installed as soon as practicable in the cycle of excavation and underground support. It shall be adequately protected against mechanical and environmental damage and shall be accessible at all times for survey purposes.

The Contractor's instrumentation personnel shall be responsible for all measurements and for proper data recording. There shall be staff based on site, available any time during construction, and capable of analyzing the data in terms of adequacy and in relation to the actual ground support measures. The results shall be entered into diagrams in compliance with the requirements of the Engineer responsible for ground support. The diagrams shall be updated immediately after a set of measurements has been completed to permit an evaluation of the stability of the structure.

At locations where lining stresses and ground pressures are measured, lining deformations shall be recorded as well.

Provisions in the final lining for a continued monitoring of the instrumentation shall be made as specified by the Designer.

Details describing the installation of the instruments shall be recorded, such as the exact position and orientation of the instruments, the length and orientation of possible drill holes, the shotcrete thickness and the ground formations encountered at the measurement location.

5.1 Details and Use of Instruments

5.1.1 DEFORMATION MEASUREMENTS (CONVERGENCE MEASUREMENTS)

Lining deformations shall be monitored by observing the movement of measuring bolts installed immediately after excavation. Measuring bolts shall be fixed during the tunnel advance, before or after shotcrete application.

The following measurements shall be taken:

a) Optical measurements generally using a theodolite

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b) Tape measurements, especially where optical measurements cannot be taken

Deformation measurements shall be taken in sections of up to 500 m along the tunnel. The positioning of the measuring bolts shall be adjusted to suit the excavation sequence adopted.

Deformation results shall be assessed in conjunction with a visual examination of the tunnel surfaces to record signs of distress such as cracks and sections of splitting and falling ground or a loosening or overstressing of support measures. Subject to the findings of both, the deformation results and any signs of distress, any adjustment to the existing support shall be made in accordance with the design and subject to the Engineer's approval.

The ambient temperature shall be taken at the time of each reading. The instrument shall be used and read in accordance with the manufacturer's instructions. Three dial gauge readings shall be taken and recorded for each measurement and averaged prior to making the temperature correction.

The instrument shall be checked against a calibration bar before and after each set of readings. If a convergence line becomes unavailable, e.g. due to final service installations obstructing the measurement, dual readings shall be taken with its replacement. If this is impossible due to construction works, then readings shall be taken on the old line at the latest possible time and the new line shall be established and read as soon as possible.

5.1.2 ROD EXTENSOMETERS

Rod extensometers employed in the works shall take the following form:

A rod anchored at the remote end of a drill hole shall pass into a plastic tube fixed in a reference collar at the open end of the hole. The relative movement between the end anchor and the reference collar shall be measured with either a dial gauge or an electric transducer on the free end of the rod. A range adjustment device fitted at the reference collar shall extend the reading range beyond that of the dial gauge. In case this multiple arrangement is employed, it shall be calibrated on one single rod extensometer installed in close proximity. Rods are installed in a single hole with each rod of a different length so that displacements at various drillhole depths may be recorded. Each rod shall be individually isolated by its own plastic sleeve. The complete assembly shall be grouted in place, fixing the anchors to the ground but allowing free movement of each rod within its sleeve.

A single reference housing shall receive all rods from one drillhole and provide protection to the reference head. The number of rods per drillhole shall be as shown on the drawings.

Other characteristics of the instrument shall be as follows:

The anchor points shall be according to the manufacturer's recommendation.

The extensometers shall be installed to the lengths shown on the drawings, where the lengths specified refer to the overall lengths of rod plus anchorage bar.

The accuracy of drilling shall be such that the drill hole shall be straight and shall not deviate from its intended orientation by more than four degrees.

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5.2 Evaluation, Interpretation

5.2.1 REPORTING

The Contractor shall compile a weekly summary of geotechnical records and monitoring measurements which shall contain such comments as:

a) comparison with design expectations

b) schedule of measurements taken

c) any unusual circumstances

d) any special measurements taken during the previous week of construction

5.2.2 DESIGN ASSESSMENT

The Contractor shall be responsible for the interpretation of geotechnical measurements such as the comparison of measuring readouts and calculation results. The Contractor shall issue processed monitoring results promptly and regularly. He shall immediately inform the Designer of any discrepancies between calculation results and actual results and shall make recommendations for a design variation.

In case of serious discrepancies arising between the calculated and the measured results, a back-analysis shall be initiated to confirm these discrepancies and in a subsequent step, the structures still to be built shall be re-analyzed.

6 Quality Control

All components must have a valid quality certificate and a valid permission for the intended use.

The Contractor shall be responsible for keeping records of all calibration certificates and for sending equipment off site for recalibration by reputable testing laboratories when required.

The Contractor shall ensure that the entire instrumentation in use has been correctly calibrated. The Contractor shall also carry out periodic checks to confirm the validity of equipment calibration in accordance with the manufacturer's instructions and to carry out adjustments if found necessary. Suspect readings shall be repeated.

7 Measurements

The quantity survey unit of the measuring device shall be piece (installed measuring device). The quantity survey unit of the measurements and readings shall be piece (measurement) per measuring point.

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8 Acceptance

8.1 Conformity of Work with Design and Technical Specification

The works shall be carried out in accordance with the design, the Technical Specification(s) and the written instructions of the Engineer.

8.2 Acceptance of Works To Removed or Covered

8.2.1 DOCUMENTS AND DATA

The acceptance of works which are to be removed or covered shall be based upon:

- a written statement by the Engineer entered into the Site Book that the works have been executed in accordance with the design and the Technical Specification(s),
- other written statements by the Engineer commenting on the execution of the works.

8.2.2 SCOPE OF WORKS

The scope of works to be removed or covered shall be determined by written statements of the Engineer and by other documents confirmed by the Engineer.

9 Applicable Regulations

9.1 Standards

Canadian Standards

German Standards

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1. Introduction

1.1 Subject of Technical Specification

This Technical Specification (TS) shall define the requirements for the execution and commissioning of underground grouting measures performed inside the Diversion Tunnel, at the intake and outlet structures and from the ground surface to achieve a ground improvement and a reduction in ground permeability at the Niagara Tunnel Facility Project.

1.2 Range of Technical Specification Application

This TS is a bid and contract document used for the execution and commissioning of the works referred to in Item 1.1.

The provisions contained in this Specification refer to the working methods to be adopted for the:

a) delivery of all the components and the entire equipment required to the site

b) drilling of boreholes for the grouting works required

c) mixing of the grouting components (materials) required

d) injection of planned underground space

e) quality control for material and workmanship.

The Scope of Work is defined for the Diversion Tunnel during excavation and support.

1.3 Definitions

The basic definitions given in this TS are in conformity with the relevant standards in force.

1.3.1 BOREHOLES

The boreholes for the grouting measures can be installed by hammer drilling or rotary drilling. Boreholes in poor ground, which are not stable, have to be cased with tubes à manchette (perforated pipes with rubber sleeves).

The diameter of boreholes with casing must be such as to allow for the installation of tubes à manchette (dia 50 mm) and screen pipes (dia 50 mm) before recovery of the casing.

Borings without casing are only admissible if the ground is firm enough to prevent the borehole from caving in. The drilling diameter is to be selected to permit the use of packers being inserted by means of pipes with a diameter of 20 mm.

1.3.2 GROUTING COMPONENTS

The main components for underground grouting are:

- water

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- cement
- sand

In addition,

- bentonite
- additives like hardeners or plasticizers
- chemical components like water glass

can be used for special requirements to be met. The individual components are specified in Subchapter 2, **Materials**

1.3.3 GROUTING EQUIPMENT

For grouting, the following equipment components will be needed on site:

- mixing plant
- pumping system
- injection lines
- packers
- measuring facilities

The components listed are specified in Subchapter 3, **Equipment**.

1.4 General Work Requirements

The Contractor shall be responsible for the quality of material and workmanship and for their conformity with the Design Documentation, other corresponding Specifications and Method Statements and the Engineer's instructions.

The Contractor shall provide his personnel with the equipment necessary in accordance with the Specification and shall grant them access to the works to enable them to carry out their works in a safe and proper way.

Grout injections may be carried out from the ground surface or from the tunnels. Special care is to be taken to ensure that the injection (grouting) equipment is selected and installed in a way, which does not impair existing utilities, structures and buildings.

Before commencing the grouting works, the Contractor shall propose a concept for these works. The concept shall comprise the equipment envisaged, the scope of work and the grouting work stages, the selection of grouting material, as well as the injection pressures and rates to be applied.

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2. Materials

2.1 General

The suitability of the individual materials for the respective ground and grouting operation must be verified by testing.

2.2 Water

The water used for grouting works must not contain more than 1.5 ‰ of soluble substances. The percentage of sulfates must drop below 1 ‰. Water polluted by organic substances is not suitable for the execution of grouting works. In order to determine chemical processes in the water, adequate water analyses shall be carried out prior to the works.

The water temperature during mixing and grouting should range between 5°C and 25°C.

2.3 Cement

Only cement with a suitable fineness of grinding shall be used. The Blaine value should at least amount to 3200 cm^2/ g. The compatibility of cement, bentonite and water shall be verified.

In exceptional cases, special rapidly setting cements with a high degree of grinding fineness may be used to stop water seepage. The time span until the material starts to set should not exceed 20 minutes.

2.4 Bentonite or Clay Powder

In case of grouting with bentonite, non-activated bentonite or clay powder shall be used. The mix proportions, regarding the share of bentonite as well as that of water in the suspension, depend on the swelling properties of bentonite or clay powder. 90 % of the bentonite grain fraction should be smaller than 2 µ and the compatibility of cement and bentonite shall be closely observed.

2.5 Sand

Only fine sand with largely round grains and without organic components within a grading range between 0.1 and 1 mm may be used. The percentage of grains smaller than 0.1 mm must not exceed 10 %.

2.6 Additives

The use of grouting additives is subject to approval by the Engineer. Before works are started, the compatibility of additives with cement and bentonite as well as with the water used, shall be verified by laboratory tests.

Only technically acknowledged additives, which have been successfully employed for similar works and do not carry any harmful implications upon application, shall be proposed by the Contractor.

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2.7 Chemical Injections

Chemical injections may be executed with water glass or acrylic resin unless otherwise proposed by the Contractor. Water glass with 37° - 39° Blaine shall be used. Hardeners may be on an organic basis or may be soda lye with sodium aluminate. The gelling time must be variable between 1 minute and 2 hours.

2.8 Suspensions

With cement-bentonite suspensions or pure cement suspensions, the water/binder ratio should range between 0.6 and a maximum of 2. Suspensions with a larger water content are not admissible.

The cement-bentonite suspensions used should be largely stable, i.e. the degree of settling must not exceed 10 %.

3. Equipment

The works may be performed using any type of equipment approved by the Engineer.

The entire equipment must have a valid quality control certificate and is to be inspected within regular inspection periods.

3.1 Mixing Plants

The site equipment shall include mixers and pumping equipment to allow for uninterrupted stirring of any grouting material (e.g. cement, bentonite, water glass or resin solution). Even in case of a power failure or any similar disturbance, a constant stirring of the injection material must be guaranteed.

The dosage of single components of the grout mix shall be measured by means of scales or volumetrically in a way to achieve an accuracy of 1 - 2 % in relation to the smallest portion of the mix. For the agitation of suspensions, colloidal mixers with a high rotation rate (1200 to 1500 rotations per minute) shall be used.

The duration of the mixing process must suit the respective grouting material but should at least be 2 minutes.

3.2 Pumping System

The injection pumps must be adjustable with respect to both pressure and flow rate. The use of pressure cylinders is not admissible. In case of piston pumps, equalising tanks shall be installed to avoid pressure surges during pump operation. The pumping rate should at least come to 60 l/min at a maximum pressure of 50 bar. It must moreover be possible to add sand or other fine inert material to the cement suspension.

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3.3 Measuring Facilities

Each mixing station shall be equipped with a pressure and flow rate recorder for each single pump. These devices shall serve to monitor the grouting process and to record operational data of each grout injection unit.

All pressure gauges used on site must be calibrated. The display range shall correspond to the pressures required and applied.

3.4 Injection Lines

A feeder line and a return line must be installed between each pump and the borehole. Thus the grouting material may circulate in the line system in case of failure and in case of any interruption of the grout injection process. A pressure gauge must be placed at the borehole mouth allowing for a direct reading of the pressure applied. Each pump must not inject more than one section of a borehole. In order to avoid sedimentation of grouting material and uncontrolled mixing or changes in the mix proportions within the line, injection lines with a diameter of 20 mm shall be used.

Furthermore, telephone communication between the borehole mouth and the pumping station should be operative at all times. The entire system shall be designed for an operation pressure of 50 bar (5 MPa).

Before starting grout injections or water pressure tests, the recorders installed in the mixing container and the pressure gauges located on the pumps and at the borehole mouth must be checked.

3.5 Packers

Once pressure is applied, the packers must be in tight contact with the borehole or grouting tube wall. The length of the packers shall be chosen in a way preventing dislocations during water tests or grout injections. The specified cross-section of water/grout flow must not be reduced at any location.

For grout injections or water pressure tests during drilling operation, single packers shall be employed. For grout injections and for water tests in completed boreholes twin packers shall be used.

All sealing elements must be available with appropriate diameter and in sufficient quantity. Using double packers, the injection length may be variable.

4. Transport

All components shall be transported by suitable means of transport and in accordance with industrial safety and road traffic regulations to avoid any damage.

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5. Workmanship

5.1 Injection Works

Grouting a ring or an array of boreholes shall be carried out adopting the following sequence:

If two rings of drill holes shall be injected, grouting will first be applied to the inner ring, before the outer ring will be grouted. At the first stage, only every second borehole will be grouted. Intermediate boreholes not yet grouted will be used to check the efficiency of the grout injection.

The injection pressure shall be selected according to the ground conditions. The pressures applied must never lead to ground fracturing. If faced with an accidental fracturing of the ground, the pressure employed for further grout injections shall be reduced to 80 % of the pressure which caused the fracturing.

The pumping rate in low-permeability ground shall amount to 50 –70 l/min, while for injections in strongly fissured ground a maximum pumping rate of 65 l/min shall be admissible.

5.2 Tube à Manchette Installation

Boreholes which have to be equipped with a casing will be equipped with perforated pipes with rubber sleeves arranged at a certain spacing (tube à manchette). The system and design of these pipes will be subject to the Engineer's approval.

The space between the borehole and the tube à manchette will be filled with cement suspension which, in the case of cased boreholes, must be applied when the casing tubes are extracted.

The composition of the cement suspension is to be suggested by the Contractor. The following information may serve as a guideline:

water:	884 l
bentonite:	75 kg
cement:	270 kg

The suitability of the mixture is to be verified on site and is to be approved by the Engineer.

Generally, the tubes à manchette shall be rinsed after each injection to keep them operable until the completion of the works. Following the completion of these works, the tubes à manchette are to be filled with cement-bentonite suspension.

5.3 Monitoring

A detailed log containing information on the grouting works executed shall be prepared separately for each single borehole and shall be submitted to the Engineer. The logs are to contain the following information:

- Indication of location
- Identification number of borehole

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- Injected section (sleeve - number)
- Date, hour, start and end of injection
- Pressure at start and end of injection
- Quantity of grouting material
- Type of grouting material
- Mix proportions

If different mix proportions shall be used within the same grouting section, these shall be indicated separately. The sequence of grout injections as well as the pressure characteristics will have to be recorded for each type of mix. The record tapes indicating pressure and flow rate measurements shall be enclosed in the log. Extraordinary events or disturbances must also be indicated.

6. Quality Control

All components must have a valid quality certificate and a valid permission for the intended use.

6.1 Suitability Test

Laboratory tests shall ensure that all requirements are met in the application of chemical injections as well as suspensions. The samples to be analyzed shall be prepared by the use of standard sand. The following characteristics shall be determined:

- Viscosity
- Settling characteristics
- Compressive strength
- Permeability
- Viscosity limit for injections (suspension viscosity is measured with a funnel, resin viscosity with a rotary cylinder viscometer)

Sample cubes of 50 x 50 x 50 [mm] shall be prepared and placed in water. The compressive strength shall be tested after 7 and after 28 days.

6.2 Quality Test

Upon injection of water glass or resin solutions, samples shall be taken from each mixing batch indicating hour, location of use, identification number of borehole, and position of sleeve within the borehole. In case of cement-bentonite suspensions, samples shall be taken from the mixing plant to be analyzed in the laboratory.

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6.3 Control of Workmanship

The efficiency of the injections shall be verified by water pressure tests carried out in intermediate boreholes. The results shall be compared with the results of water pressure tests carried out before the grouting operation started.

In case of uncertainty about the success of the grouting operation, additional confirmatory boreholes shall be drilled.

6.4 Water Pressure Tests

6.4.1 GENERAL

Water pressure tests are to be performed in rock. In soil they may be realised in exceptional cases.

Generally, water pressure tests are conducted at three pressure stages. The tests are to be extended over sections of 3 m or less, if necessary. In case of boreholes with single packers, the tests may proceed in drilling direction, in case of boreholes with double packers, the tests may be carried out in reverse direction following the completion of a borehole.

6.4.2 EXECUTION OF WATER PRESSURE TESTS

Installations for water pressure tests are to be designed for a maximum pressure of 25 bar. The pressure is measured with a pressure gauge. The water consumption is determined by use of a water meter. The water pressure applied is measured at the borehole mouth. Additionally, the following data are to be recorded at each test:

- Elevation of pressure gauge = borehole mouth
- Elevation of packer
- Pressure loss in pipe from borehole mouth to discharge through holes in sealing element (calibration of sealing element)

The pressure to be applied depends on the hydrostatic pressure prevailing in joints and voids. The pressure stages are determined on the basis of the maximum pressure, with the first stage amounting to a quarter and the second stage amounting to one half of the maximum pressure. The third pressure stage corresponds to the maximum pressure selected. On the falling side, in turn, half of the maximum pressure and at the last stage a quarter thereof are to be applied. Measurements may only be commenced after a state of equilibrium has been established, i.e. as soon as the pressure gauge indicates a steady pressure and the discharge of water is constant. At that point, the pressure has to be maintained for 5 minutes and the amount of water injected must be read from the water meter.

The results yielded by the water pressure tests shall be recorded in graphic form with all the characteristic data being included in the respective log. The graphic representation should be in the form of a pressure/flow rate diagram.

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7. Measurements

The quantity survey unit of the grouting measures shall be

- t (weight) for the materials,
- m (length) for the drilling of boreholes, differentiating between drilling inside the tunnel in all directions and drilling from the ground surface and graded in such steps as "up to 5 m, up to 10 m, up to 15 m, up to 30 m".
- h (time) for the ground injecting in phases, the time basis being the pump's operation time.
- piece for the delivery and appropriation of the whole equipment to the execution site and between the execution sites

8. Acceptance

8.1 Conformity of Work with Design and Technical Specification

The works shall be carried out in accordance with the design, the Technical Specification and the written instructions of the Engineer.

8.2 Acceptance of Works To Be Removed or Covered

8.2.1 DOCUMENTS AND DATA

The acceptance of works which are to be removed or covered shall be based upon:

- a written statement by the Engineer entered into the Site Book that the works have been executed in accordance with the design and the Technical Specification(s),
- other written statements by the Engineer commenting on the execution of the works.

8.2.2 SCOPE OF WORKS

The scope of works to be removed or covered shall be determined by written statements of the Engineer and by other documents confirmed by the Engineer.

9. Applicable Regulations

9.1 Standards

Canadian Standards

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German Standards

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1. Introduction

1.1 Subject of Technical Specification

This Technical Specification (TS) shall define the requirements for the execution and commissioning of interface grouting measures for the prestressing of the final lining of the Diversion Tunnel of the Niagara Tunnel Facility Project.

1.2 Range of Technical Specification Application

This TS is a bid and contract document used for the execution and commissioning of the works referred to in Item 1.1.

The provisions contained in this Specification refer to the working methods to be adopted for the:

a) delivery of all the components and the entire equipment required to the site

b) joint installation of grouting hoses and waterproofing system

c) mixing of required grouting components (materials)

d) injection of annular space between shotcrete lining and waterproofing system at the specified pressure

e) quality control for material and workmanship.

The Scope of Work is defined for the Diversion Tunnel during construction of the final lining.

1.3 Definitions

The basic definitions given in this TS are in conformity with the relevant standards in force.

1.3.1 GROUT HOSES

Synthetic pipes, with a nominal internal diameter of 15 mm and a wall thickness of approx. 3 mm, shall be provided at the interface between the shotcrete lining and the waterproofing membrane of the tunnel. The installation shall be carried out together with the installation of the waterproofing system.

The grout hoses are generally installed in rings at a uniform spacing along the tunnel.

1.3.2 MANCHETTES

The grout hoses are fitted with reinjectable outlet valves, termed manchettes, comprising 5 mm thick soft rubber sleeves, 200 mm long and covering groups of three 5 mm diameter holes drilled at intervals along the pipe. The manchettes are generally spaced at 3,000 mm centres and are fixed in position to prevent sliding.

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1.3.3 PVC JACKETS

To facilitate the distribution of grout into the interface, the grout hoses fitted with the manchettes are installed in a jacket of PVC sheet with a thickness of 250 microns and a circumference of 900 mm. The jackets have been carefully fixed to the prepared surface through metallic strips approximately spaced at 500 mm centres.

1.3.4 CONNECTION POINTS

The ends of the grout hoses, which shall stick out of the Diversion Tunnel's final lining concrete face, shall be provided with a 25 mm diameter I.S.O. or similar female threaded socket fitted with a screwed plug and installed flush with the concrete surface.

The Contractor shall provide suitable tools and equipment to make all connections necessary to these embedded sockets during interface grouting operations. Care shall be exercised at all times to avoid damage to the permanently embedded sockets.

The sockets shall be closed with caps once the interface grouting operation is finished.

1.3.5 GROUT BLOCKING RINGS

For the grout not to proceed too far from the points of injection, grout blocking rings shall be installed every 12 m. A grout blocking ring consists of a piece of geotextile fleece, which is not backed by any synthetic material. The geotextile fleece is folded to not less than four layers and fixed to the shotcrete surface around the circumference of the tunnel.

1.3.6 GROUTING COMPONENTS

The main components are:

- water
- cement

The individual components are specified in the Subchapter 2, **Materials**

1.4 General Work Requirements

The Contractor shall be responsible for the quality of material and workmanship and for their conformity with the Design Documentation, other corresponding Specifications and Method Statements, as well as the Engineer's instructions.

The Contractor shall provide his personnel with the know-how and equipment necessary in accordance with the Specification and shall grant them access to the works to enable them to carry out their work in a safe and proper way. All interface grouting operations on site shall be performed by skilled workmen under the direct and continuous guidance and supervision of foremen and engineers relying on extensive experience in this type of work.

Before commencing the interface grouting works, the Contractor shall propose a concept for these works. The concept shall comprise the equipment envisaged, the scope of work and the

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grouting work stages, the selection of grouting material, as well as the injection pressures and rates to be applied.

Interface grouting shall only be commenced once contact grouting has been completed and once the specified concrete strength for the final lining has been attained.

2. Materials

2.1 General

The suitability of the individual materials for the respective ground and the grouting operation must be verified by testing.

2.2 Water

The water used for grouting works must not contain more than 1.5 ‰ of soluble substances. The percentage of sulfates must be below 1 ‰. Water polluted by organic substances is not suitable for the execution of grouting works. In order to determine chemical processes in the water, adequate water analyses shall be carried out prior to the works.

The water temperature during mixing and grouting shall range between 5°C and 25°C.

2.3 Cement

Ordinary Portland cement with a suitable fineness of grinding shall be used. The Blaine value shall at least amount to 3200 cm^2 / g. The quality strength of the cement (strength, hardening time) shall correspond with the working conditions required and the ultimately pressure required.

2.4 Suspensions

The water/binder ratio of the suspension shall range between 0.5 and 2.0. Suspensions with a larger water content are not admissible.

The suitable water/binder ratio in the different pressure stages shall be examined by trials.

3. Equipment

The works may be performed using any type of equipment approved by the Engineer.

The entire equipment must have a valid quality control certificate and is to be inspected within regular inspection periods.

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3.1 Grout Mixer

A two-compartment high-speed colloidal mixer such as the Colcrete mixer or any equivalent shall be used for grout mixing. The grout shall be mixed in one compartment and discharged through strainers into a holding tank of suitable capacity. From the holding tank the grout shall pass through further strainers into the suction end of the grout pump. Provision shall be made to keep the grout in the holding tank continuously agitated by mechanical means.

The mixer(s) shall be of sufficient capacity to ensure that the grout pumps do not run dry at any time.

3.2 Pumping System

The grout shall be injected by means of an approved double-acting reciprocating pump or any other type of approved pump, equipped with interconnecting pipes and valves in a way permitting a stand-by pump and water supply equipment to be brought into immediate service as may be necessary to provide continuous injection of a hole or connection point. Grout pumps shall be capable of smoothly injecting grout at any pressure up to 30 bar. Air vessels shall be incorporated in the equipment arrangement to dampen surges in grouting pressure.

Pressure relief valves shall be incorporated in the system to avoid the possibility of injection at pressures in excess of that specified or instructed for the point being grouted.

The grouting equipment shall be such that the rate of delivery and/or pressure can be readily and precisely adjusted down to zero flow and that the grout consistency can be readily adjusted without causing any interruption of sufficient duration to allow the pumped grout to set.

For interface grouting through grout hoses, it is envisaged that the main grout mix is pumped with the aid of high-pressure pumps to a holding tank with mechanical agitation, forming a component of the local underground grouting unit. The capacity of the transport pumps shall be equal to twice the capacity of the underground grouting unit.

At the underground working point in the tunnel, for example, not less than three grouting pumps (plus stand-by pumps) each with a minimum capacity of one litre per second at 30 bar allowing good pressure control (such as Peroni pumps) shall be provided. A properly functioning pressure relief valve shall be fitted on each pump delivery to control and limit the grouting pressure.

For filling and pressurising the grout hoses and grout seals ahead of an interface grouting operation and for flushing the grout hoses after grouting a separate hydraulic pump (20 bar capability) with a capacity of five litres per second shall also be provided at each working location.

3.3 Injection Capacity at Working Point

Each grouting unit installed at the individual points of injection, including the mixing plant or the holding tank, the pump and the associated pipes shall be capable of delivering not less than 60 litres of liquid grout per minute at a pressure of 30 bar.

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For interface grouting operation, the delivery capability of the grouting unit provided at the working point shall not be less than 180 litres of liquid grout per minute at a pressure of 30 bar when utilising three injection pumps in parallel.

The actual quantity of grout required per minute shall be validated at the interface grouting trials to be carried out.

3.4 Water Tank

Each and every grouting unit employed on site shall include a water storage tank of adequate capacity to be used for a flushing of the pumps, pipes and grout hoses, etc.

3.5 Mobile Grouting Platforms

The use of mobile grouting platforms by the Contractor is envisaged for an efficient working performance in the tunnels. Only suitable mobile platforms shall be employed to move injection equipment into position in order to avoid damage to the finished surfaces of the concrete lined Diversion Tunnel. All mobile platforms shall be provided with suitable hauling and braking devices.

3.6 Grouting Communication

Where the various elements of a grouting unit are located in such positions that verbal communication at normal voice level between the pump and the hole or connection point to be grouted is not satisfactory, the Contractor shall install a verbal communication such as a telephone and shall operate and maintain the communication equipment to ensure efficient and satisfactory service at all times.

3.7 Measuring Facilities

Pressure gauges shall be fitted to the grout pump and to a point approximately one meter ahead of the grout hose connection point.

A pressure/time diagram recording plotter of approved make shall be installed at a position approved by the Engineer on the delivery pipe from each pump injecting grout.

A water meter of approved type, indicating quantities of half a litre, shall be installed in all supply mains to measure the mixing water.

A flow meter to measure the grout volume injected during interface grouting operations shall be installed in the pipework arrangement for each grouting unit.

The Contractor shall arrange for an adequate number of pressure gauges, pressure/time diagram recording plotters including charts, water meters and flow meters correctly calibrated to be available on site, preventing grouting operations to be held up at any time due to a lack of accurately calibrated instruments.

The pressure gauges shall have a range not exceeding twice the expected maximum pressure for a particular grouting stage and shall have an accuracy of plus / minus three per cent.

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Two certified pressure gauges together with calibration equipment by an approved authority for re-calibration purposes and one hundred per cent replacement stock of working pressure gauges shall be on hand at all times. The certificated pressure gauges shall not be used for grouting.

Working pressure gauges shall not be used for longer than two twelve hour shifts after which time they shall be cleaned and re-calibrated. All working gauges shall be clearly numbered for identification purposes.

4. Transport

All components shall be transported by suitable means of transport and in accordance with industrial safety and road traffic regulations to avoid any damage.

5. Workmanship

5.1 Grouting Works

The composition of the grout mixture for interface grouting operations shall be approved by the Engineer.

Interface grouting of a defined section of the works shall be carried out without interruption day and night until completed.

At the point of injection, one end of each segment of the grout hose ring shall be connected to one grouting pump. The other end of each segment shall be connected to the return flow manifold and shall lead to a holding tank. Each preset ring shall be equipped with stop valves and pressure gauges. Alternatively a four-way valve arrangement allowing control of the grouting operation from the pump may be approved for adoption.

Generally three preset rings in the tunnel shall be interconnected and grouted simultaneously, requiring a grouting unit of three working pumps. The preset rings shall be connected at alternate positions, in a way that every other ring is grouted clockwise or anticlockwise respectively.

The grouting operation shall commence at the first group of preset rings with full pump capacity. As the absorption of grout decreases, the injection pressure slowly increases. To prevent clogging of the preset rings in those sections of the pipe where there may be little or no flow, the stop valves at the return flow end of the preset ring shall be opened briefly to purge the line. This operation shall be repeated at ten minute intervals or at such intervals as on-going experience indicates to be adequate.

When the specified pressure is reached and no more grout is absorbed, the grouting pump shall be disconnected, flushed with water and connected to the other end of the preset ring, where the same procedure is applied in reverse direction of the preset ring. When the specified pressure is reached again and no more grout is absorbed, the grouting pump shall be disconnected and leapfrogged forward to be connected to the next grout hose.

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The grouted ring shall be flushed with water and the embedded sockets shall be closed off with permanent screw plugs. In case of satisfactory results of the interface grouting operation and if the preset grouting ring is not anticipated to be used again, final flushing with water will not be required.

Generally, the injection shall be judged to be satisfactory if the grout take on any ring drops to below one litre per minute at the specified pressure.

Generally the speed of grouting advance along the Diversion Tunnel should not exceed three to four metres per hour.

It is anticipated that the interface gap induced by the specified grout pressure will be in the order of 2 - 3 mm, equivalent to a convergence of 3 - 5 mm on the internal diameter of the Diversion Tunnel's final concrete lining. The Contractor shall plan his operations in the tunnel to cater for a total rate of grout injection of up to 8,000 litres of fluid mix per hour at the start of grouting when the pressures will be much less than the specified maximum.

In the event that the surrounding rock absorbs only a small quantity of grout and the specified pressure is likely to be attained rapidly, the injection rate shall be reduced to permit a dissipation of excess water to take place and to maintain the four metre speed of advance mentioned previously.

In the event that the grout travel is not sufficiently restricted due to leakage into fissures or through the final concrete lining and the pressure is unable to build up to the specified maximum or the anticipated convergence of the lining is not obtained, the injection of grout shall be stopped and the preset grout hose rings shall be flushed out. After a period of three hours or any other period determined by the Engineer, the preset rings shall be pressurised with water and the manchettes shall be cracked open to ensure that they will be reinjectable.

When directed by the Engineer within a period of 24 hours, the preset rings shall be reconnected and grout injection shall recommence.

This procedure shall be repeated as necessary until the specified pressure is maintained and/or the anticipated convergence is achieved.

In the event that interruption to the work is unavoidable through causes beyond the control of the Contractor, the grouting of the last preset ring shall be finished in the specified manner and flushed out.

After such an interruption the grouting shall be restarted approximately 10 metres ahead of the section previously injected and carried out in a backward direction with a single grout pump until the last completely injected preset ring has been reached. The remaining grouting pumps shall normally be used in the forward direction where this is practicable in the Diversion Tunnel.

Any significant leakage from the final concrete lining which is not self-sealing shall be by-passed and treated and the area shall be grouted again through flushed out preset rings until the specified pressure and/or convergence is attained.

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5.2 Grouting Procedure

Where shown on the drawings, interface grouting through grout hoses shall be carried out to prestress the rock surrounding the concrete lining and to prestress the final concrete lining in a way that internal water pressure shall not cause adverse cracking of the final concrete lining.

The grouting works shall be carried out making initial injections in every second ring. The remaining rings in between shall be used as back-up system. If satisfactory convergence of the final concrete lining is not obtained, the back-up rings shall be grouted as directed by the Engineer.

5.3 Monitoring

A detailed log containing information on the grouting works executed shall be prepared separately for each single pressure ring and shall be submitted to the Engineer. The log is to contain the following information:

- Reference number and location of grouted preset rings.
- Details of grout injections indicating pressures, grout consistencies, grout volumes injected, quantities of material injected and injection times throughout the period of injection.
- Details of grouting processes adopted, surface leaks, interconnections and reflux.
- Charts from the recording pressure gauges.

6. Quality Control

All components must have a valid quality certificate and a valid permission for the intended use.

6.1 Grouting Trials

6.1.1 PURPOSE OF TRIALS

The trials are designed to establish operational procedures for the interface grouting to ensure optimum prestressing of the linings in the Diversion Tunnel.

6.1.2 SCOPE OF TRIALS

It is intended that the trials will be carried out on seven 12-metre-long adjacent concrete bays approx. at km 7.3 in the Diversion Tunnel.

6.1.3 PROCEDURES

Before embarking on the trial grouting, the Contractor shall - in consultation with the Engineer - develop a detailed statement of the procedures to be followed during the grouting trials.

The trial grouting will provide the following information:

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(a) Suitability of grout and interface grouting arrangement

(b) Pressure required to initiate grout travel

(c) Rate of travel and how it may be controlled by injection procedures

(d) Grout take with respect to geological conditions

(e) Asymmetrical deformation of the lining and how this may be controlled

(f) Number of rings to be injected at any one time and pressures in individual rings

(g) Monitoring procedures

(h) Adequacy of acceptance criteria

The trials will be evaluated by the Engineer by means of instrumentation installed within the concrete lining and surrounding rock as well as by grout injection characteristics.

The results of this evaluation will be used to develop optimum operational procedures.

6.1.4 INSTRUMENTATION

A typical instrumentation layout is shown on proposal drawing PD-01-1008. Each instrumented cross-section will be in the centre of a 12 metre concrete bay. The scope of the instrumentation shown corresponds to the sections, subjected to the highest stresses. Other sections will be similar but will involve fewer instruments.

6.2 Quality Control of Works

In order to check the efficiency of the grouting measures, monitoring will be carried out at representative locations in the Diversion Tunnel. This monitoring will typically involve the following methods:

(a) Verification of available records

(b) Precise monitoring of convergence in vertical and horizontal axes during grouting of a section.

(c) Piezometer measurements at locations where such instruments have been installed, prior to concreting, to observe tunnel conditions.

(d) Extensometer measurements at locations where such instruments have been installed, prior to concreting, to observe tunnel conditions.

7. Measurements

The quantity survey unit of the grouting measures shall be

- m^3 (volume) for the suspension,
- h (time) for the injection in phases, the time basis being the pump's operation time.

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8. Acceptance

8.1 Conformity of Work with Design and Technical Specification

The works shall be carried out in accordance with the design, the Technical Specification(s) and the written instructions of the Engineer.

8.2 Acceptance of Works To Be Removed or Covered

8.2.1 DOCUMENTS AND DATA

The acceptance of works which are to be removed or covered shall be based upon:

- a written statement by the Engineer entered into the Site Book that the works have been executed in accordance with the design and the Technical Specification(s),
- other written statements by the Engineer commenting on the execution of the works.

8.2.2 SCOPE OF WORKS

The scope of works to be removed or covered shall be determined by written statements of the Engineer and by other documents confirmed by the Engineer.

9. Applicable Regulations

9.1 Standards

Canadian Standards

European Standards

* * *

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1. Introduction

1.1 Subject of Technical Specification

This Technical Specification (TS) shall define the requirements for the execution and commissioning of the final lining for the Diversion Tunnel at the Niagara Tunnel Facility Project.

1.2 Range of Technical Specification Application

This TS is a bid and contract document used for the execution and commissioning of the works referred to in Item 1.1.

The provisions contained in this Specification refer to the working methods to be adopted for the:

a) delivery of all the components and the entire equipment required to the site

b) installation of formwork required

c) execution of concrete works

d) quality control for workmanship and material.

The Scope of Work is defined for the Diversion Tunnel during the construction of the final lining.

1.3 Definitions

The basic definitions given in this TS are in conformity with the relevant standards in force.

1.3.1 FINAL LINING CONCRETE

For the concrete composition, Canadian standards shall mainly be applicable. A concrete with high abrasion resistance shall be produced. In addition to this, the following requirements shall be met:

- The release strength (= concrete strength at formwork removal) shall be 3 MPa, reached after 12 hours.

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- The concrete composition shall be selected in such way that development of internal restraint stresses as a result of hydration will be minimized and the required release strength of 3 MPa will be reached within said 12 hours, without it being significantly exceeded.
- The concrete composition shall be suited to meet the respective seasonal conditions (summer, winter).
  Should this not be possible with one composition, two special compositions shall be developed.
- The concrete composition shall consider the placing of concrete behind the horse-shoe shaped formwork. Especially the flow characteristics and the concrete's "bleeding" effect will have to be taken into account.

The concrete bay length is planned to be 12 m at a maximum. The final concrete lining will not be reinforced. The final lining will be prestressed with high-pressure grouting at the interface between the waterproofing membrane and the shotcrete lining.

1.3.2 FORMWORK

A formwork with a smooth surface shall be used. Special attention is to be paid to the sealing of joints and to the concreting windows. The shutter length (= formwork construction length) should be in the range of 12 m.

Both, formwork and formwork joints will have to be completely tight to prevent the leakage of grouting material. Both, formwork joints and formwork skin joints will have to be spaced at regular intervals.

Preference is given to steel formwork. Wooden formwork may not be exposed to the sun and to wind for excessive periods of time. The formwork should be fixed on a shutter which is designed to the requirements of the concreting procedure.

Within the formwork skin, windows and hoses for concreting behind the formwork have to be provided in sufficient number and in a way ensuring a sufficient filling of the concrete bay under all project conditions.

The formwork system in general is subject to the Engineer's approval.

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1.3.3 JOINTS

All joints shall be butt joints and placed according to the drawings.

Due to the tunnel alignment and the straight course of the formwork, there will be an offset within the joints in the curves. This offset size should be minimized by readjusting the shutter and shall not exceed 77 mm (theoretical value) at a maximum.

1.3.4 CURING

Until the concrete is sufficiently hardened, it is to be protected against detrimental influences - for example excessive warming, drying out due to sun or wind, running water, chemical attack, frost.

1.3.5 CONTACT GROUTING

Following the concrete setting, there will be some porous cavities especially in the crown of the tunnel. These cavities will have to be filled with grout. For this task to be accomplished, hoses will be installed in the crown behind the final concrete lining, attached to the waterproofing membrane. Fittings will be provided at each end of the concrete bay.

Along the hoses, rubber sleeves with grout flow openings will be installed at a mutual spacing of less than 3 m.

1.3.6 INTERFACE GROUTING

For a pre-stressing of the final concrete lining, high-pressure grouting at the interface of the waterproofing system and the shotcrete lining will be carried out. For this task, a separate specification is available.

1.4 General Work Requirements

The Contractor shall be responsible for the quality of material and workmanship and for their conformity with the Design Documentation, other corresponding Specifications and Method Statements and the Engineer's instructions.

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The Contractor shall provide his personnel with the know-how and equipment necessary in accordance with the Specification and shall grant them access to the works to enable them carry out their work in a safe and proper way.

Before commencing the concrete works, the Contractor shall propose a concept for these works. The concept shall comprise the equipment envisaged, the scope of work and the work stages.

2. Materials

2.1 Aggregates

Aggregates shall be taken from a source approved by the Engineer. The mixture of the aggregates shall be uniform without gap grading. The gravel (coarse) fraction shall be of cubic crushed or rounded form.

Aggregates shall be hard, durable, non-porous and clean and shall not be chemically reactive. They shall not contain any deleterious material in sufficient quantity to adversely affect the strength at any age or the durability of the concrete or to cause corrosion of reinforcement.

The grading and the shape of the aggregates shall be such that a concrete can be produced with the specified proportions and consistency, which will readily work into position without segregation and without the use of excessive water and which can readily be compacted into a dense impervious mass.

The nominal maximum aggregate size shall be 16 mm. The gravel fraction of the aggregate shall not exhibit excessive fragmentation during delivery. The percentage of brittle grains shall be less than 5 %. The percentage of particles smaller than 0.06 mm, which can be washed away, shall not exceed 1 %.

Sand and gravel shall be clean. Frozen aggregates shall not be used. The minimum permissible temperature shall be + 3°C. Should the aggregates be warmed using steam, special attention shall be paid to controlling the moisture content, particularly in the sand fraction.

All aggregates shall have a specific gravity of not less than 26 kN/m³.

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The grading curve shall comply with the curve determined during suitability tests. The deviation of the given specified gradation should not exceed the values listed below.

Table: Deviation from grain particle size

Grain Diameter	Admissible Deviation
0.06 mm	-/+ 1 %
0.25 mm	-/+ 1 %
1 mm	-/+ 2 %
4 mm	-/+ 3 %

2.2 Cement and Cementing Materials

It is of particular importance to use cement of uniform chemical composition and uniform fineness. Before commencement of delivery, the required characteristic values are to be agreed upon by the Engineer with the cement manufacturer. For the entire cement delivered, the manufacturer shall make the cement analyses and the standard test results available.

The cement shall be ordinary Portland cement, rapid hardening Portland cement or Portland pulverized fuel ash cement. The cement type shall be 20 according to the C.S.A. Standard 23.1-00.

In addition, the cement used should satisfy the following requirements:

(a) Initial setting time not less than three hours.

(b) Fineness: Not less than 340 m^2/kg; if content of pulverized fuel ash greater than 20 %, not less than 380 m^2/kg.

(c) Bleeding: not more than 20 cm^3 (Heidelberg Method); if content of pulverized fuel ash greater than 20 %, not more than 15 cm^3.

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(d) Compressive strength after one day (24 h ± 1 h) on mortar cubes: not less than 9 N/mm²

(e) The temperature of the cement at the time of use in the mixing plant must not be higher than 60°C.

If cementing materials (like fly ash) are used, their suitability to meet the special requirements of the final concrete lining will have to be tested and the results will have to be approved by the Engineer.

2.3 Water

The water shall be clean and free of harmful matter in such quantities, as would affect the properties of concrete in the plastic or hardened state.

The water shall satisfy the requirements of potable water.

2.4 Admixtures

Admixtures added to the concrete, must not affect the concrete's hardening, strength and durability or cause corrosion of the reinforcement.

Chlorides or materials containing chlorides which promote steel corrosion may not be added to reinforced concrete or concrete which comes into contact with reinforced concrete. The prerequisite for the use of admixtures is a qualification test to be performed by the Contractor. The test results must be submitted to the Engineer.

2.5 Concrete

The concrete mix design should meet the following requirements (according to C.S.A 23. 1-00):

- concrete with high abrasion resistance and limited heat of hydration
- water / cement ratio ≤ 0.45
- aggregates size 0 mm to 16 mm
- recommended cement volume 300 kg / m³

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- required release strength 3 MPa after 12 hours
- required characteristic strength 35 MPa after 28 days
- air void content 3% to 6% at a maximum

2.6 Contact Grouting Material

The contact grouting material shall be a cement-water suspension with sufficient fluid characteristics to fill the porous cavities and annular space between the final concrete lining and the waterproofing membrane.

If other materials are used, they have to be consistent with the concrete. The consistency has to be demonstrated by test or by approved documents and the use of alternative materials has to be approved by the Engineer.

3. Equipment

The works may be performed using any type of equipment approved by the Engineer.

The entire equipment must have a valid quality control certificate and is to be inspected within regular inspection periods.

The design and construction of the formwork shutter has to be evaluated by approved documents (calculations and drawings) and a check of the shutter by a Professional Engineer. The results have to be certified by the Engineer.

4. Transport

All single components shall be transported by suitable means of transport and in accordance with industrial safety and road traffic regulations to avoid any damage.

The concrete must not separate while being transported to the construction site and it shall be of the required workability at the location and time of placing.

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5. Workmanship

5.1 General

Before starting the concrete works, the Contractor shall develop a concrete works program, which shall contain information on the

- type of concrete production, on site, ready mix
- distance of external plants to the site
- capacity of the mixing plants, additional plants for substitution (incl. distance to the site)
- testing procedure, suitability tests, quality control tests
- thermal development of the concrete during hardening
- schedule of concreting, simultaneous concreting on different sites
- concrete works procedure - use and preparation of formwork, cast in place procedure (progress, vibration, quality supervision)
- formwork replacement (concrete requirements)
- curing procedure

The concrete works program has to be submitted to the Engineer for approval.

5.2 Formwork

The formwork must be thoroughly cleaned before use. Before concreting, appropriate shutter oil is to be applied in such a way that no concrete sticks to the formwork.

Any formwork support materials subject to rust or corrosion are to be removed upon striking of the formwork. Any reinforcement or support materials remaining in the concrete must be rust and corrosion-proof.

Particular care must be taken in the construction of formwork for the end face of the concrete bays to ensure that the shuttering is especially tight. Without exception, shuttering for end faces must be of smooth-planed boards with parallel, tongue-

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and-groove jointing; the forms must have a minimum thickness of 20 mm and must be of uniform width. Joints are to be so tight as to be unrecognisable, and the finished wall surface is to be perfectly smooth and even.

The formwork has to be erected and stabilized in such a way, that all stresses and strains caused by the concrete works can be covered. After erection and stabilization, the formwork will be surveyed for to its "correct" installation. The "correct" installation will be approved by the surveyor.

The construction element may only be stripped and the support may only be removed when the concrete has sufficiently hardened. The concrete has sufficiently hardened when the element is strong enough to support all loads, to which it is subjected when stripped, with the prescribed safety.

5.3 Concrete Works

5.3.1 CONCRETE PRODUCTION, SITE MIXING PLANT

The aggregates have to be stored on site in separate boxes for gravel, coarse sand and fine aggregates. They have to be protected against dryness, wetness and freezing. For the production of all types of concrete, the individual aggregate's components are to be measured by weight using automatic dosing equipment.

The cement and the additives shall be stored in such way that they will be protected against seasonal influences and that they will keep their original state of quality at the time of delivery. For the concrete production, the components are to be measured by weight, using automatic dosing equipment.

The concrete mixing plant is to be laid out for a separated and automatic batching of 3 different additives. To permit monitoring of the levels of additives added to the concrete mixture, a transparent gauge glass is to be foreseen.

The concrete components (cement, aggregates, water and additives) must be measured with an accuracy of 3 %. The weight batching machines shall be carefully maintained and cleaned and provided with simple and convenient means of checking the weighing mechanisms plus they shall be checked when required by the Engineer.

The composition of each type of concrete to be mixed is to be posted at the mixing plant in a clearly legible form and must include the requirements of the given

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standards. The materials must be mixed in concrete mixers which are suitable for the pertinent concrete composition. The concrete mixer must be equipped with an electrical current indicator to facilitate regulation of the concrete's consistency. If the specific water content of the aggregates varies, the amount of wet material plus the amount of mixing water must always be selected in such a way, that the total amount of water remains constant.

The dimensions of the mixing plant have to be sufficient to deliver enough concrete to all relevant sites at any time of the concreting process. The concrete components and the concrete production have to be protected from extreme weather conditions (heat, rain). Mixing plants for sites located in cold weather areas, which may experience frost periods, are to be equipped with mixing water and aggregate heating systems.

A site laboratory, fully equipped to carry out all concrete and concrete component tests required, is to be set up and operated by experienced personnel. An expert in concrete technology and concrete production shall be in charge of this laboratory.

Test mixes are to be made for each type of concrete. The results are to be submitted to the Engineer. The mixes shall be approved by the Engineer and a trial mix shall be prepared under full-scale conditions, including workability tests and cube testing.

5.3.2 READY-MIXED CONCRETE

The entire ready-mixed concrete shall meet the requirements described in this Specification. In addition to this, the Contractor shall submit the name and address of the ready-mix Contractor to the Engineer for approval, giving all operation and plant details.

The details of the ready-mix Contractor shall include information on the plant, the equipment, the storage depots, as well as the transportation and quality systems. The Engineer shall have access to the ready-mix site for inspection at any time. The Engineer may reject the proposed ready-mix Contractor and may cancel an approval at any time, if the quality of the concrete or the documentation of the quality control is not satisfactory in the opinion of the Engineer.

All testing of the mixed concrete shall be executed on site.

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The Contractor shall ensure that the supplier keeps records of all the required tests and the quality control for mixing and transportation.

The concrete shall be delivered to the site in truck mixers or agitators which are continuously in operation. Each batch delivered must be accompanied by a certificate containing the following information:

- Name of supplier
- Type and grade of concrete
- Mix code number
- Time and date of mixing
- Temperature of mixing
- Additives
- Cement type
- Cement content
- Water cement ratio or quantity of added water
- Time of arrival of truck on site
- Time of end of discharge
- Registration number of truck
- Delivery certificate number

The certificates shall be available to the Engineer for quality supervision.

Any addition of water and admixtures to the concrete after the concrete has been discharged from the mixing plant shall not be accepted.

5.3.3 CONCRETING PROCEDURE

The concrete workability shall remain satisfactory until placing and compaction is finished. This shall at a minimum be 3 hours at 25°C upon arrival on site, this shall also be true for hot weather periods.

During cold weather and frost periods, the concrete shall be placed at a specified minimum temperature because of the lower hardening rate and the danger of permanent impairment of defined concrete properties. With ambient temperatures of +5°C to -3°C, the concrete temperature upon placing must not fall below +5°C. With ambient temperatures below -3°C, the concrete temperature must not fall below +10°C.

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During hardening, the concrete temperature may not exceed 50°C.

Before the concrete is placed, all formwork elements and surfaces to come into contact with the concrete shall be cleaned from dust, mud and other impurities. The concrete shall not be placed in standing water unless this has been specified or approved.

During placing, suitable means shall be provided to prevent premature hardening of the concrete put in contact with hot surfaces.

When placing concrete in layers, if no construction joints are foreseen, the placing may only be interrupted for a period of time during which the concrete does not set, so that a good and even connection is possible between the two layers of concrete. The concrete shall be placed in layers of such depth that the new layer will be readily and properly mixed with the previous layer below by the use of vibrators. The difference in height of the layer's level on the right hand sidewall and the left hand sidewall of the final lining may not exceed 1 m.

Concreting shall begin in the bottom parts of the sidewalls and shall finish in the crown. Normally the concrete shall be pressed into the formwork. If the formwork is filled by gravity flow, the concrete's height of fall shall not exceed 1 m.

The type and number of vibrators shall be approved by the Engineer and shall consider the mass and quality of concrete to be compacted and the type of formwork.

The formwork shall be released, when the final concrete lining meets its release strength, measured in the crown by suitable means of measurement.

5.3.4 CURING

The curing of the final lining surface will start immediately after the formwork is released.

When water curing is applied, chill shocks are to be avoided (as could occur when cool water comes into contact with warm concrete surfaces) due to the resulting danger of peeling or scaling. The quality of water used for curing shall be the same as that used for concrete mixing. If liquid membranes are used, they must not affect the normal setting reaction of cement. Compounds incorporating reflective, white or light-coloured pigments shall be used.

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The methods of preventing the concrete from prematurely drying are to be submitted to the Engineer for approval before use.

The concrete must be cured during the first four days.

6. Quality Control

All components must have a valid quality certificate and a valid permission for the intended use.

During the entire period of construction, the Contractor will have to verify the material properties and qualities as defined by the Specifications and Standards.

In addition to the tests and investigations contained in the Specifications and Standards, all other tests deemed necessary by the Engineer are to be performed.

Records are to be kept of all test results and submitted to the Engineer. The Contractor shall grant the Engineer full access to and use of the laboratory and shall produce on demand the records of all tests carried out.

6.1 Suitability Tests

6.1.1 CONCRETE COMPONENTS

No aggregates shall be delivered to the site without satisfactory initial sampling and testing. The sample of fine aggregate shall be 25kg in weight and that of the coarse aggregate shall be 50kg in weight.

The Contractor's attention is drawn to the need to maintain a consistent aggregate quality and he will be expected to undertake adequate testing to ensure that the quality does not vary significantly (reference is made to Subchapter 6.2, Quality Control Tests).

All components have to be certificated for their origin and quality. The suitability of the components used has to be approved by the Contractor's concrete expert and by the Engineer.

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6.1.2 CONCRETE

In order to verify the suitability of the concrete compositions for the respective task, tests at the site or the mixing plant have to be carried out for both designed concrete compositions (winter and summer composition). The following items have to be tested using three samples per item under the mentioned conditions:

- Bulk density
- Air void content (= 3% to 6 %, maximum)
- Consistency immediately after mixing and one hour later (= class F3; DIN 1045-2)
- Release strength after 12 hours (= 3 MPa)
- Characteristic strength after 28 days (= 35 MPa)
- Characteristic strength after 90 days

6.2 Quality Control Tests

6.2.1 AGGREGATES

The following tests have to be carried out with a frequency of "each delivery"

- grading analyses
- wet analyses
- moisture content, for sand
- organic impurities
- visual inspections of aggregate type, granulometric composition, aggregate condition, particle shape, detrimental components (e.g. coal, humic substances, brittle grains, etc.)

The moisture content of the sand is to be checked in addition once a week.

Chloride and sulphate tests have to be carried out once each 4 months and in case of suspected change.

The tests are to be carried out in accordance with DIN EN 12620.

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6.2.2 CEMENT AND CEMENTING MATERIALS

The following tests have to be carried out every 4 months:

- compressive strength
- specific surface
- chemical analysis.

Certificates issued by the supplier shall be tested per storage vessel.

The tests are to be conducted in accordance with the German DIN EN 196 Standard and the requirements of Subchapter 2, Materials~~Materials~~.

6.2.3 ADMIXTURES

The certificates issued by the supplier have to be checked at each delivery to the site.

6.2.4 CONCRETE

Fresh concrete has to be tested according to the criteria listed below:

testing item	testing frequency	testing procedure	testing moment
consistency	once for every batch on site	acc. to German DIN EN 12350 Standard	before placing of concrete
water / cement ratio	once for every batch on site	by visual inspection	before placing of concrete
unit weight	once for every batch on site	by visual inspection	before placing of concrete
bulk density	three times per concrete bay	acc. to German DIN EN 12350 Standard	during concreting
air void content	three times per concrete bay	acc. to German DIN EN 12350 Standard	during concreting

Hardened concrete has to be tested according to the criteria listed below:

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testing item	testing frequency	testing procedure	testing moment
compressive strength	three times per concrete bay at the crown	with penetration test or pendulum hammer	after 12 h (release strength)
compressive strength	three cubes or cylinders per concrete bay	acc. to German DIN EN 12390 Standard	after 28 days (characteristic strength)
compressive strength	three cubes or cylinders per concrete bay	acc. to German DIN EN 12390 Standard	after 90 days (characteristic strength)
air void content	three times per concrete bay	acc. to German DIN EN 12390 Standard	after 7 days (abrasion resistance)

The testing procedure and interpretation of results is described in the above mentioned references. The limit values of the individual tests are specified in Subchapter 2, Materials~~Materials~~ and Subchapter 6.1, Suitability Tests.

6.2.5 CONCRETE WORKS

The minimum radius of the cross-section shall be the design radius. Smaller radii are to be avoided.

If faced with a smaller radius, the following measures will have to be taken:

origin	extension	consequence	check	measures
Local "breakdown" of formwork	limited in size	increase of concrete lining thickness	sufficient thickness of concrete lining and sufficient flow volume of cross section	grinding of bulges
	whole concrete bay			if maximum flow can not be achieved, breakdown and reconstruction of

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				concrete bay
wrong alignment of formwork	whole concrete bay	increase / decrease of concrete lining thickness	sufficient thickness of concrete lining	if maximum flow can not be achieved, breakdown and reconstruction of concrete bay in any other case, smoothening of the surface as described below.

The minimum thickness of the final concrete lining shall be the design thickness. Any reduction in thickness shall be avoided. Any increase in thickness shall be limited to the design thickness + 10 cm. The space, available for the placing of the final concrete lining has to be proven by survey of the shotcrete lining surface.

Should the required limits not be met (thinner final lining), the area in question should be re-excavated and re-supported. Should the limits be exceeded, the difference between the allowable and the measured thickness shall be compensated by additional shotcrete.

The survey results of the shotcrete surface, as well as the measures to be taken when the limits are exceeded are - in any case - subject to Engineer's approval.

The final concrete lining surface shall be smooth and flat. Wedges and bulges are to be avoided, or smoothened by grinding. Unevenness shall not exceed 4 degrees (angle of gradient) in all directions.

7. Measurements

The quantity survey unit of the concrete for the final lining shall be m^3.

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8. Acceptance

8.1 Conformity of Work with Design and Technical Specification

The works shall be carried out in accordance with the design, the Technical Specification(s) and the written instructions of the Engineer.

8.2 Acceptance of Works To Be Removed or Covered

8.2.1 DOCUMENTS AND DATA

The acceptance of works which are to be removed or covered shall be based upon:

- a written statement by the Engineer entered into the Site Book that the works have been executed in accordance with the design and the Technical Specification(s),
- other written statements by the Engineer commenting on the execution of the works.

8.2.2 SCOPE OF WORKS

The scope of works to be removed or covered shall be determined by written statements of the Engineer and by other documents confirmed by the Engineer.

9. Applicable Regulations

9.1 Standards

Canadian Standards

CSA 23.1-00:	Concrete materials and method of concrete construction
CSA 23.2-00:	Methods of test for concrete
CSA 23.3-94:	Design of concrete structures

European / German Standards

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DIN EN 196	Methods of testing cement
DIN EN 197-1	Cement Part 1: Composition, specifications and conformity criteria for common cements
DIN EN 206	Concrete Part 1: Specification, performance, production and conformity
DIN 1045-1:	Concrete, reinforced and prestressed concrete structures Part 1: Design
DIN 1045-2:	Concrete, reinforced and prestressed concrete structures Part 2: Concrete specification, properties, production and conformity application rules for DIN EN 206-1
DIN 1045-3:	Concrete, reinforced and prestressed concrete structures. Part 3: Execution of structures
DIN EN 12620	Aggregates for mortar and concrete
DIN EN 12350	Testing methods for fresh concrete
DIN EN 12390	Testing methods for hard concrete

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1. Introduction

1.1 Subject of Technical Specification

This Technical Specification (TS) shall define the requirements for the execution and commissioning of the invert segment as part of the final tunnel lining for the Diversion Tunnel at the Niagara Tunnel Facility Project.

1.2 Range of Technical Specification Application

This TS is a bid and contract document used for the execution and commissioning of the works referred to in Item 1.1.

The provisions contained in this Specification refer to the working methods to be adopted for the:

a) delivery of all the components and the entire equipment required to the site

b) installation of a plant on site for the prefabrication of the invert segment with the entire equipment required for production and testing

c) production of invert segments, storage and delivery on site

d) installation of invert segments on site

e) quality control for workmanship and materials.

The Scope of Work is defined for the Diversion Tunnel during the construction of the final lining.

1.3 Definitions

The basic definitions given in this TS are in conformity with the relevant standards in force.

1.3.1 INVERT SEGMENT CONCRETE

For the concrete composition, Canadian standards shall mainly be applicable. A concrete with high abrasion resistance shall be produced.

The invert segments will be prefabricated in a plant on site. The dimensions of the prefabricated invert segments have been documented in the corresponding drawings.

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1.3.2 FORMWORK

Sufficient formwork moulds will have to be supplied for the production of the prefabricated invert segment. Steel formwork with a smooth surface shall be used. The formwork moulds shall be equipped with enough vibrators for concrete compacting.

Both, formwork and formwork joints will have to be completely tight to prevent leakage of grouting material. Both, formwork joints and formwork skin joints will have to be spaced at regular intervals.

The formwork is be thoroughly cleaned before use.

Any formwork support material subject to rust or corrosion is to be removed upon striking of the formwork. Any reinforcement or support material, remaining in the concrete and coming into contact with atmospheric humidity is to be rust and corrosion-proof.

All proposed shuttering details are to be submitted for approval by the Engineer.

The formwork system in general is subject to the Engineer's approval.

1.3.3 JOINTS

All joints are to be butt joints and placed according to the drawings.

Due to the tunnel alignment and the straight course of the invert segment, there will be an offset within the joints in the curves. The offset size should be minimized readjustment and shall not exceed the maximum theoretical value.

1.3.4 CURING

Until the concrete is sufficiently hardened, it is to be protected against detrimental influences - for example excessive warming, drying out due to sun or wind, running water, chemical attack, frost.

1.3.5 PROTECTION SHEET

In order to protect the waterproofing membrane system against damage, a geotextile with an area weight of $\geq$ 750 g / m^2 shall be laid upon the waterproofing membrane prior to the installation of the precast invert segments.

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1.3.6 MORTAR BEDDING

The precast invert segments shall be embedded in a mortar bed. The mortar bed shall be provided before the invert segments are installed. The mortar bed shall stabilize the invert segment in its exact position. The thickness shall depend on the surrounding conditions, but shall not exceed 5 cm.

1.3.7 CONTACT GROUTING

Upon installation of the invert segment, there might be a few porous cavities in the mortar bed, caused by the installation procedure. These cavities will have to be filled with grout. For this task to be accomplished, three holes with a diameter of 50 mm are provided in every invert segment.

1.3.8 INTERFACE GROUTING

For a pre-stressing of the final concrete lining, high-pressure grouting at the interface of the waterproofing system and the shotcrete lining will be carried out. For this task, a separate specification is available.

1.4 General Work Requirements

The Contractor shall be responsible for the quality of material and workmanship and for their conformity with the Design Documentation, other corresponding Specifications and Method Statements and the Engineer's instructions.

The Contractor shall provide his personnel with the know-how and equipment necessary in accordance with the Specification and shall grant them access to the works to enable them to carry out their work in a safe and proper way.

Before commencing the concrete works, the Contractor shall propose a concept for these works. The concept shall comprise the equipment envisaged, the scope of work and the work stages.

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2. Materials

2.1 Aggregates

Aggregates shall be taken from a source approved by the Engineer. The mixture of the aggregates shall be uniform without gap grading. The gravel (coarse) fraction shall be of cubic crushed or rounded form.

Aggregates shall be hard, durable, non-porous and clean and shall not be chemically reactive. They shall not contain any deleterious material in sufficient quantity to adversely affect the strength at any age or the durability of the concrete or to cause corrosion of reinforcement.

The grading and the shape of the aggregates shall be such that a concrete can be produced with the specified proportions and consistency, which will readily work into position without segregation and without the use of excessive water and which can readily be compacted into a dense impervious mass.

The nominal maximum aggregate size shall be 16 mm. The gravel fraction of the aggregate shall not exhibit excessive fragmentation during delivery. The percentage of brittle grains shall be less than 5 %. The percentage of particles smaller than 0.06 mm, which can be washed away, shall not exceed 1 %.

Sand and gravel shall be clean. Frozen aggregates shall not be used. The minimum permissible temperature shall be + 3°C. Should the aggregates be warmed using steam, special attention shall be paid to controlling the moisture content, particularly in the sand fraction.

All aggregates shall have a specific gravity of not less than 26 kN/m³.

The grading curve shall comply with the curve determined during suitability tests. The deviation of the given specified gradation should not exceed the values listed below.

Table: Deviation from grain particle size

Grain Diameter	Admissible Deviation
0.06 mm	-/+ 1 %

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0.25 mm	-/+ 1 %
1 mm	-/+ 2 %
4 mm	-/+ 3 %

2.2 Cement and Cementing Materials

It is of particular importance to use cement of uniform chemical composition and uniform fineness. Before commencement of delivery, the required characteristic values are to be agreed upon by the Engineer with the cement manufacturer. For the entire cement delivered, the manufacturer shall make the cement analyses and the standard tests results available.

Cement shall be Ordinary Portland Cement, Rapid Hardening Portland Cement or Portland Pulverized Fuel Ash Cement. The cement type shall be 20 according to the C.S.A. Standard 23.1-00.

In addition, the cement used should satisfy the following requirements:

(a) Initial setting time not less than three hours.

(b) Fineness: Not less than 340 m^2/kg; if content of pulverized-fuel ash greater than 20 %, not less than 380 m^2/kg.

(c) Bleeding: not more than 20 cm^3 (Heidelberg Method); if content of pulverized fuel ash greater than 20 %, not more than 15 cm^3.

(d) Compressive strength after one day (24 h $\pm$ 1 h) on mortar cubes: not less than 9 N/mm^2

(e) The temperature of the cement at the time of use in the mixing plant must not be higher than 60°C.

If cementing materials (like fly ash) are used, their suitability to meet the special requirements of the final concrete lining will have to be tested and the results will have to be approved by the Engineer.

2.3 Water

The water shall be clean and free of harmful matter in such quantities, as would affect the properties of concrete in the plastic or hardened state.

The water shall satisfy the requirements of potable water.

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2.4 Admixtures

Admixtures added to the concrete, must not affect the concrete's hardening, strength and durability or cause corrosion of the reinforcement.

Chlorides or materials containing chlorides which promote steel corrosion may not be added to reinforced concrete or concrete which comes into contact with reinforced concrete. The prerequisite for the use of admixtures is a qualification test to be performed by the Contractor. The test results must be submitted to the Engineer.

2.5 Concrete

The concrete mix design should meet the following requirements (according to C.S.A 23. 1-00):

- concrete with high abrasion resistance
- water / cement ratio ≤ 0.45
- aggregates size 0 mm to 16 mm
- recommended cement volume 300 kg / m^3
- required characteristic strength 35 MPa after 28 days
- air void content 3% to 6% at a maximum

2.6 Reinforcement

The reinforcement steel used, shall be ribbed steel, grade 500 R or 500 W according to C.S.A. Standard 23.1-00.

In order to improve the composite action and to limit the crack formation, small-diameter reinforcement bars with a small spacing shall be used.

The concrete cover shall be sufficient in accordance with the invert segment requirements and in compliance with the design. The sufficient concrete cover shall be ensured by concrete spacers, fixed to the reinforcement in sufficient number.

2.7 Mortar

The mortar for the mortar bedding shall be composed of one part of cement and three parts of sand. The cement shall fulfill the above mentioned requirements. The

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sand shall consist of naturally occurring sand, of crushed rock or of gravel or a combination thereof. The sand shall be clean, hard and free of impurities. It shall comply with the above mentioned concrete aggregate requirements.

Mortar plasticizer, if used, shall be subject to acceptance by the Engineer and shall be used in the proportions and manner recommended by the manufacturer.

The water content of mortar shall be just sufficient to ensure a dense mortar with adequate workability, when trowelled or worked into place. Mortar that has begun to harden shall not be used in any part of the works.

All materials shall be accurately gauged by gauge boxes and mechanically mixed and used within 30 minutes of first mixing. Retempering of mortar will not be permitted. Gauge boxes and mixers shall be kept clean.

2.8 Contact Grouting Material

The contact grouting material shall be a cement-water suspension with sufficient fluid characteristics to fill the porous cavities and annular space between the invert segment and the mortar bedding.

If other materials are used, they have to be consistent with the concrete. The consistency has to be demonstrated by tests or approved documents and the use of alternative materials has to be approved by the Engineer.

3. Equipment

The works may be performed using any type of equipment approved by the Engineer.

The entire equipment must have a valid quality control certificate and is to be inspected within regular inspection periods.

The design and construction of the formwork moulds is to be evaluated by approved documents (calculations and drawings) and the moulds are to be checked by a Professional Engineer. The results are to be certificated by the Engineer.

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4. Transport

All components shall be transported by suitable means of transport and in accordance with industrial safety and road traffic regulations to avoid any damage.

The concrete must not separate while being transported to the construction site and it shall be of the required workability at the location and time of placing.

The precast invert segments have to be loaded, unloaded and carried on site in such a way, that they and especially their wedges are protected against damage at every time and that these procedures will not cause loading conditions, which are not covered by the calculations and the design.

5. Workmanship

5.1 General

Before starting the concreting works, the Contractor shall develop a concrete works program, which shall contain information on the

- type of concrete production, on site, ready mix
- distance of external plants to the site
- capacity of the mixing plants, additional plants for substitution (incl. distance to the site)
- testing procedure, suitability tests, quality control tests
- thermal development of the concrete during hardening
- schedule of concreting, simultaneous concreting
- concrete works procedure - use and preparation of formwork, cast in place procedure (progress, vibration, quality supervision)
- formwork replacement (concrete requirements)
- curing procedure

The concrete works program has to be submitted to the Engineer for approval.

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5.2 Formwork

The formwork has to be erected and stabilized in such a way that all stresses and strains caused by the concrete works can be covered.

Special attention is to be paid to the sealing of joints and the concreting of windows. The concrete surface must be smooth, free of voids and pores. Any formwork use more than once must be approved by the Engineer.

The construction element may only be stripped and the support may only be removed when the concrete has sufficiently hardened. The concrete has sufficiently hardened when the element is strong enough to support all loads, to which it is subjected when stripped, with the prescribed safety.

Before concreting, appropriate shutter oil is to be applied to ensure that no concrete will stick to the formwork.

Generally, the formwork system (incl. skin) is subject to the Engineer's approval.

5.3 Concrete Works

5.3.1 CONCRETE PRODUCTION, SITE MIXING PLANT

The aggregates have to be stored on site in separate boxes for gravel, coarse sand and fine aggregates. They have to be protected against dryness, wetness and freezing. For the production of all types of concrete the individual aggregate components are to be measured by weight using automatic dosing equipment.

The cement and the additives shall be stored in such way that they will be protected against seasonal influences and that they will keep their original state of quality at the time of delivery. For the concrete production, the components are to be measured by weight, using automatic dosing equipment.

The concrete mixing plant is to be laid out for a separated and automatic batching of 3 different additives. To permit monitoring of the levels of additives added to the concrete mixture, a transparent gauge glass is to be foreseen.

The concrete components (cement, aggregates, water and additives) must be measured with an accuracy of 3 %. The weight batching machines shall be carefully maintained and cleaned and provided with simple and convenient means of checking the weighing mechanisms plus they shall be checked when required by the Engineer.

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The composition of each type of concrete to be mixed is to be posted at the mixing plant in a clearly legible form and must include the requirements of the given standards. The materials must be mixed in concrete mixers which are suitable for the pertinent concrete composition. The concrete mixer must be equipped with an electrical current indicator to facilitate regulation of the concrete's consistency. If the specific water content of the aggregates varies, the amount of wet material plus the amount of mixing water must always be selected in such a way, that the total amount of water remains constant.

The dimensions of the mixing plant have to be sufficient to deliver enough concrete to all relevant sites at any time of the concreting process. All concrete components and the concrete production have to be protected from extreme weather conditions (heat, rain). Mixing plants for sites located in cold weather areas, which may experience frost periods, are to be equipped with mixing water and aggregate heating systems.

A site laboratory, fully equipped to carry out all concrete and concrete component tests required, is to be set up and operated by experienced personnel. An expert in concrete technology and concrete production shall be in charge of this laboratory.

Test mixes are to be made for each type of concrete. The results are to be submitted to the Engineer. The mixes shall be approved by the Engineer and a trial mix shall be prepared under full-scale conditions, including workability tests and cube testing.

5.3.2 READY-MIXED CONCRETE

The entire ready-mixed concrete shall meet the requirements described in this Specification. In addition to this, the Contractor shall submit the name and address of the ready-mix Contractor to the Engineer for approval, giving all operation and plant details.

The details of the ready-mix Contractor shall include information on the plant, the equipment, the storage depots, as well as the transportation and quality systems. The Engineer shall have access to the ready-mix site for inspection at any time. The Engineer may reject the proposed ready-mix Contractor and may cancel an approval at any time, if the quality of the concrete or the documentation of the quality control is not satisfactory in the opinion of the Engineer.

All testing preparation and testing of the mixed concrete shall be executed on site.

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The Contractor shall ensure that the supplier keeps records of all the required tests and the quality control for mixing and transportation.

The concrete shall be delivered to the site in truck mixers or agitators which are continuously in operation. Each batch delivered must be accompanied by a certificate containing the following information:

- Name of supplier
- Type and grade of concrete
- Mix code number
- Time and date of mixing
- Temperature of mixing
- Additives
- Cement type
- Cement content
- Water cement ratio or quantity of added water
- Time of arrival of truck on site
- Time of end of discharge
- Registration number of truck
- Delivery certificate number

The certificates shall be available to the Engineer for quality supervision.

Any addition of water and admixtures to the concrete after the concrete has been discharged form the mixing plant shall not be accepted.

5.3.3 CONCRETING PROCEDURE

The concreting procedure will start once the required reinforcement has been arranged and fixed against displacement during concreting. The formwork and the reinforcement arrangement will have to be checked for compliance with the requirements of the Contractor's Quality Management System. The approval has to be recorded and made available for the Engineer's quality supervision.

The concrete workability shall remain satisfactory until placing and compaction is finished. This shall at a minimum be 3 hours at 25°C upon arrival on site, this shall also be true for hot weather periods.

During cold weather and frost periods the concrete shall be placed at a specified minimum temperature because of the lower hardening rate and the danger of permanent impairment of defined concrete properties. With ambient temperatures of

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+5°C to -3°C, the concrete temperature upon placing must not fall below +5°C. With ambient temperatures below -3°C, the concrete temperature must not fall below +10°C.

During hardening, the concrete temperature may not exceed 50°C.

Before the concrete is placed, all formwork elements and surfaces to come into contact with the concrete shall be cleaned from dust, mud and other impurities. The concrete shall not be placed in standing water unless this has been specified or approved.

During placing, suitable means shall be provided to prevent premature hardening of the concrete put in contact with hot surfaces.

When placing concrete in layers, if no construction joints are foreseen, the placing may only be interrupted for such a period of time during which the concrete does not set, so that a good and even connection is possible between the two layers of concrete. The concrete shall be placed in level layers of such depth that the new layer will be readily and properly mixed with the previous layer below by the use of internal vibrators.

The type and number of vibrators shall be approved by the Engineer and shall consider the mass of concrete to be compacted, the density of reinforcement, and the type of formwork.

The formwork shall be released, when the invert segments meet the required strength. The required strength shall be calculated and the corresponding period shall be verified by suitability tests.

5.3.4 CURING

The invert segment will be kept in the formwork until the required release strength for the formwork is reached. The curing measures for the surface, which is not covered by formwork, have to be started immediately after concreting is finished.

When water curing is applied, chill shocks are to be avoided (as could occur when cool water comes into contact with warm concrete surfaces) due to the resulting danger of peeling, or scaling. The quality of water used for curing shall be the same as that used for concrete mixing. If liquid membranes are used, they must not affect the normal setting reaction of cement. Compounds incorporating reflective, white or light-coloured pigments shall be used.

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The concrete has to be cured until the formwork is released.

5.3.5 STORAGE

The prefabricated invert segments are to be stored in a way protecting them against any kind of damage. To minimize internal stress and strain conditions during storage, they have to be supported by wooden line bearers, arranged in the third points of the curved part.

6. Quality Control

All components must have a valid quality certificate and a valid permission for the intended use.

During the entire period of construction, the Contractor will have to verify the material properties and qualities as defined by the Specifications and Standards.

In addition to the tests and investigations contained in the Specifications and Standards, all other tests deemed necessary by the Engineer are to be performed.

Records are to be kept of all test results and submitted to the Engineer. The Contractor shall grant the Engineer full access to and use of the laboratory and shall produce on demand the records of all tests carried out.

6.1 Suitability Tests

6.1.1 CONCRETE COMPONENTS

No aggregates shall be delivered to the site without satisfactory initial sampling and testing. The sample of fine aggregate shall be 25kg in weight and that of the coarse aggregate shall be 50kg in weight.

The Contractor's attention is drawn to the need to maintain a consistent aggregate quality and he will be expected to undertake adequate testing to ensure that the quality does not vary significantly (reference is made to Subchapter 6.2, Quality Control Tests).

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All components have to be certificated for their origin and quality. The suitability of the components used has to be approved by the Contractor's concrete expert and by the Engineer.

6.1.2 CONCRETE

In order to verify the suitability of the concrete compositions for the respective tasks, tests at the site or at the mixing plant have to be carried out for both designed concrete compositions (winter and summer composition). The following items have to be tested using three samples per item under the mentioned conditions:

- Bulk density
- Air void content (= 3% to 6 %, maximum)
- Consistency immediately after mixing and one hour later (= class F3; DIN 1045-2)
- Characteristic strength after 28 days (= 35 MPa)

6.1.3 MOMENT OF FORMWORK RELEASE

The required concrete strength has to be calculated, considering all loading conditions of the invert segment during the hardening period.

The moment of formwork release has to be determined by concrete strength tests after 3 days, 7 days and 28 days. The tests have to be carried out using three samples per test. The required strength and the corresponding moment have to be analyzed by interpretation of the test results.

6.2 Quality Control Tests

6.2.1 AGGREGATES

The following tests have to be carried out with a frequency of "each delivery"

- grading analyses
- wet analyses
- moisture content, for sand
- organic impurities

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- visual inspection of aggregate type, granulometric composition, aggregate condition, particle shape, detrimental components (e.g. coal, humic substances, brittle grains, etc.)

The moisture content of the sand is to be checked in addition once a week.

Chloride and sulphate tests have to be carried out once each 4 months and in case of suspected change.

The tests are to be carried out in accordance with DIN EN 12620.

6.2.2 CEMENT AND CEMENTING MATERIALS

The following tests have to be carried out every 4 months:

- compressive strength
- specific surface
- chemical analysis.

Certificates issued by the supplier shall be tested per storage vessel.

The tests are to be conducted in accordance with the German DIN EN 196 Standard and the requirements of Subchapter 2, Materials.

6.2.3 ADMIXTURES

The certificates issued by the supplier have to be checked at each delivery to the site.

6.2.4 CONCRETE

Fresh concrete has to be tested according to the criteria listed below:

testing item	testing frequency	testing procedure	testing moment
consistency	once for every batch on site	acc. to German DIN EN 12350 Standard	before placing of concrete
water / cement ratio	once for every batch on site	by visual inspection	before placing of concrete
unit weight	once for every batch on site	by visual inspection	before placing of concrete
bulk density	three times per invert	acc. to German DIN	during concreting

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	segment	EN 12350 Standard	
air void content	three times per invert segment	acc. to German DIN EN 12350 Standard	during concreting

Hardened concrete has to be tested according to the criteria listed below:

testing item	testing frequency	testing procedure	testing moment
compressive strength	three cubes or cylinders each 10th invert segment	acc. to German DIN EN 12390 Standard	after 28 days (characteristic strength)
compressive strength	three cubes or cylinders each 10th invert segment	acc. to German DIN EN 12390 Standard	after 90 days (characteristic strength)
air void content	three times per invert segment	acc. to German DIN EN 12390 Standard	after 7 days (abrasion resistance)

The testing procedure and interpretation of results is described in the above mentioned references. The limit values of the individual tests are specified in Subchapter 2, Materials and Subchapter 6.1, Suitability Tests.

6.2.5 CONCRETE WORKS

The minimum thickness of the final concrete lining shall be the design thickness. Any reduction in thickness shall be avoided. Any increase in thickness shall be limited to the design thickness + 10 cm. Tolerances in extension, length, width, shall not exceed 10% of the original (design) dimensions.

Should the required limits not be met (thinner invert segment), the related segment will have to be built a second time.

The final lining surface of the installed segments shall be smooth and flat. Wedges and burrs are to be avoided, or smoothened by grinding. Unevenness shall not exceed 4 degrees (angle of gradient) in all directions.

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7. Measurements

The quantity survey units may be described as follows

- concrete for invert segment = m^3
- reinforcement = ton
- mortar for mortar bedding = m^2
- protective sheet = m^2

8. Acceptance

8.1 Conformity of Work with Design and Technical Specification

The works shall be carried out in accordance with the design, the Technical Specification(s) and the written instructions of the Engineer.

8.2 Acceptance of Works To Be Removed or Covered

8.2.1 DOCUMENTS AND DATA

The acceptance of works which are to be removed or covered shall be based upon:

- a written statement by the Engineer entered into the Site Book that the works have been executed in accordance with the design and the Technical Specification(s),
- other written statements by the Engineer commenting on the execution of the works.

8.2.2 SCOPE OF WORKS

The scope of works to be removed or covered shall be determined by written statements of the Engineer and by other documents confirmed by the Engineer.

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9. Applicable Regulations

9.1 Standards

Canadian Standards

CSA 23.1-00:	Concrete materials and method of concrete construction
CSA 23.2-00:	Methods of test for concrete
CSA 23.3-94:	Design of concrete structures

European / German Standards

DIN EN 196	Methods of testing cement
DIN EN 197-1	Cement Part 1: Composition, specifications and conformity criteria for common cements;
DIN EN 206	Concrete Part 1: Specification, performance, production and conformity
DIN 1045-1:	Concrete, reinforced and prestressed concrete structures Part 1: Design
DIN 1045-2:	Concrete, reinforced and prestressed concrete structures Part 2: Concrete Specification, properties, production and conformity application rules for DIN EN 206-1
DIN 1045-3:	Concrete, reinforced and prestressed concrete structures . Part 3: Execution of structures
DIN EN 12620	Aggregates for mortar and concrete
DIN EN 12350	Testing methods for fresh concrete
DIN EN 12390	Testing methods for hard concrete

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1. Introduction

1.1 Subject of Technical Specification

This Technical Specification (TS) shall define the requirements for the execution and commissioning of the concrete works for the intake and outlet structures at the Niagara Tunnel Facility Project.

1.2 Range of Technical Specification Application

This TS is a bid and contract document used for the execution and commissioning of the works referred to in Item 1.1.

The provisions contained in this Specification refer to the working methods to be adopted for the:

a) delivery of all the components and the equipment required to the site

b) installation of required formwork

c) execution of concrete works

d) quality control for workmanship and material.

The Scope of Work is defined for the concreting of the intake and outlet structures.

1.3 Definitions

The basic definitions given in this TS are in conformity with the relevant standards in force.

1.3.1 OUTLET STRUCTURE

The outlet structure shall be built in a watertight manner concerning both concrete composition and construction.

In addition to these requirements, the concrete composition shall meet the C.S.A. requirements for resistance against thawing and freezing.

1.3.2 INTAKE STRUCTURE

The intake structure shall be built in a watertight manner concerning both concrete composition and construction.

In addition to these requirements, the concrete composition shall meet the C.S.A. requirements for resistance against thawing and freezing, as well as the requirements for resistance against severe sulphate attack.

1.3.3 CONCRETE SUBBASE

The concrete subbase is a layer of lean concrete, arranged beneath the invert of the structure. It serves the task of leveling the excavated underground surface and of allowing an exact and

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proper arrangement of the required reinforcement. It moreover ensures a continuous bedding of the structure's invert.

The thickness of the subbase concrete shall not exceed 10 cm on average.

1.3.4 CONCRETE FILL

The concrete fill is a lean concrete layer, placed on the bottom of the canal to protect the Rochester Shale surface and to level out the invert of the canal. The minimum thickness of the concrete fill shall be 5 cm.

1.3.5 1ST STAGE INVERT CONCRETE

The 1st stage invert concrete is part of the final structure and shall be watertight. It shall be installed immediately after excavation. It shall take on the loads caused by the installation and the launching of the Tunnel Boring Machine (TBM). The 1st stage invert concrete shall be reinforced concrete in accordance with the design requirements.

1.3.6 2ND STAGE INVERT CONCRETE

The 2nd stage invert concrete serves the completion of the invert within the shaft structure to the final invert level. The 2nd stage invert concrete shall meet the requirements with respect to surface evenness and smoothness stipulated by the flow criteria. The 2nd stage invert concrete shall be watertight and shall consist of reinforced concrete in accordance with the design requirements.

1.3.7 CAST-IN-PLACE CONCRETE

Cast-in-place concrete specifies the other parts of the structure (shaft walls, linings of cross-sections) which are not described above. It will be placed upon completion of the excavation and support period of the Diversion Tunnel. The cast-in-place concrete shall meet the requirements with respect to surface evenness and smoothness stipulated by the flow criteria. The cast-in-place concrete shall be watertight and shall consist of reinforced concrete in accordance with the design requirements.

1.3.8 FORMWORK

Formwork with a smooth surface shall be used. Special attention is to be paid to the sealing of joints and concreting windows. The shutter length (= formwork construction length) should be in the range of 5 m.

Both, formwork and formwork joints will have to be completely tight to prevent the leakage of grout material. Both formwork joints and formwork skin joints will have to be spaced at regular intervals.

Preference is given to steel formwork. Wooden formwork may not be exposed to the sun and to wind for excessive periods of time. The formwork shall be fixed on a shutter which is designed to the requirements of the concreting procedure.

Within the formwork skin, windows and hoses for concreting behind the formwork shall be provided in sufficient number and in a way ensuring a sufficient filling of the concrete bay under all project conditions.

The formwork system in general is subject to the Engineer's approval.

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1.3.9 JOINTS

All joints shall be butt joints and placed according to the drawings. Every joint, expansion joint and construction joint shall be sealed with a corresponding joint tape in compliance with the Specification for the waterproofing system.

1.3.10 CURING

Until the concrete is sufficiently hardened, it is to be protected against detrimental influences – for example excessive warming, drying out due to sun or wind, running water, chemical attack.

1.3.11 CONTACT GROUTING

Upon setting of the concrete, there will be a few porous cavities especially in the crown of the tunnel. In order to ensure a homogenous bedding of the structure, these cavities will have to be filled with grout.

For this task to be accomplished, holes shall be arranged in the crown area's concrete lining.

1.3.12 COMPRESSIBLE MATERIAL LAYER

In order to limit the total final loads exerted on the structures by eliminating the loadings caused by long-term underground pressure rearrangement, a layer of compressible material, with a thickness of 10 cm, shall be foreseen between the structure's backside and the excavation surface.

1.4 General Work Requirements

The Contractor shall be responsible for the quality of material and workmanship and for their conformity with the Design Documentation, other corresponding Specifications and Method Statements and the Engineer's instructions.

The Contractor shall provide his personnel with the know-how and equipment necessary in accordance with the Specification and shall grant them access to the works to enable them to carry out their work in a safe and proper way.

Before commencing the concrete works, the Contractor shall propose a concept for these works. The concept shall comprise the equipment envisaged, the scope of work and the work stages.

2. Materials

2.1 Aggregates

Aggregates shall be taken from a source approved by the Engineer. The mixture of the aggregates shall be uniform without gap grading. The gravel (coarse) fraction shall be of cubic crushed or rounded form.

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Aggregates shall be hard, durable, non-porous and clean and shall not be chemically reactive. They shall not contain any deleterious material in sufficient quantity to adversely affect the strength at any age or the durability of the concrete or to cause corrosion of reinforcement.

The grading and the shape of the aggregates shall be such that a concrete can be produced with the specified proportions and consistency, which will readily work into position without segregation and without the use of excessive water and which can readily be compacted into a dense impervious mass.

The nominal maximum aggregate size shall be 32 mm. The gravel fraction of the aggregate shall not exhibit excessive fragmentation during delivery. The percentage of brittle grains shall be less than 5 %. The percentage of particles smaller than 0.06 mm, which can be washed away, shall not exceed 1 %.

Sand and gravel shall be clean. Frozen aggregates shall not be used. The minimum permissible temperature shall be + 3°C. Should the aggregates be warmed using steam, special attention shall be paid to controlling the moisture content, particularly in the sand fraction.

All aggregates shall have a specific gravity of not less than 26 kN/m^3.

The grading curve shall comply with the curve determined during suitability tests. The deviation of the given specified gradation shall not exceed the values listed below.

Table: Deviation from grain particle size

Grain Diameter	Admissible Deviation
0.06 mm	-/+ 1 %
0.25 mm	-/+ 1 %
1 mm	-/+ 2 %
4 mm	-/+ 3 %

2.2 Cement and Cementing Materials

It is of particular importance to use cement of uniform chemical composition and uniform fineness. Before commencement of delivery, the required characteristic values are to be agreed upon by the Engineer with the cement manufacturer. For the entire cement delivered, the manufacturer shall make the cement analyses and the standard test results available.

The cement shall be ordinary Portland cement, rapid hardening Portland cement or Portland pulverized fuel ash cement. The cement type shall be 20 according to the C.S.A. Standard 23.1-00.

In addition, the cement used shall satisfy the following requirements:

(a) Initial setting time not less than three hours.

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(b) Fineness: Not less than 340 m^2/kg; if content of pulverized fuel ash greater than 20 %, not less than 380 m^2/kg.

(c) Bleeding: not more than 20 cm^3 (Heidelberg Method); if content of pulverized fuel ash greater than 20 %, not more than 15 cm^3.

(d) Compressive strength after one day (24 h ± 1 h) on mortar cubes: not less than 9 N/mm^2

(e) The temperature of the cement at the time of use in the mixing plant must not be higher than 60°C.

If cementing materials (like fly ash or slag) are used, the suitability to meet the special requirements of the final concrete lining will have to be tested and approved by the Engineer.

2.3 Water

The water shall be clean and free of harmful matter in such quantities, as would affect the properties of concrete in the plastic or hardened state.

The water shall satisfy the requirements of potable water.

2.4 Admixtures

Admixtures added to the concrete, must not affect the concrete's hardening, strength and durability or cause corrosion of the reinforcement.

Chlorides or materials containing chlorides which promote steel corrosion may not be added to reinforced concrete or concrete which comes into contact with reinforced concrete. The prerequisite for the use of admixtures is a qualification test to be performed by the Contractor. The test results must be submitted to the Engineer.

2.5 Structural Concrete Composition

The concrete mix design shall meet the C.S.A 23. 1-00 requirements of a freezing and thawing restricted concrete. The concrete mix used for the intake structure shall furthermore fulfill the requirements of a sulphate-resistant concrete. And in addition, the following requirements shall be met:

- aggregates size 0 mm to 32 mm
- recommended cement volume 270 kg / m^3 (maximum)
- recommended cementing material (slag) volume 50 kg / m^3 (minimum)

or

- recommended "blended cement" volume 320 kg / m^3
- water / cement ratio ≤ 0.45
- water reducer and / or plasticizers are recommended
- required characteristic strength 35 MPa after 28 days (= long-term strength)

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- the concrete will have to meet the water infiltration test requirements according to DIN EN 12390 for watertight structures. That means the water infiltration depth, tested with the mentioned method, shall not exceed 30 mm.

2.6 Lean Concrete Composition

The lean concrete composition shall meet the requirements of a grade N concrete, C.S.A. 23.1-00. Its characteristic strength shall be 10 MPa.

2.7 Reinforcement

The reinforcement steel used shall be ribbed steel, grade 500 R or 500 W according to C.S.A. Standard 23.1-00.

In order to improve the composite action and to limit the crack formation, small-diameter reinforcement bars with a small spacing shall be used.

2.8 Contact Grouting Material

The contact grouting material shall be a cement-water suspension with sufficient fluid characteristics to fill the porous cavities and annular space between the final concrete lining and the waterproofing membrane.

If other material is used, they will have to be consistent with the concrete. The consistency has to be demonstrated by test or approved documents and the use of alternative materials has to be approved by the Engineer.

2.9 Compressible Material Layer

The layer shall be stiff enough to cover the stress and strain caused by concrete placement without deformation. At the same time, the layer shall be smooth and flexible enough to transform the long-term underground pressure into deformation so that the structure will not be strained by this kind of loading throughout the facility's design life time.

For that task, polystyrol material with an original thickness of 10 cm will be used. The layer will be installed at the excavated wall surface of the pit before concreting.

3. Equipment

The works may be performed using any type of equipment approved by the Engineer.

The entire equipment must have a valid quality control certificate and is to be inspected within regular inspection periods.

The design and construction of the formwork moulds is to be evaluated by approved documents (calculations and drawings) and the moulds are to be checked by a Professional Engineer. The results are to be certificated by the Engineer.

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4. Transport

All components shall be transported by suitable means of transport and in accordance with industrial safety and road traffic regulations to avoid any damage.

The concrete must not separate while being transported to the construction site and it shall be of the required workability at the location and time of placing.

5. Workmanship

5.1 General

Before starting the concreting works, the Contractor shall develop a concrete works program, which shall contain information on the

- type of concrete production, on site, ready mix
- distance of external plants to the site
- capacity of the mixing plants, additional plants for substitution (incl. distance to the site)
- testing procedure, suitability tests, quality control tests
- thermal development of the concrete during hardening
- schedule of concreting, simultaneous concreting on different sites
- concrete works procedure – use and preparation of formwork, cast-in-place procedure (progress, vibrating, quality supervision)
- formwork replacement (concrete requirements)
- curing

The concrete works programme has to be submitted to the Engineer for approval.

5.2 Formwork

The formwork must be thoroughly cleaned before use. Before concreting, appropriate shutter oil is to be applied to ensure that no concrete will stick to the formwork.

Any formwork support material subject to rust or corrosion is to be removed upon striking of the formwork. Any reinforcement or support material, remaining in the concrete is to be rust and corrosion-proof.

Particular care must be taken in the construction of formwork for the end face of the concrete bays to ensure that the shuttering is especially tight. Without exception, shuttering for end faces must be of smooth-planed boards with parallel, tongue-and-groove jointing; the forms must have a minimum thickness of 20 mm and must be of uniform width. Joints are to be so tight as to be unrecognisable, and the finished wall surface is to be perfectly smooth and even.

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The formwork has to be erected and stabilized in such a way, that all stresses and strains caused by the concrete works can be covered. After erection and stabilization, the formwork will be checked and evaluated for its "correct" installation.

The construction elements may only be stripped and the support may only be removed when the concrete has sufficiently hardened. The concrete has sufficiently hardened when the element is strong enough to support all loads, to which it is subjected when stripped, with the prescribed safety.

5.3 Reinforcement

The reinforcement shall - in an approved manner - be stored above ground and shall be protected against aggressive elements. It shall be cut and bent in accordance with the corresponding standards. The tying wire shall be made of soft annealed mild steel with such diameter that all connections required shall be carried out with sufficient stiffness.

The reinforcement arrangement has to be designed, installed and connected in such a way that it is stiff enough to stand without additional support and to minimize deformations and displacements while concreting.

The concrete cover shall be sufficient in accordance with the structural requirements and in compliance with the design. A sufficient concrete cover shall be ensured by concrete spacers, fixed to the reinforcement in sufficient number.

5.4 Concrete Works

5.4.1 CONCRETE PRODUCTION, SITE MIXING PLANT

The aggregates have to be stored on site in separate boxes for gravel, coarse sand and fine aggregates. They have to be protected against dryness, wetness and freezing. For the production of all types of concrete, the individual aggregate components are to be measured by weight using automatic dosing equipment.

The cement and the additives shall be stored in such a way that they will be protected against seasonal influences and that they will keep their original state of quality at the time of delivery. For the concrete production, the components are to be measured by weight, using automatic dosing equipment.

The concrete mixing plant is to be laid out for a separated and automatic batching of 3 different additives. To permit monitoring of the levels of additives added to the concrete mixture, a transparent gauge glass is to be foreseen.

The concrete components (cement, aggregates, water and additives) must be measured with an accuracy of 3 %. The weight batching machines shall be carefully maintained and cleaned and provided with simple and convenient means of checking the weighing mechanisms plus they shall be checked when required by the Engineer.

The composition of each type of concrete to be mixed is to be posted at the mixing plant in a clearly legible form and must include the requirements of the given standards. The materials must be mixed in concrete mixers which are suitable for the pertinent concrete composition. The

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concrete mixer must be equipped with an electrical current indicator to facilitate regulation of the concrete's consistency. If the specific water content of the aggregates varies, the amount of wet material used plus the amount of mixing water must always be selected in such a way, that the total amount of water remains constant.

The dimensions of the mixing plant have to be sufficient to deliver enough concrete to all relevant sites at any time of the concreting process. All concrete components and the concrete production have to be protected against extreme weather conditions (heat, rain). Mixing plants for sites located in cold weather areas, which may experience frost periods, are to be equipped with mixing water and aggregate heating systems.

A site laboratory, fully equipped to carry out all concrete and concrete component tests required, is to be set up and operated by experienced personnel. An expert in concrete technology and concrete production shall be in charge of this laboratory.

Test mixes are to be made for each type of concrete. The results are to be submitted to the Engineer. The mixes shall be approved by the Engineer and a trial mix shall be prepared under full-scale conditions, including workability tests and cube testing.

5.4.2 READY-MIXED CONCRETE

The entire ready-mixed concrete shall meet the requirements described in this Specification. In addition to this, the Contractor shall submit the name and address of the ready-mix Contractor to the Engineer for approval, stating all the operation and plant details.

The details of the ready-mix Contractor shall include information on the plant, the equipment, the storage depots, as well as the transportation and quality systems. The Engineer shall have access to the ready-mix site for inspection at any time. The Engineer may reject the proposed ready-mix Contractor and may cancel an approval at any time, if the quality of the concrete or the documentation of the quality control is not satisfactory in the opinion of the Engineer.

The concrete shall in all respects comply with DIN standards, except where amended in this Specification.

All testing of the mixed concrete shall be executed on site.

The Contractor shall ensure that the supplier keeps records of all the required tests and the quality control for mixing and transportation.

The concrete shall be delivered to the site in truck mixers or agitators which are continuously in operation. Each batch delivered must be accompanied by a certificate containing the following information:

- Name of supplier
- Type and grade of concrete
- Mix code number
- Time and date of mixing
- Temperature of mixing
- Additives
- Cement type
- Cement content
- Water cement ratio or quantity of added water

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- Time of arrival of truck on site
- Time of end of discharge
- Registration number of truck
- Delivery certificate number

The certificates shall be available to the Engineer for quality supervision.

Any addition of water and admixtures to the concrete after the concrete has been discharged form the mixing plant shall not be accepted.

5.4.3 CONCRETING PROCEDURE

The workability of the concrete shall remain satisfactory until placing and compaction is finished. This shall at a minimum be for 3 hours at 25°C upon arrival on site; this shall also be true for hot weather periods.

During cold weather and frost periods the concrete shall be placed at a specified minimum temperature because of the lower hardening rate and the danger of permanent impairment of defined concrete properties. With ambient temperatures of +5°C to –3°C, the concrete temperature upon placing must not fall below +5°C. With ambient temperatures below –3°C, the concrete temperature must not fall below +10°C.

During hardening, the concrete temperature may not exceed 50°C.

Before the concrete is placed, all formwork elements and surfaces to come into contact with the concrete shall be cleaned from dust, mud and other impurities. The concrete shall not be placed in standing water unless this has been specified or approved.

During placing, suitable means shall be provided to prevent premature hardening of the concrete put in contact with hot surfaces.

When placing concrete in layers, if no construction joints are foreseen, the placing may only be interrupted for a period of time during which the concrete does not set, so that a good and even connection is possible between the two layers of concrete. The concrete shall be placed in level layers of such depth that each layer will be readily and properly mixed with the previous layer below by the use of internal vibrators. The difference in height of the layer's level on the right hand sidewall and the left hand sidewall of the final lining may not exceed 1 m.

Concreting shall begin in the bottom parts of the sidewalls and shall finish in the crown. Normally the concrete shall be pressed into the formwork. If the formwork is filled by gravity flow, the concrete's height of fall shall not exceed 1 m.

The type and number of vibrators shall be approved by the Engineer and shall consider the mass and quality of concrete to be compacted and the type of formwork.

The formwork shall be released, when the final concrete lining meets its release strength, measured in the crown by suitable means of measurement.

5.4.4 CURING

The curing of the final lining surface will start immediately after the formwork is released.

When water curing is applied, chill shocks are to be avoided (as could occur when cool water comes into contact with warm concrete surfaces) due to the resulting danger of peeling or

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scaling. The quality of water used for curing shall be the same as that used for concrete mixing. If liquid membranes are used, they must not affect the normal setting reaction of cement. Compounds incorporating reflective, white or light-coloured pigments shall be used.

The methods of preventing the concrete from prematurely drying are to be submitted to the Engineer for approval before use.

The concrete must be cured during the first four days.

6. Quality Control

All components must have a valid quality certificate and a valid permission for the intended use.

During the entire period of construction, the Contractor will have to verify the material properties and qualities as defined by the Specifications and Standards.

In addition to the tests and investigations contained in the Specifications and Standards, all other tests deemed necessary by the Engineer are to be performed.

Records are to be kept of all test results and submitted to the Engineer. The Contractor shall grant the Engineer full access to and use of the laboratory and shall produce on demand the records of all tests carried out.

6.1 Suitability Tests

6.1.1 CONCRETE COMPONENTS

No aggregates shall be delivered to the site without satisfactory initial sampling and testing. The sample of fine aggregate shall be 25 kg in weight and that of the coarse aggregate shall be 50 kg in weight.

The Contractor's attention is drawn to the need to maintain a consistent aggregate quality and he will be expected to undertake adequate testing to ensure that the quality does not vary significantly (reference is made to Subchapter 6.2, Quality Control Tests).

All components have to be certificated for their origin and quality. The suitability of the components used has to be approved by the Contractor's concrete expert and by the Engineer.

6.1.2 CONCRETE

In order to verify the suitability of the concrete compositions for the respective tasks, tests at the site or at the mixing plant have to be carried out for both designed concrete compositions (winter and summer composition). The following items have to be tested using three samples per item under the mentioned conditions:

- Bulk density
- Air void content (= 3 % to 6 %, maximum)
- Consistency immediately after mixing and one hour later (= class F3; DIN 1045-2)

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- Release strength after design time for formwork removal
- Characteristic strength after 28 days (= 35 MPa)

6.2 Quality Control Tests

6.2.1 AGGREGATES

The following tests have to be carried out with a frequency of "each delivery"

- grading analyses
- wet analyses
- moisture content, for sand
- organic impurities
- visual inspection of aggregate type, granulometric composition, aggregate condition, particle shape, detrimental components (e.g. coal, humic substances, brittle grains, etc.)

The moisture content of the sand has to be checked in addition once a week.

Chloride and sulphate tests have to be carried out once every 4 months and in case of suspected change.

The tests are to be carried out in accordance with DIN EN 12620.

6.2.2 CEMENT AND CEMENTING MATERIALS

The following tests have to be carried out every 4 months:

- compressive strength
- specific surface
- chemical analysis.

Certificates issued by the supplier shall be tested per storage vessel.

The tests are to be conducted in accordance with the German DIN EN 196 Standard and the requirements of Subchapter 2, Materials.

6.2.3 ADMIXTURES

The certificates issued by the supplier have to be checked at each delivery to the site.

6.2.4 CONCRETE

Fresh concrete has to be tested according to the criteria listed below:

testing item	testing frequency	testing procedure	testing moment
consistency	once for every batch on site	acc. to German DIN EN 12350 Standard	before placing of concrete
water / cement	once for every batch on	by visual inspection	before placing of

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ratio	site		concrete
unit weight	once for every batch on site	by visual inspection	before placing of concrete
bulk density	three times per concrete bay	acc. to German DIN EN 12350 Standard	during concreting
air void content	three times per concrete bay	acc. to German DIN EN 12350 Standard	during concreting

Hardened concrete has to be tested according to the criteria listed below:

testing item	**testing frequency**	**testing procedure**	**testing moment**
compressive strength	three times per concrete section	with penetration test or pendulum hammer	after 12 h (release strength)
compressive strength	three cubes or cylinders per concrete bay	acc. to German DIN EN 12390 Standard	after 28 days (characteristic strength)
water infiltration	three times per concrete section	acc. to German DIN EN 12390 Standard	
air void content	three times per concrete bay	acc. to German DIN EN 12390 Standard	after 7 days (abrasion resistance)

The testing procedure and interpretation of the results is described in the above mentioned references. The limit values of the individual tests are specified in Subchapter 2, Materials and Subchapter 6.1, Suitability Tests.

6.2.5 CONCRETE WORKS

The minimum dimensions of the structures shall be the designed dimensions. Smaller dimensions are to be avoided.

If faced with smaller dimensions, the following measures will have to be taken:

origin	**Extension**	**consequence**	**Check**	**measures**
local "breakdown" of formwork	limited in size	increase of structural concrete thickness	sufficient thickness of concrete structure and sufficient flow volume of cross section	grinding of bulges
	whole concrete section			if maximum flow can not be achieved, breakdown and reconstruction of concrete section

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origin	Extension	consequence	Check	measures
wrong alignment of formwork	whole concrete section	increase / decrease of structural concrete thickness	sufficient thickness of concrete structure	if maximum flow can not be achieved, breakdown and reconstruction of concrete section in any other case, smoothening of the surface as described below.

The minimum thickness of the concrete structures shall be the design thickness. Any reduction in thickness shall be avoided. Any increase in thickness shall be limited to the design thickness + 10 cm. The space available for the placing of the final concrete lining has to be proven by survey of the shotcrete lining surface.

Should the required limits not be met (thinner lining), the area in question should be re-excavated and re-supported. Should the limits be exceeded, the difference between the allowable and the measured thickness shall be compensated by additional shotcrete.

The survey results of the shotcrete surface, as well as the measures to be taken when the limits are exceeded are – in any case – subject to the Engineer's approval.

The surface of the concrete structure shall be smooth and flat. Wedges and bulges are to be avoided, or to be smoothened by grinding. Unevenness shall not exceed 4 degrees (angle of gradient) in all directions.

7. Measurements

The quantity survey unit of the concrete shall be m^3, the quantity survey unit of the reinforcement shall be ton.

8. Acceptance

8.1 Conformity of Work with Design and Technical Specification

The works shall be carried out in accordance with the design, the Technical Specification(s) and the written instructions of the Engineer.

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8.2 Acceptance of Works To Be Removed or Covered

8.2.1 DOCUMENTS AND DATA

The acceptance of works which are to be removed or covered shall be based upon:

- a written statement by the Engineer entered into the Site Book that the works have been executed in accordance with the design and the Technical Specification(s),
- other written statements by the Engineer commenting on the execution of the works.

8.2.2 SCOPE OF WORKS

The scope of works to be removed or covered shall be determined by written statements of the Engineer and by other documents confirmed by the Engineer.

9. Applicable Regulations

9.1 Standards

Canadian Standards

CSA 23.1-00:	Concrete materials and method of concrete construction
CSA 23.2-00:	Methods of test for concrete
CSA 23.3-94:	Design of concrete structures

European / German Standards

DIN EN 196	Methods of testing cement
DIN EN 197-1	Cement Part 1: Composition, specifications and conformity criteria for common cements;
DIN EN 206	Concrete Part 1: Specification, performance, production and conformity
DIN 1045-1:	Concrete, reinforced and prestressed concrete structures Part 1: Design
DIN 1045-2:	Concrete, reinforced and prestressed concrete structures Part 2: Concrete Specification, properties, production and conformity Application rules for DIN EN 206-1
DIN 1045-3:	Concrete, reinforced and prestressed concrete structures. Part 3: Execution of structures
DIN EN 12620	Aggregates for mortar and concrete
DIN EN 12350	Testing methods for fresh concrete

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DIN EN 12390	Testing methods for hard concrete

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1. Introduction

1.1 Subject of Technical Specification

This Technical Specification (TS) shall define the requirements for the execution and commissioning of the waterproofing system in the Diversion Tunnel of the Niagara Tunnel Facility Project.

1.2 Range of Technical Specification Application

This TS is a bid and contract document used for the execution and commissioning of the works referred to in Item 1.1.

The provisions contained in this Specification refer to the working methods to be adopted for the:

a) delivery of all the components and the entire equipment required to the site

b) installation of components required

c) quality control for material and workmanship.

The Scope of Work is defined for the installation of the final lining for the Diversion Tunnel.

1.3 Basic Requirements

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1.3.1 GENERAL

A dual layer waterproofing system shall be installed in tunnel sections, where the swelling potential of the rock mass may affect the stability of the tunnel, In all other tunnel sections, a single layer waterproofing system is envisaged (Fig. 1 and Fig. 2).

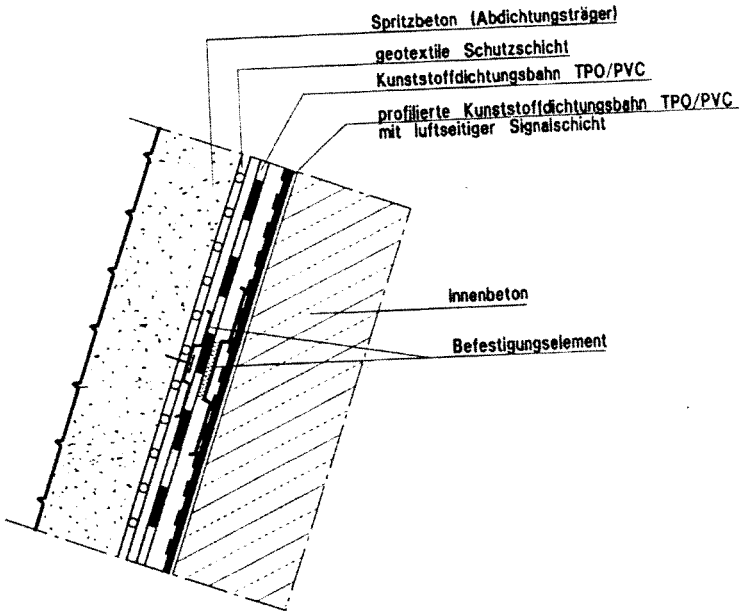

Fig. 1: Dual layer waterproofing system

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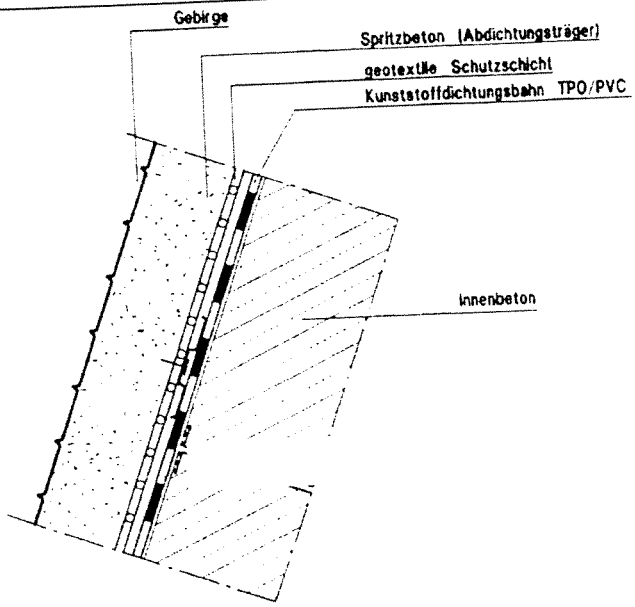

Fig. 2: Single layer waterproofing system

1.3.2 SHOTCRETE SURFACE

The basis for the waterproofing system must be constructed in such a way that – taking the material properties into account without any overstress and/or damage being caused – the protective sheet and the loosely installed plastic waterproofing membrane may fit to the shotcrete base as snugly as possibly. In particular:

- all wedges and edges shall be smoothed. The ratio between diameter and depth of local "inaccuracies" shall not be smaller than 10 : 1. The minimum radius shall exceed 20 cm.
- all protruding iron parts shall be removed
- all iron parts, which can not be removed (e. g. heads of rock dowels) shall be covered with shotcrete with a minimum thickness of 3 cm.
- all inflowing water shall be collected and drained off.

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1.3.3 REGULATING SHOTCRETE

To meet the shotcrete surface requirements, a thin shotcrete layer, is to be installed where required - independent of the excavation and support procedure. The mechanical properties and the thickness of the so-called regulating shotcrete are to be adapted to the fastening elements (discs) used for the waterproofing membrane and the protective sheet.

1.3.4 GEOTEXTILE FLEECE

To prevent the waterproofing membrane from being damaged when it is pressed against the shotcrete surface, a protective sheet must be provided between the waterproofing membrane and the shotcrete surface.

This sheet should be a geotextile, patched with a thin membrane on one side.

1.3.5 WATERPROOFING MEMBRANE

The waterproofing membrane shall consist of Polyvinylchloride (PVC) or Polyolefin (TPO/FPO).

The materials used must all be permanently resistant to all kinds of external influences and must not be harmed by the usual deformations of structures due to shrinkage, temperature change, or ground movement. The materials used for waterproofing must be compatible with each other and with all other materials they might come into contact with.

1.3.6 JOINT SEALING

In every outside joint of the intake and outlet structure joint tapes shall be placed. The functions of these joint tapes are to seal the joints against liquid inflow and to prevent seepage through the joints.

Depending on the function and location, the following types of joints are distinguished:

Tunnel Final Lining Joint

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Within the final lining joint area the waterproofing membrane will be protected against damage by an additional membrane strip fixed on the membrane by welding. The joint will be sealed against grouting inflow by a kind of geotextile fixed on the front face of the previous concrete bay.

Construction Joints

The construction joints of the intake and outlet structure are sealed with joint tapes (water stops). Injection hoses, installed in the joints to grout the joint surface shall support the waterproofing effect. The injection hoses should be constructed and arranged in such way, that joint grouting will be possible throughout the Diversion Tunnel's design life time.

Expansion Joints

Expansion joints are sealed with joint tapes, which are suited to keep the joint tight independent of the joint movement. Additional injection hoses shall be installed in the expansion joints.

1.3.7 SLEEVES

To penetrate the waterproofing membrane with hoses for interface grouting and for other devices to be installed outside the waterproofing membrane, special, pre-fabricated sleeves will be provided. These sleeves will be welded on the waterproofing membrane and will surround the hoses in such a way that the location of the membrane penetration is as waterproof as the surrounding waterproofing system.

1.4 General Work Requirements

The Contractor shall be responsible for the quality of material and workmanship and for their conformity with the Design Documentation, other corresponding Specifications, the Method Statements and the Engineer's instructions.

The Contractor shall provide his personnel with the equipment necessary in accordance with the Specification and shall grant them access to the works to enable them to carry out their work in a safe and proper way.

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Before commencing the waterproofing works, the Contractor shall propose a concept for these works. The concept shall comprise the equipment envisaged, the scope of work and the work stages.

2. Materials

2.1 Geotextile Fleece

The protective sheet consists of a geotextile, patched with a thin membrane on one side facing the waterproofing membrane.

The geotextile satisfy have the following minimum requirements:

• Material	Polypropylene (PP) or Polyethylene (PE-HD)
• Product identification	Manufacturer, thickness, type, production date
• Product appearance	Mechanically woven fleece
• Area weight Test Method: EN 965	$\geq$600 g/m², -/+ 5 %
• Melting flow (for PE-HD only) Test Method: DIN ISO 1133	Tolerable deviation: $\leq$ 10 %
• Thickness under a pressure of 2 kPa Test Method: EN 964-1	$\leq$ 10 mm
• Thickness under a pressure of 20 kPa Test Method: : EN 964-1	$\geq$ 4 mm
• Tensile breaking force	$\geq$ 25 kN/m
Elongation at break (tension)	$\geq$ 50 %

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Test Method: EN ISO 12 219	
• Perforation force	≥ 8 kN and ≤ 20 kN
Test Method: EN ISO 12 236	
• Elongation at perforation	≥ 50 %
Test Method: EN ISO 12 236	
• Storage in salt water (10 % NaCl) at 23° C for 28 days	Reduction in tensile strength ≤ 25 % Reduction in tensile elongation ≤ 25 %
Test Method: DIN 16 726, 5.18	
• Storage in sulfuric acid (5%) at 23° C for 28 days	Reduction in tensile strength ≤ 25 % Reduction in tensile elongation ≤ 25 %
Test Method: DIN 16 726, 5.18	
• Storage in caulk water (saturated with $Ca(OH)_2$) at 23° C for 28 days	Reduction in tensile strength ≤ 25 % Reduction in tensile elongation ≤ 25 %
Test Method: DIN 16 726, 5.18	
• Fire resistance	Non flammable

The patched backing membrane shall satisfy the following minimum requirements:

• Material	Polyolefin (FPO or TPO)
• Product identification	Manufacturer, thickness, type, production date
• Product appearance	No blisters, cracks, nests or holes
• Thickness	Minimum 0.3 mm
• Materials	Polyolefin (FPO or TPO)
• Tensile breaking force	≥ 25 kN/m
• Elongation at break	≥ 300 %

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• Fire resistance	Non flammable

2.2 Waterproofing Membrane

The waterproofing membrane shall satisfy the following minimum requirements

• Material	Polyolefines (FPO or TPO)
• Product identification	Manufacturer, thickness, type, production date
• Product appearance	No blisters, cracks, or nests, full areal bond between signal layer and membrane
• Straight deviation and evenness	Deviation from straight $\leq$ 50 mm
Test Method: DIN 16 726, 5.2	Evenness $\leq$ 10 mm
• Single membrane thickness	3.0 mm (mean), -/+ 5 %
Dual membrane thickness	2.0 mm + 1.5 mm (mean), -/+ 5 %
• Thickness signaling layer	$\leq$ 0.2 mm
• Density	Tolerable deviation: + 0,03, -0,003 g/cm³
Test Method: DIN 53 479	
• Melting flow	Tolerable deviation: $\leq$ 10 %
Test Method: DIN ISO 1133	
• Breaking strength (tear)	> 15 N/mm²
Elongation at break (tear)	> 500 %
Test Method: DIN 16 726, 5.6.1	
• Module of Elasticity between 1 and 2 % elongation	< 100 N/mm²

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Test Method: DIN 16 726, 5.6.2	
• Multiaxial tension (bulge test)	Tolerable deviation: > 50 % of 1,0 m dia. sample
Test Method: DIN 53 861	
• Shear test for welded seams	Break outside seam, shear strength factor ≥ 0.9
Test Method: DVS 2226-2	
• Peel test for welded seams	Peel resistance ≥ 0.8 * thickness * tension stress [N/mm²]
Test Method: DVS 2226-3	
• Resistance against water pressure	No leakage at pressure of 30 bar over 72 hours
Test Method: DIN 16 726, 5.11	
• Perforation	No perforation for test tool of 500 g weight falling from 750 mm
Test Method: DIN 16 726, 5.12	
• Storage at 100° C for 1 hour	Change of dimensions ≤ -/+ 2 % No blister formation
Test Method: DIN 16 726, 5.13.1	
• Storage in water at 80° C for 70 days	Reduction in tensile strength ≤ 20 %
Test Method: DIN 16 726, 5.13.3	
• Storage in water at 50° C for 8 months	Reduction in tear strength ≤ 20 % Reduction in tear elongation ≤ 20 %
Test Method: SIA-V 280, test 13	
• Storage in salt water (10 % NaCl) at 23° C for 28 days	Reduction in tear strength ≤ 20 % Reduction in tear elongation ≤ 20 %
Test Method: DIN 16 726, 5.18	
• Storage in sulfuric acid (5%) at 23° C for 28 days	Reduction in tear strength ≤ 20 % Reduction in tear elongation ≤ 20 %
Test Method: DIN 16 726, 5.18	
• Storage in caulk water (saturated with	Reduction in tear strength ≤ 20 %

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$Ca(OH)_2$) at 23° C for 28 days	Reduction in tear elongation ≤ 20 %
Test Method: DIN 16 726, 5.18	
• Fire resistance	Non flammable

The inner layer of dual membranes shall have dimples with 2 - 3 mm diameter, 0.5 mm high spacing 20 mm approx. to provide a space between the two membranes for vacuum testing.

2.3 Joint Tapes

2.3.1 JOINT TAPES FOR CONSTRUCTION JOINTS, EXPANSION JOINTS

The joint tapes (water stops) for the waterproofing of construction and expansion joints shall be manufactured from non-reclaimed, durable, weldable plasticized PVC of a oil- and bitumen-resistant material quality, using softening agents with a polymer molecular structure.

The minimum material requirements shall be as follows:

- ultimate tensile strength at + 23°C (acc. to EN ISO 527) > 10 N/mm²
- elongation at break at + 23°C (acc. to EN ISO 527) > 350 %
  at - 20°C (acc. to EN ISO 527) > 200 %
- minimum thickness, construction joints: 3.5 mm
  minimum thickness, expansion joints: 4 mm

3. Equipment

The works may be performed using any type of equipment approved by the Engineer.

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The entire equipment must have a valid quality control certificate and is to be inspected within regular inspection periods.

4. Transport

All components shall be transported by suitable means of transport and in accordance with industrial safety and road traffic regulations to avoid any damage.

5. Workmanship

5.1 Tunnel

Before starting the waterproofing works in the tunnel, the shotcrete surface of the initial lining shall be reviewed for its suitability for the works anticipated. The requirements, described in chapter 1 indicate the criteria of suitability.

5.1.1 REGULATING SHOTCRETE

At locations at which the required surface condition has not been met, regulating shotcrete must be applied. The following minimum requirements shall be met:

1. Adequacy of mechanical properties
2. Minimum thickness 30 mm
3. The ratio of diameter to the height of local "inaccuracies" due to excavation must be at least 10:1
4. Filletings with a minimum radius of 0.20 m
5. Care is to be taken that all rebound is removed, especially in the invert.

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5.1.2 GEOTEXTILE FLEECE

Before installing the geotextile fleece as a protective sheet, the regulating shotcrete must be checked by the Contractor of the waterproofing system works and acceptance must be stated in written form.

The protective sheet is delivered and installed onto the surface of the regulating shotcrete in strips fixed by fastening elements (discs). Depending on the weight of the protective sheet, 3 discs per m^2 should be positioned at the tunnel roof, while 2 discs per m^2 should be sufficient at the sidewalls and the invert.

The overlapping of the strips should not be smaller than 100 mm.

5.1.3 WATERPROOFING MEMBRANE

The waterproofing membrane is delivered in rolled strips. The strips are welded onto the above mentioned discs (Fig. 3). Dual membrane elements are delivered with prefabricated seams. Only the minimum amount of seems required for installation shall be produced on site (Fig. 4).

The connection between the waterproofing membrane and the fastening elements must be inferior in strength to the connection between the individual strips of waterproofing membrane. If subjected to extremely high stresses, the waterproofing membrane should break loose from the fastening elements, preventing damage being done to the membrane itself.

The strips are connected by welding with flat-face fillet welds; solid seams are not permitted in the standard case. Controllable double seams (Fig. 5) are provided at each joint. The control space of the double seam must be at least 10 mm wide, but must not exceed 20 mm. T-joints as well as repair works may be carried out as solid seams of at least 30 mm. Cross-joints shall be avoided. Welding has to be carried out in accordance with the temperature range specific for the material used. Seams must not be welded at temperatures below + 5°C, unless special measures are taken, which are approved by the Engineer.

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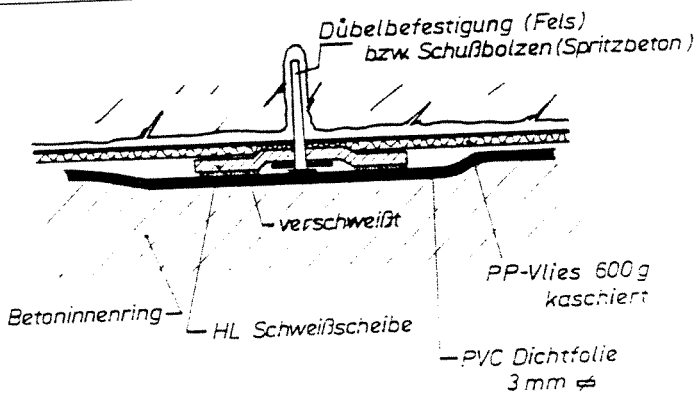

Fig. 3: Installation of the single layer waterproofing system

In the tunnel invert, where the precast invert concrete segment is laid ahead of the final lining vault, the installed waterproofing system segment (geotextile and waterproofing membrane) has to be covered with suitable measures, to prevent damage (reference is made to the corresponding drawing no. PD-01-1020).

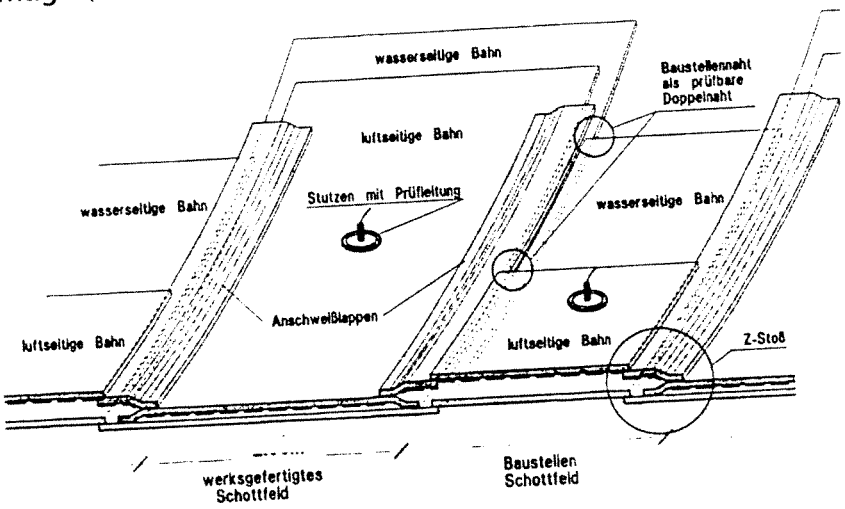

Fig. 4: Connection of dual layer waterproofing membrane

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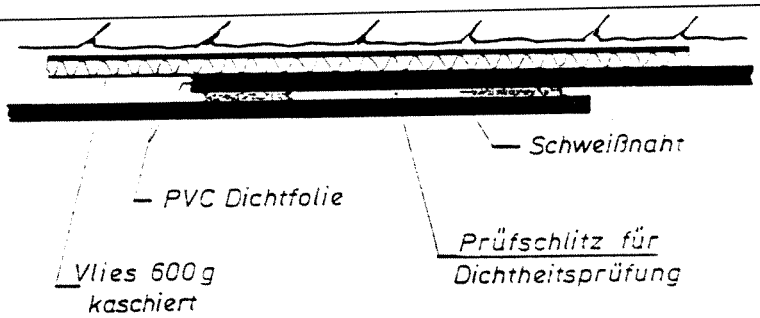

Fig. 5: Controllable double seam

5.1.4 SLEEVES

Waterproofing membrane strips with welded sleeves shall be prefabricated and delivered to the site. The hoses shall carefully be inserted into the sleeves, following the manufacturer's order.

The hoses and sleeves shall be fixed and protected in such a way that no moving, cracking or other damage will occur during concreting.

Pre-fabricated sleeves shall be provided to penetrate the waterproofing membrane with grouting hoses and for other devices to be installed through the waterproofing membrane. These sleeves shall be welded on the waterproofing membrane and will surround grouting hoses and such devices in such a way, that the location of the membrane penetration is waterproof (Fig. 6 and 7).

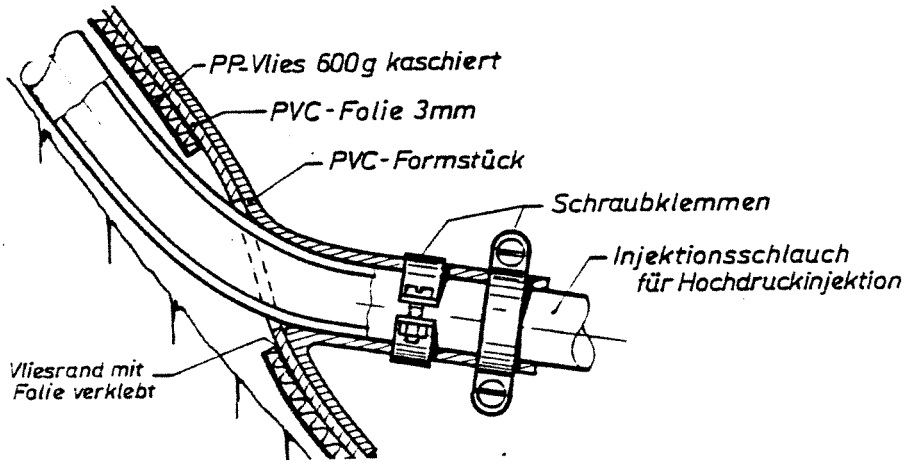

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Fig. 6: Sleeve for grouting hose

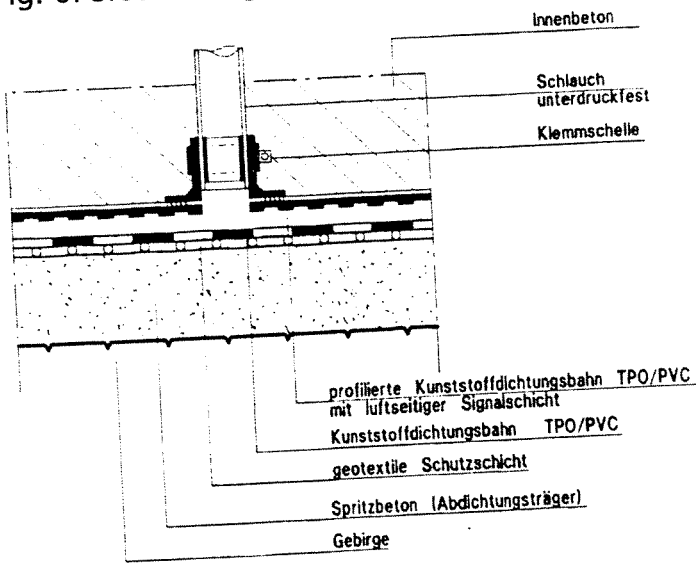

Fig. 7: Sleeve for testing of dual layer membrane system

5.2 Intake, Outlet Structure

Considering the width of the structure, the required joint tapes shall be located within the joint as close as possible to the outside face of the concrete structure. They shall be installed and fixed in such way that no moving, bending or any other kind of damage will occur during concreting. The injection hoses shall be installed in such way that the joints can be sealed against water from the inside and the outside over the entire length. The grouting procedure shall be possible to be repeated at any time throughout the lifetime of the structures.

Required field connections shall be welded by experienced personnel according to the manufacturer's or the Employer's instructions.

At the interfaces to the tunnel structure, the intake /outlet structures are sealed with joint tapes, which are welded on the waterproofing membrane on the Diversion Tunnel side and inserted in the structural concrete of the intake and outlet structure.

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6. Quality Control

6.1 Suitability Tests

Suitability tests as specified in section 1 must be carried out by the manufacturer for all components of the waterproofing system. The test procedure and the material performance have to be certified by an officially approved checking organisation.

6.2 Testing During Production

During production of plastic components of the waterproofing system, tests have to be performed, which cover the following requirements and are documented by the manufacturer at specified intervals and the checking organisation at 6 month intervals.

6.2.1 GEOTEXTILE FLEECE WITH BACKING MEMBRANE

• Material	Each delivery
• Product identification	Each delivery
• Product appearance	Each delivery
• Area weight	Every 1000 m^2
• Thickness	Every 1000 m^2
• Tensile breaking force	Daily or every 4000 m^2
Elongation at break (tension)	Daily or every 4000 m^2
• Perforation force	Daily or every 4000 m^2

6.2.2 WATERPROOFING MEMBRANE

• Material	Continuously or each delivery
• Product identification	Continuously or each delivery

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• Product appearance	Continuously or each delivery
• Density	daily
• Melting flow	daily
• Membrane thickness	Continuously or 2 * each shift
• Thickness of signaling layer	Continuously or 2 * each shift
• Breaking strength (tear)	daily
Elongation at break (tear)	daily
• Shear test for prefabricated seams	daily
• Peel test for prefabricated seams	daily
• Storage at 100° C for 1 hour	daily

6.3 Testing on Site

6.3.1 GEOTEXTILE FLEECE

The product sheets containing test results for items specified in 3.2.1 shall be checked on site for each delivery. Only fleece materials, which do meet the specified requirements may be installed in the tunnel.

6.3.2 WATERPROOFING MEMBRANE

The product sheets containing test results for items specified in 3.2.2 shall be checked on site for each delivery. Only membrane materials, which do meet the specified requirements may be installed in the tunnel.

Dual layer membrane systems shall be tested by connection of the test hoses to a vacuum system. Each compartment is to be tested before concreting of the final lining (Fig. 8). Initially - 0.7 bar of vacuum pressure shall be applied until after 10 minutes - 0.5 bar testing pressure is installed. The pressure shall be recorded for 15 minutes. The test is considered as passed, if the pressure drop after 10 minutes does not exceed 20 % (= 0.1 bar) of the applied test pressure. Repair before

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concreting is carried out with additional layers of membrane welded on to the damaged areas.

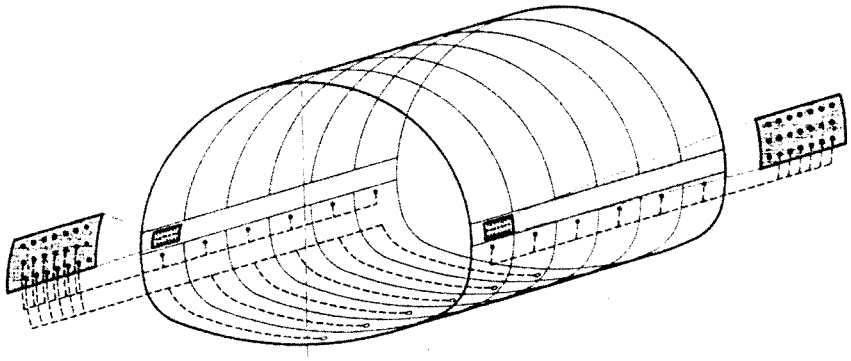

Fig. 8: Testing of compartments

Single layer membrane systems shall be visually inspected and the inspection documented, before concrete is placed.

The double seams of the waterproofing membrane produced on site are to be tested with compressed air of 2.0 to 2.5 bar. In the test, the pressure is applied at one end of the test section and measured at the other end. The test is considered as passed, if the pressure drop after 10 minutes does not exceed 20 % of the applied test pressure.

T-joints, repair seams and sleeves for penetration through the membrane shall be tested with a vacuum bell jar applying a low pressure of 0.2 bar over 10 minutes.

Tests and QA/QC inspections have to be carried out and documented accordingly.

6.4 Joint Tapes

The Contractor shall furnish the Employer with copies of the manufacturer's test certificates for the water stops to be supplied.

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7. Measurements

The quantity survey unit of the waterproofing system components (geotextile and membrane) shall be m^2. The quantity survey unit of the joint tapes shall be m.

8. Acceptance

8.1 Conformity of Work with Design and Technical Specification

The works shall be carried out in accordance with the design, the Technical Specification and the written instructions of the Engineer.

8.2 Acceptance of Works To Be Removed or Covered

8.2.1 DOCUMENTS AND DATA

The acceptance of works which are to be removed or covered shall be based upon:

- a written statement by the Engineer entered into the Site Book that the works have been executed in accordance with the design, the documentation and with the Technical Specification(s),
- other written statements by the Engineer commenting on the execution of the works.

8.2.2 SCOPE OF WORKS

The scope of works to be removed or covered shall be determined by written statements of the Engineer and by other documents confirmed by the Engineer.

9. Applicable Regulations

9.1 Standards

Canadian Standards

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European / German Standards

DIN EN 918	Fasteners; terminology; spelling of terms; abbreviations
DIN EN 964:	Geotextiles and geotextile-related products: determination of thickness at specified pressures
DIN EN 965 (ISO 9864)	Geotextiles and geotextile-related products: determination of mass per unit area
DIN 4102	Fire behaviour of building materials and elements - classification of building materials
DIN16726	Plastic roofing felt and waterproofing sheet - testing
ISO 527	Plastics: tensile test
ISO 10319	Geotextiles and geotextile-related products: wide - width tensile test
SIA 280	Plastic waterproofing membrane sheets: requirements and material testing methods

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1. Introduction

1.1 Subject of Technical Specification

This Technical Specification (TS) shall define the requirements for the execution and commissioning of drainage measures in the Diversion Tunnel of the Niagara Tunnel Facility Project.

1.2 Range of Technical Specification Application

This TS is a bid and contract document used for the execution and commissioning of the works referred to in Item 1.1.

The provisions contained in this Specification refer to the working methods to be adopted for the:

a) delivery of all the components and the entire equipment required to the site

b) installation of drainage measures

c) quality control for material and workmanship.

The Scope of Work is defined for the excavation and support procedure to be adopted for the Diversion Tunnel.

1.3 Definitions

The basic definitions given in this TS are in conformity with the relevant standards in force.

In general, two types of measures may be distinguished with respect to drainage:

- Drainage of water seeping into the tunnel through the initial lining or the tunnel face
- Treatment of water from the surrounding rock mass to increase rock mass stability and limit rock mass permeability

Subsequently, the respective components shall be described:

1.3.1 DRAINAGE MATS

Drainage mats are geotextiles with a watertight surface on the front side and a permeable medium on the back side. They will be fixed to the shotcrete of the initial lining in case of extensive water inflow through the shotcrete lining.

1.3.2 DRAINAGE PIPES

Drainage pipes are flexible plastic pipes, with a diameter between 1" and 2". They are used to drain the inflow of water at certain locations of the shotcrete lining. Several pipes can be interconnected with pipe fittings to create one "collection pipe".

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.3.3 INVERT DRAINAGE

The water of all these drainage systems is collected in a pit, located in the precast concrete invert segment. This pit offers sufficient space to retain the incoming water and drain it to the collection tank.

.3.4 PUMP SUMPS

In a downhill tunnel excavation, pumps sumps are to be installed approx. every 30 m on both sides of the excavation in the vicinity of the tunnel face to collect and remove the water coming from the excavated and supported tunnel area.

These pump sumps shall have a diameter of not less than 800 mm and a depth of not less than 1 m. The walls should be covered with precast concrete elements or with shotcrete. The bottom shall feature a pumping pit and shall be covered with shotcrete. The pumps shall remove the water by pipes, fixed to the sidewalls, to the portal areas or to nearby collection points.

.3.5 COLLECTION TANK

At the lowest point of the tunnel, a tank with sufficient volume shall be installed to retain the water collected in the tunnel. The tank shall be equipped with two pumps (redundant system) to avoid flooding. The tank can be excavated beneath the invert and supported with a reinforced shotcrete lining or installed as a mobile basin.

During the downhill excavation and while approaching the lowest point of the tunnel, a mobile collection tank shall be attached to the tunnel boring machine behind the gantry, for the water from the tunnel backside and the excavation area to be collected and pumped out.

3.6 SETTLING TANK

The water collected in the tunnel might on the one hand be mixed with suspended sediments and settleable particles and might on the other hand be polluted with liquids like oil etc.. And it might be alkaline in composition due to the cement components contained in the shotcrete.

In view of these facts and in response to the environmental requirements, a settling tank with a light oil separator, and - depending on the ph-value - with a neutralization facility shall be installed. The settling tank shall be constructed in such a way that the environmental requirements for the water to be conveyed into any existing watercourse can be fulfilled.

The settling tank can be constructed as an earth basin, supported by reinforced shotcrete or as a precast steel basin. The light oil separator shall be installed at the basin's intake, the neutralisation facility at the basin's outlet.

The intended neutralisation process, with sulphuric acid or carbonic acid, shall be submitted to the Engineer for approval. Neutralisation with hydrochloric acid shall be avoided, due to the health risk and the danger to the environment.

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1.3.7 WATER TREATMENT OF SURROUNDING ROCK MASS

To reduce the permeability of the surrounding rock mass, the area in the vicinity of the tunnel is sealed by grouting. Details regarding this procedure are presented in the corresponding Specification "Underground Grouting".

1.4 General Work Requirements

The Contractor shall be responsible for the quality of material and workmanship and for their conformity with the Design Documentation, the General Technical Specification, the detailed Technical Specification and the Engineer's instructions.

2. Materials

Reference is made to Item 1.4 – Definitions. The material depends on the manufacturer and the construction method.

3. Equipment

The works may be performed using any type of equipment approved by the Engineer.

The entire equipment must have a valid quality control certificate and is to be inspected within regular inspection periods.

The pumps, the necessary pumping pipes, as well as all other components previously mentioned, will have to be sufficient in dimension to safely remove the local water inflow.

At the entrance of the settling tank, a measuring unit shall be installed to quantify the amount of water.

4. Transport

All components shall be transported by suitable means of transport and in accordance with industrial safety and road traffic regulations to avoid any damage.

5. Workmanship

The Contractor shall present an organisation chart and a time schedule to the Engineer for approval, giving due consideration to all conditions accompanying the execution of the works.

All components will have to be installed with such care that the success of the measures is guaranteed at any time.

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5. Quality Control

All components must have a valid quality certificate and a valid permission for the intended use.

The quality of the measures taken has to be controlled by permanent visual inspection. The quality of the water released into the watercourse has to be monitored at regular intervals in accordance with the relevant environmental requirements.

7. Measurements

The quantity survey units of the individual components shall be:

Drainage mats	m^2 of mats installed
Drainage pipes	m length of pipes installed
Invert drainage	m of drainage installed and operating satisfactorily
Pump sumps	piece of pump sump(s) installed
Settling tank	piece of settling tank(s) installed incl. all additional components
Installation of equipment	1 piece
Timeframe per measure:	day of operation

3. Acceptance

3.1 Conformity of Work with Design and Technical Specification

The Works shall be carried out in accordance with the design, the Technical Specification(s) and the written instructions of the Engineer.

3.2 Acceptance of Works To Be Removed or Covered

3.2.1 DOCUMENTS AND DATA

The acceptance of works which are to be removed or covered shall be based upon:

- a written statement by the Engineer entered into the Site Book that the works have been executed in accordance with the design and the Technical Specification(s),
- other written statements by the Engineer commenting on the execution of the works.

3.2.2 SCOPE OF WORKS

The scope of works to be removed or covered shall be determined by written statements of the Engineer and by other documents confirmed by the Engineer.

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9. Applicable Regulations

9.1 Standards

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1. Introduction

1.1 Subject of Technical Specification

This Technical Specification (TS) shall define the requirements for the execution and commissioning of tunnel excavation and support works in the Diversion Tunnel at the Niagara Tunnel Facility Project.

1.2 Range of Technical Specification Application

This TS is a bid and contract document used for the execution and commissioning of the works referred to in Item 1.1.

The provisions contained in this Specification refer to the working methods to be adopted for the:

a) delivery of all the components and the entire equipment required to the site

b) excavation of required tunnel cavity by drilling and blasting or mechanical excavation

c) mucking and storage of excavated material

d) installation of required support measures

e) quality control for material and workmanship.

The Scope of Work is defined for the Diversion Tunnel at the tunnel connection area to the outlet and the intake structure during the excavation and support period.

1.3 Definitions

The basic definitions given in this TS are in conformity with the relevant standards in force.

1.3.1 EXCAVATION AND SUPPORT TYPES

The excavation and support works have to be carried out, in compliance with the excavation and support type documentation. This documentation states the allowable excavation volume per round, i.e. the span and the cross-section area of

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the next excavation step and type, as well as the extent and location of the required support measures.

The excavation and support types have been designed based upon the rock mass description and the rock mass behaviour description.

The application of the different excavation and support types at the works is to be determined on site by experienced personnel and by arrangement with the Engineer, taking into account the local geology, verified by visual inspection and documentation, as well as the deformation of the excavated and supported tunnel area, verified by geotechnical measurements and monitoring.

1.3.2 EXCAVATION AND SUPPORT OF TUNNEL ENTRANCE / EXIT AREA

At the tunnel entrance and exit area, the tunnel cross-section is changing from square shape at the intake / outlet interface to circular shape within a stretch of 20 m. This tunnel stretch will be excavated by drilling and blasting adopting the principles of the New Austrian Tunnelling Method (NATM).

1.3.3 MINED TUNNEL PORTAL

For the mined tunnel portal at the intake / outlet, a special excavation and support technique is intended to be employed, taking the cross-section form and the "starting procedure" into account. For this procedure to be adopted, the entire edge of the excavation cross-section is supported with reinforced shotcrete. To limit the excessive breakout of rock mass, caused by blasting, rock dowels with a minimum length of 6 m shall be installed horizontally on top of the crown of the tunnel.

The excavation, by blasting, shall be done in several steps and for the support of the excavation surface, reinforced shotcrete and rock dowels shall be installed immediately after excavation.

1.3.4 DRILLING AND BLASTING

Tunnel excavations involving drilling and blasting shall only be carried out by experienced, well trained personnel. At an early stage, in advance of the proposed use of explosives, the Contractor shall inform the Engineer, third parties, statutory authorities and services which have an interest in the project or are likely to be affected by the blasting operations, of the general nature of the operation. The

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Contractor shall - in due time (at a minimum a fortnight) - subsequently notify the Engineer and all others listed above of the intended use of explosives.

With this notification, the Contractor will submit to the Engineer's approval a detailed method statement considering all aspects of the intended use.

1.3.5 MECHANICAL EXCAVATION, TUNNEL BORING MACHINE

The circular Diversion Tunnel will be excavated with a tunnel boring machine (TBM). In response to the rock mass conditions, a so-called "gripper machine" will be installed.

The tunnel boring machine shall be designed and constructed in such a way that

- horizontal and vertical alignment requirements are met
- the differing conditions of the surrounding rock mass, e.g. rock strength and rock mass strength, parting plane structure can be governed
- the minimum clearance necessary will be achieved for the proper construction of the works and the overbreak will be limited to a minimum
- provisions will be made to resist rotation of the tunnel boring machine
- all materials used will be fire resistant.
- an effective fire-fighting system will be installed on the machine
- adequate access will be granted to all areas of the TBM where work, including maintenance, may have to be carried out

In the design and manufacturing of the TBM it must be ensured that no contamination of excavated material will take place. Material contaminated during the excavation process shall be handled by the Contractor.

Further detailed specifications are described in Subchapter 3, Equipment and Subchapter 5, Workmanship.

1.3.6 MUCKING

The excavated rock material will be mucked out by a belt conveyor, installed at the sidewall of the tunnel.

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1.3.7 MATERIAL DEPOSIT

The excavated material will be deposited as required by the Owner. It will be placed in layers of approximately 0.5 m and compacted according to the storage requirements.

On the designated storage area, a temporary deposit for contaminated materials will be installed. The temporary deposit shall cover a volume of 60,000 m^3 at a maximum (complying with a 15 workday excavation progress).

To meet this requirement, the storage area shall cover a base area of approx. 100 m x 200 m. The material shall be stored in such a way that the slopes will be stable under normal weather conditions. The temporary deposit is sealed against the underground with an impermeable base and surrounded by peripheral ditches and drains to capture any runoff. The runoff will be collected in a separate settlement basin and suitably treated prior to discharge into the water treatment plant of the temporary tunnel drainage.

1.3.8 SUPPORT INSTALLATION

Depending on the defined support types (see above) the respective support measures shall be implemented as described in the corresponding drawings. The support elements which comprise

- reinforced shotcrete
- steel H-beams and steel U-profiles
- rock dowels

are listed in the corresponding Specifications. For the installation of the support elements, a differentiation is made between an area within the TBM, right behind the cutter, and an area behind the TBM. The installation of the support elements will interrupt or even govern the TBM advance.

1.4 General Work Requirements

The Contractor shall be responsible for the quality of material and workmanship and for their conformity with the Design Documentation, other corresponding Specifications and Method Statements and the Engineer's instructions.

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The Contractor shall provide his personnel with the equipment necessary in accordance with the Specification and shall grant them access to the works to carry out their work in a safe and proper way.

Before commencing the works, the Contractor shall propose a concept to the Engineer for approval. The concept shall comprise the equipment envisaged, the scope of work and the work stages.

2. Materials

2.1 Explosives

The mandatory requirements of the Owner will be considered. In addition to that the following items are obligatory as well.

Only licensed explosives and detonators shall be used. Explosives and detonators shall be stored in separate vessels, which shall be protected against damage and misuse. The storage volume on site shall not exceed the needs of two days.

The explosives and detonators used shall be safe in handling until the intended time of use. Explosives shall only be handled and used by the Contractor's duly authorised personnel. The names and qualifications shall be submitted to the Engineer in writing prior to any possible use of explosives.

All statutory requirements for the storage and use of explosives have to be considered. The Contractor shall give notice about the use and storage of explosives to the Engineer and all security services and responsible authorities for approval. This information shall contain

- the volume and type of explosives and detonators stored on site
- the type, construction and location of the different storage vessels
- the authorised personnel with name and qualification
- the shot-firer's name and qualification
- the design of the used blasting system with information about the specific volume of explosives (g explosives / m^3 excavation) and the number and firing sequence of the detonators.

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2.2 Support Elements

The material and handling of the support elements listed above is described in the corresponding Specifications. Reference is made to the

- "Technical Specification Shotcrete"
- "Technical Specification Reinforcement"
- "Technical Specification Rock Dowels"
- "Technical Specification Steel Ribs"

3. Equipment

The works may be performed using any type of equipment approved by the Engineer.

The entire equipment must have a valid quality control certificate and is to be inspected and maintained within regular inspection and maintenance periods.

3.1 General Construction Plants

For excavation by drilling and blasting, within the tunnel entrance / exit areas the Contractor will use a driller for the boreholes and the rock dowel installation and a shotcrete installation plant depending on the method applied (wet or dry shotcrete).

For general delivery and transportation services within the tunnel, trains will be used. A train station will be installed in the lowest part of the tunnel.

A list of construction plants intended to be used and a concept of transportation will be submitted to the Engineer for approval.

3.2 Tunnel Boring Machine (TBM)

In addition to the general definitions (reference is made to Subchapter 1.3.5, Mechanical Excavation, Tunnel Boring Machine) the TBM shall satisfy the following requirements:

- Installation of steel ribs, shotcrete and rock dowels immediately behind the cutter head.

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- Installation of steel ribs, wire mesh, shotcrete and rock dowels from the working platform between the TBM and the gantry, providing ring closure after approximately 40 m.
- Installation of shotcrete and rock dowels from the TBM gantry.
- Arrangement of gripper system in such a way that the support measures to be installed behind the cutter hand will not be obstructed by the position of the grippers.
- Provision of steering and gripper system suitable for hard rock and deformable soft rock.
- Provision of probing facility suitable to drill at least 15 m ahead of the excavation face, without interruption of the TBM advance cycle.
- Provision of access facility in the front of the cutter head for maintenance and other works.
- TBM operation, unimpaired by a damp and wet working environment.
- Maintenance of cutting tools possible at all times from the rear side or the front side of the cutter head.
- cutterhead with minimum peripheral exposure
- cutterhead with Variable Frequency Drive (VFD), fully reversible and allowing increased torque at startup
- hydraulic roof support offering immediate rock support at the rear of the shield "fingers" with full support to protect the workers
- two sets roof drills mounted on a ring gear behind the cutterhead with independent control and bolting while boring, coverage is 360 deg. The rock drills will be designed and equipped to execute cavity grouting and formation grouting from the top of the TBM.

Instantaneous penetration rates for the TBM have been estimated by 2 reputable TBM manufacturers. The estimates are based on propriatory models developed by Robbins and Wirth including studies carried out by the Colorado School of Mines, NTH (Norwegian Institute of Technology) and others.

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Based on STRABAG's empirical data in similar rock formations and in order to allow for the anticipated mixed face conditions, the instantaneous penetration rates obtained from the manufacturers have been reduced by applying a factor of 0.75.

Due to the potential gassy conditions, the TBM will be designed with an electrical system to Class I Div II specifications. In addition, the TBM will be fitted with a methane monitoring system, which consists of a 3 sensor system. The first sensor provides for continuous methane monitoring in the cutterhead, the second sensor is located in the vicinity of the operator and the third senses the ventilation exhaust discharge. Automatic shut down of the main power is accomplished at pre-set levels

In a methane event the essential services will remain on and will be supplied as a Class I Div I explosion proof system these services include:

- Emergency lighting
- Ventilation
- Power for discharge pumps (pump not included)
- Communications
- Methane monitor

3.3 Belt Conveyor

The belt conveyor has to be designed and constructed in such a way that:

- the excavated rock material can be mucked out in the required volume and with the required progress without any interruption of the TBM advance for mucking
- the excavated material will be transported in a safe way and the working personnel will be protected against any kind of incident / accident
- an emergency stop is possible at any time
- the conveyor is protected against misuse

A detailed specification, including an installation plan will be given to the Engineer for approval.

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3.4 Tunnel Ventilation

Ventilation ducting shall be non-combustible.

Atmospheric tests shall be carried out continuously to determine the concentrations of the following contaminants and to ensure that the oxygen content of the atmosphere is at least 20 %.

- Carbon dioxide
- Carbon monoxide
- Hydrogen sulphide
- Methane
- Sulphur dioxide
- Nitrogen oxides
- Oil vapour
- Silica dust

The exposure of any person to silica dust shall not exceed internationally recognised limits, which are approved by the Engineer.

In case of changes in the work procedures or changes in ground conditions, the reference dust measurements shall be checked with traditional documentation measurements.

The procedures for corrective actions shall be described in the emergency plan.

Recirculation of cleaned air will not be accepted.

3.5 Dust control

3.5.1 Dust prevention in the cutterhead

The dust suppression system consists of nozzles on the cutterhead to suppress dust produced by the boring operation. The water or foam passes through a rotary swivel mounted on the back side of the cutterhead

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The flow can be adjusted according to prevailing ground conditions Water or foam can also be sprayed in hoppers to wet the excavated material

3.5.2 Dust control in the tunnel.

Dust control is provided by the design of air flow and the use of dust shields, which are circulation in the lace area is provided by suction. Through careful attention to air flows, the dust is controlled and confined to dust production areas and then carried by piping to the air scrubber system The air scrubber fans are mounted on and are part of the trailing backup system.

4. Transport

All components shall be transported by suitable means of transport and in accordance with industrial safety and road traffic regulations to avoid any damage.

5. Workmanship

5.1 Drilling and Blasting

Boreholes intended to be charged with explosives for blasting shall be drilled in strict accordance with the agreed pattern in spacing, direction and depth.

No borehole shall be charged until completion of all drilling operations at the face.

Blasting operations shall be carried out only under the direction of an experienced operator and explosives shall only be handled by shot-firers. The Contractor will appoint one competent person to be responsible for the security of explosives.

Blasting shall be carried out carefully so as to avoid the loosening or shattering of rock beyond the required line of excavation. All loose or shattered rock shall be removed by scaling down or other means before personnel will be permitted to restart operation after blasting.

If required, the neighbourhood of the blasting location has to be protected against "flying" rock pieces.

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To extract the explosive gases, a minimum fresh air ventilation of 15 minutes is obligatory before the personnel is permitted to resume operations on site.

Notices of blasting operations shall be posted on site. Before each firing, the responsible shot-firer shall give audible warning, clear the area and take measures to prevent personnel from entering the danger area.

No person shall be allowed to approach the face and no face operation shall commence until the authorised person in charge of the operation has given permission.

The results of blasting shall be monitored closely and where appropriate changes of the blasting operation shall be proposed for agreement of the Engineer.

5.2 TBM Operation

5.2.1 INFORMATION TO BE PROVIDED

As part of this Proposal an outline specification of the TBM intended for use is provided.

In addition to full mechanical and electrical details, an assessment of maximum, average, and intended progress rates is to be provided, supported by records from existing machines of the same type under similar ground conditions. The name of the proposed TBM manufacturer shall be stated with information on his experience, production capacity, etc.

5.2.2 INSPECTION OF FACILITIES

The Contractor is to allow the Engineer full inspection of the machine facilities during fabrication or adaptation, testing, installation and commissioning.

5.2.3 MACHINE MAINTENANCE

The Contractor shall provide the Engineer with a proposed machine maintenance schedule, including a list of maintained spare parts and available periods for assessment and acceptance. Details outlining the cooperation and the split responsibilities between the TBM manufacturer and the Contractor shall be given.

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Use of the machine shall not commence until the maintenance schedule is agreed.

5.2.4 PERSONNEL TRAINING

Evidence shall be produced to the Engineer that

- the senior personnel has had previous experience regarding the operation of similar TBMs under similar ground conditions
- the operating personnel has had previous TBM experience or has undergone training in day to day machine use, steering and operation
- the entire personnel has been trained in emergency procedures

5.2.5 WORKING ENVIRONMENT

The TBM shall be designed in such a way that working conditions during operation and maintenance fulfil the health and safety requirements. Care shall be taken regarding working postures, accessibility, quality of air and noise level.

5.3 Installation of Support Elements

In advance of every excavation and support step, the intended excavation and support type for the execution has to be determined in writing by the Contractor's Representative and agreed by the Engineer. The record's shall contain but shall not be limited to such facts as:

- Excavation area (from chainage to chainage)
- Determined excavation and support type (according to described types)
- Length of unsupported excavation area (round length)
- Specifications of the individual support elements, like thickness of shotcrete lining, kind of reinforcement, kind and length of steel ribs, number, arrangement, type and length of rock dowels
- Place of support installation, right behind the cutter head, between TBM and gantry, behind the gantry
- Additional measures like dewatering measures, grouting measures, etc.
- Measurement installation, type, location, arrangement

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The works shall be carried out in compliance with this record. The decision regarding the excavation and support type to be applied will have to be evaluated at every excavation round and will have to be adapted to the local geological and geomechanical conditions of the surrounding rock mass.

The support elements will have to be installed in such a way that they are effective with respect to their required use.

Sufficient quantities of every individual support element will have to be stored on site, to react to unforeseen events, caused by unforeseen rock mass behaviour.

In addition to the designed support elements, liner plates and timber struts in sufficient number and dimension will have to be stored on site.

For reasons of personnel safety, the work site has to be kept safe at any time and as long as necessary for the personnel to be evacuated.

6. Quality Control

All components must have a valid quality certificate and a valid permission for the intended use.

6.1 Quality Test

All materials and components have to be tested with respect to their specific use. Records of the testing shall be produced and submitted to the Engineer for approval. If necessary, adaptations of materials and components have to be made.

Quality tests of all delivered materials have to be carried out regularly. The equipment has to be inspected and maintained periodically to prevent failure during operation.

6.2 Control of Workmanship

The works have to be guided and supervised by experienced personnel. The excavation and support works shall be recorded for every shift. The records shall contain, but shall not be limited to the following information:

- Number of workmen within the team

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- Name of foreman
- Sequence and duration of working steps (excavation, installation of support elements, etc.)
- Tunnel chainage at the beginning and the end of the shift.
- Progress of work
- Special events like unforeseen overbreak, unforeseen deformations, unforeseen water inflow etc. and corrective action
- Additional works like dewatering, grouting, etc.
- Inspections by the Engineer or the Owner's representatives
- Other events like failure of any kind of equipment, incidents /accidents, problems encountered with material delivery, etc.

7. Measurements

The quantity survey unit for excavation shall be m^3 of excavated material.

8. Acceptance

8.1 Conformity of Work with Design and Technical Specification

The works shall be carried out in accordance with the design, the Technical Specification and the written instructions of the Engineer.

8.2 Acceptance of Works To Be Removed or Covered

8.2.1 DOCUMENTS AND DATA

The acceptance of works which are to be removed or covered shall be based upon:

- a written statement by the Engineer entered into the site Book that the works have been executed in accordance with the design and the Technical Specification(s),

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- other written statements by the Engineer commenting on the execution of the works.

8.2.2 SCOPE OF WORKS

The scope of works to be removed or covered shall be determined by written statements of the Engineer and by other documents confirmed by the Engineer.

9. Applicable Regulations

9.1 Standards

Canadian Standards

European Standards

9.2 Guidelines

CEN TC 151 WG4 N8:	Tunnelling machines, road headers, continuous miners and impact rippers, safety requirements; Rev. 13 May 1994
CEN TC 151 WG4 N7	Construction equipment and building material machines - safety in manufacture - tunnelling machines; Rev. 10 July 1994
CEN TC 151 WG4 N22	Tunnelling machines, horizontal thrustboring machines, lining erection equipment, safety requirements; Rev. 10 July 1994

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1. Introduction

1.1 Subject of Technical Specification

This Technical Specification (TS) shall define the requirements for the execution and commissioning of excavation and support works for the Dewatering System in the Diversion Tunnel of the Niagara Tunnel Facility Project.

1.2 Range of Technical Specification Application

This TS is a bid and contract document used in the execution and commissioning of the works referred to in Item 1.1.

The provisions contained in this Specification refer to the working methods to be adopted for the:

a) delivery of all components and the entire equipment required to the site

b) drilling of required boreholes

c) mucking and disposal of excavated material

d) installation of required support measures

e) installation of facilities at the surface

f) quality control for workmanship and material.

The Scope of Work is defined for the Diversion Tunnel at the connection area of the tunnel with the outlet and the intake structure during the excavation and support period.

1.3 Definitions

The basic definitions given in this TS are in conformity with the relevant standards in force.

1.3.1 DEWATERING SHAFTS

For the dewatering of the Diversion Tunnel, five shafts will be provided at the low point of the tunnel. The shafts will be running from the surface to the crown of the tunnel. Their length will be approximately 129 m and their inside diameter will be 750 mm. Coated steel pipes will be used as casing. For the dewatering procedure, pumps with flexible hoses will be installed in the individual shafts. The water collected in the Diversion Tunnel will be pumped via the shafts into a water collection sump, with a diameter of 3,050 mm, which will be located next to the shaft top structure. From there the water will flow through a HDPE pipe, with a diameter of 1,000 mm, to Canal 2. Details are given in the corresponding Drawing.

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1.3.2 SHAFT TOP STRUCTURE

At the shaft tops, the steel pipes are founded with rectangular concrete slabs, flexibly bedded on the ground. These pipes are covered with blind flanges, equipped with a vent with screen. Details are given in the corresponding Drawings.

1.3.3 PUMP SUMP

At the bottom of the Diversion Tunnel, a 2.0 m x 2.0 m x 2.0 m pump sump will be installed. To accommodate this pump sump, the tunnel will be deepened, covering an area 6.0 m in length x 4.0 m in width. The invert will be made of cast-in-place, reinforced concrete with a minimum thickness of the required final lining thickness.

The pump sump will be covered with a fixed and perforated cover construction, which can be removed.

1.3.4 SHAFT EXCAVATION OVERBURDEN

The overburden material is described as soil. Therefore the shaft excavation in this layer will be done from the surface. The excavated hole, will be covered with a casing pipe, which will be advanced simultaneous to the drilling. The excavation diameter will be 1,050 mm. The casing pipe will be removed while filling the annulus between the final steel pipe and the borehole surface with cement-sand grout.

1.3.5 SHAFT EXCAVATION ROCK MASS

In the hard rock area, the shafts will be excavated adopting the raise-boring method. With this method, a pilot hole is drilled from the surface or the top end. At the low point of the borehole in the tunnel cross-section, a reamer with the required excavation diameter is connected to the drill rod and the excavation is done by pulling the rotating reamer back to the surface. The excavated material which falls into the tunnel can then be mucked out.

1.3.6 FINAL CASING

The final casing will be made of coated steel pipes with a wall thickness between 8 mm and 30 mm. The inside diameter will be 750 mm. The steel pipes will be coated on the interior and the exterior in compliance with the surrounding conditions. At defined distances, steel spacers will be provided at the pipe outside to keep the pipe string centric and to transfer the vertical loads to the surrounding rock mass.

The coating material requirements are specified below.

1.4 General Work Requirements

The Contractor shall be responsible for the quality of material and workmanship and for their conformity with the Design Documentation, other corresponding Specifications and Method Statements and the Engineer's instructions.

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The Contractor shall provide his personnel with the entire equipment necessary in accordance with the Specification and shall grant them access to the works to enable them to carry out their work in a safe and proper way.

Before commencing the works, the Contractor shall propose a concept to the Engineer for approval. The concept shall comprise the equipment envisaged, the scope of work and the work stages.

2. Materials

2.1 Steel

The steel of the pipes shall be a high-quality steel in accordance with the C.S.A. Standards. Its characteristic yield strength shall not be lower than 240 MPa.

The spacers shall be of the same quality as the pipes and shall be factory-welded onto the pipe segment.

2.2 Coating

The installed steel pipes will be coated

On the exterior: with a 3-layer polyethylene (PE) coating

On the interior: with a fusion-bonded epoxy coating

The coatings will generally be factory-applied, yet the coating at the welded segment joints will be completed on site.

2.3 Annular Grouting Material

The annular grouting material shall be made of sand, cement and water, using approximately two parts of sand, one part of cement and one part of water. The detailed composition shall be adjusted by trials.

2.4 Concrete

The concrete for the concrete slab at the top of the shafts shall be a grade C-2 quality according to the C.S.A. Standard A23.1-00.

The concrete for the pump sump shall be of the same quality and specification as the concrete for the invert segment. Reference is made to the corresponding "concrete works, invert segment" Specification.

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3. Equipment

The works may be performed using any type of equipment approved by the Engineer.

The entire equipment must have a valid quality control certificate and is to be inspected and maintained within regular inspection and maintenance periods.

3.1 Overburden Excavation

For the overburden excavation, standardized equipment for shaft excavation of this diameter will be used.

3.2 Raise Boring Equipment

The equipment will comprise the following components (example):

Machine:	Tamrock Rhino 1000DC. Weight: 14,000 kg (with crawler 18,000 kg). Height: 5,450 mm (with beams 5,800 mm)
Stabilizers:	11"-12¼" integral stabilizers
Drill rods:	10", 1.52 meter long (high strength)
Pilot bit:	11" – 12 ¼" tricone roller bit (Sandvik or Baker Hughes)
Reamer head:	Sandvik CRH 3, weight (total): 2,600 kg
Cutters:	Sandvik CMR-41 and CMR-52

3.3 Pipe Installation

For the pipe installation, standardized equipment for this kind of pipe installation will be used.

4. Transport

All components shall be transported by suitable means of transport and in accordance with industrial safety and road traffic regulations to avoid any damage.

5. Workmanship

5.1 Drilling and Casing in Overburden

The drilling and casing of the borehole will be carried out simultaneously from the surface. Because of the water sensitivity of the surrounding soil material, water-base mud will have to be avoided.

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The casing will be removed, while filling the annulus with the sand-cement-grout composition.

5.2 Raise Boring

5.2.1 SET-UP

1. An unarmored concrete slab, 5 m x 4 m x 0.25 m (length x width x height) is cast on an air-cleaned and well-leveled rock surface. The clearance height above the concrete slab shall be >6.5 m.
2. Two foundation beams are placed and positioned on the concrete slab. Each beam is held by twelve anchor bolts, diameter 20 mm - 25 mm with a length of 1600 mm, grouted into solid rock.
3. The raise borer is mounted on the beams and erected. The initial drilling direction is adjusted in one direction with the help of adjustable spanners and in the other direction with the help of shims placed between the foundation beams and the concrete slab.
4. A water re-circulation basin of 50 m^3 at a minimum, is built adjacent (within 30 meters) to the drill site with double 4" steel pipes connecting the basin with the raise boring rig.
5. Before starting the pilot hole drilling, the initial drilling direction is controlled and all anchor bolts are tightened.

5.2 PILOT HOLE DRILLING

1. The pilot hole drilling commences slowly and carefully with low load and rotation.
2. Upon completion of the first stabilizer, the initial drilling direction is controlled by Skanska and the Client (in special occasions) and adjustments are made - if necessary.
3. The pilot hole drilling continues, by adding one stabilizer to each other, carefully until the whole stabilizer package has been drilled into the rock.
4. The pilot hole drilling continues with normal load and rotation by adding one drill rod after another. Rock samples, coming up with the flush water, can regularly be taken for tests or inspections. If fractures or significant changes of the rock conditions are recognized, the thrust and rotation of the pilot bit is adjusted in line with our experience. If the flush water disappears, grouting may be necessary. (In case of Directional Drilling: values from the directional drilling tool are continuously displayed on a laptop computer in the operator's cabin, and saved on disc.)
5. Once the pilot hole has reached its final depth, the deviation from the theoretical point of break through will be measured.

5.2.3 CHANGING OF DRILL BIT FROM PILOT BIT TO REAMER HEAD

1. After breakthrough, the pilot bit will be dismantled and the reamer head will be connected.
2. The reamer will be taken down to the lower tunnel and put in the right position to be mounted.

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3. Once put in the right position, the threads will be connected and fully torqued. At this point, the reamer must be locked, for example with the help of the machinery available inside the tunnel.

5.2.4 UP-REAMING TO FINAL RAISE BORE DIAMETER

1. The reaming phase commences from the bottom upwards, first carefully until the reamer head has full contact with the rock surface and then at normal load and rotation. The thrust and rotation will be adjusted, from time to time, in line with the experience acquired and the rock conditions encountered.
2. The cuttings produced by reaming will consist of fine material. The material will fall down through the shaft and pile up at the bottom where mucking is carried out.
3. When the reamer head will have reached the machine, it will be secured with chains and the machine will be de-mobilized. The reamer head will then easily be lifted out of the hole with a crane or a similar device.

5.3 Pipe Installation

The pipe string will be composed of prefabricated segments welded together on site. The steel thickness requires the welding method to be adopted. The welded joints shall have the same bearing capacity as the regular pipe walls. At the joints, the coating is completed on site.

The pipe string will be installed from the surface connecting the pipe segments and driving the string into the borehole all the way to the bottom.

After installation of the pipe string, the annular space will be grouted with the required grout composition. At last the pipes will be covered with blind flanges and the shaft top construction will be completed.

6. Quality Control

All components must have a valid quality certificate and a valid permission for the intended use.

6.1 Quality Test

All materials and components have to be tested for their specific use. Records of the testing shall be produced and submitted to the Engineer for approval. If necessary, adaptations of materials and components have to be made.

Quality tests of all delivered materials have to be carried out regularly. The equipment has to be inspected and maintained periodically to prevent failure during operation.

6.2 Control of Workmanship – General

All kinds of specified works have to be controlled and supervised for their adequacy according to the design and other method statements and specifications. The works shall be recorded daily,

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furnishing information on progress, name of responsible people, number of workmen, used equipment, unforeseen events, etc.

6.3 Control of Workmanship – Raise Boring

6.3.1 RECORDS

1. For all works, a diary shall be kept on a day to day basis, describing activities, progress, notes, etc..
2. In addition, a drill record shall be produced when drilling. This record shall document the drilling characteristics for each drill rod, including such information as rod no., type of drilling (pilot hole or reaming), date (year, month, day), start time (hour, minute), stop time (hour, minute), load (metric tones), penetration (meter per hour), accumulated bored length (meter) incl. average length (value of directional drilling tool)

All records will be available to the Engineer's checking and approval.

6.3.2 CONTROL PROCEDURES

Prior to commencement of drilling works

The position and the alignment of the raise borer is controlled and documented in the diary. The tightening of all anchor bolts, holding the raise borer, is controlled.

During performance of drilling works

Upon completion of the first stabilizer, the initial drilling direction is controlled and documented in the diary (adjusted - if necessary). All drilling parameters (load, RPM, etc.) are continuously controlled (by the operator) and adjusted to the actual drilling situation. The parameters for each drill rod are to be noted down in the drill record. The rock cuttings are collected by the operator for visual inspection or test.

Upon completion of drilling works for pilot hole

Upon completion of the drilling works for the pilot hole, the final position and the length of the pilot hole will be measured and the results will be added to the diary.

6.4 Control of Workmanship – Annular Grouting

The success achieved by annular grouting has to be evaluated by recording the grout volume, the grouting pressure, and the grouting time. The values obtained have to be compared with the values calculated based on theoretical conditions.

7. Measurements

The quantity survey unit of the excavation shall be m^3 excavated material. The quantity survey unit of the installed pipes shall be m.

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8. Acceptance

8.1 Conformity of Work with Design and Technical Specification

The works shall be carried out in accordance with the design, the Technical Specification(s) and the written instructions of the Engineer.

8.2 Acceptance of Works To Be Removed or Covered

8.2.1 DOCUMENTS AND DATA

The acceptance of works to be removed or covered shall be based upon:

- a written statement by the Engineer entered into the Site Book that the works have been executed in accordance with the design and with the Technical Specification(s),
- other written statements by the Engineer commenting on the execution of the works.

8.2.2 SCOPE OF WORKS

The scope of works to be removed or covered shall be determined by written statements of the Engineer and by other documents confirmed by the Engineer.

9. Applicable Regulations

9.1 Standards

Canadian Standards

European Standards

* * *

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Appendix 1.1(vv)

Appendix 1.1(vv) - Owner's Mandatory Requirements

1. GENERAL

1.1 Introduction

1. The Mandatory Requirements cover the minimum requirements for the design, instrumentation, construction, testing, commissioning and other requirements necessary for the performance of the Work. These requirements are the minimum acceptable requirements for the Work. The Contractor shall develop additional requirements and Specifications as necessary to perform the Work.

2. These requirements shall be used in conjunction with the Summary of Work, Concept Drawings and other information as provided by the Owner to perform the Work.

1.2 Operating Environment

1. The tunnel and all ancillary equipment required for its safe operation shall be capable of adequate operation under all weather and river conditions.

1.3 Water Surface Elevations

1. Water surface elevations defined in Appendix 1.1(sss) shall be used in the design of the Tunnel Facility Project as appropriate.

1.4 Water Level Gauges

1. The water level gauges for measuring the intake and outlet canal water levels are as shown on the Concept Drawings.

2. These gauge locations shall be used in conjunction with the hydraulic design levels defined in Appendix 1.1(aa) for determining the GFA of the tunnel.

1.5 Design and Service Life

1. The primary elements of the Niagara Tunnel Facility Project are required to be designed and constructed for a service life of 90 -yrs with no tunnel outages during such 90-yr life. Elements not specifically required to be designed to a 90-yr service life shall be designed to applicable and appropriate codes, guidelines and standards that are commensurate with their intended purpose.

2. The following elements shall be designed and constructed to a 90-yr service life:

   (a) tunnel lining system, including

      (i) reinforced concrete lining

      (ii) annular grout

(iii) impermeable liner if used

(iv) gaskets and/or any other water control features incorporated in the Work

(b) intake structure

(c) outlet structure.

3. Assessment of 90-Yr Service Life

(a) **Loading –** The tunnel lining system and intake and outlet structures shall be designed for all short- and long-term prescribed time-dependent loading and deformations. The 90-yr service life shall be deemed to have been met by demonstrating compliance with the long-term time-dependent loading and deformations prescribed in Section 8.3 of this Appendix.

(b) **Loading and Deformation –** Compressible annular grout, if proposed, and compressible materials at the intake and outlet structures shall be designed to accommodate all short- and long-term time dependent loading and deformation as prescribed in Section 8.3. Confined compressive testing of annular grout mixes with a confining pressure equivalent to the applied pressure shall be performed to determine the compressive strength of the grout at the calculated long-term (90-yr) deformation. The 90-yr service life shall be deemed to have been met by demonstrating through testing that the measured compressive strength of the grout at a strain equivalent to the 90-yr deformation assumed for the design is greater than the ultimate design strength (f_c') of the grout.

(c) **Sulphate Attack –** The cement for the annular grout and reinforced concrete lining shall be designed to resist the effects of sulphate attack. Accelerated tests shall be performed on the annular grout and lining concrete mixes. The 90-yr service life shall be deemed to have been met by demonstrating through testing that the mixes are resistant to sulphate attack derived from the highest values of sulphate concentrations for the groundwater in contact or potentially in contact with the tunnel lining or annular grout over a 90-yr period.

(d) **Corrosion from Chloride Penetration –** The tunnel lining system shall be designed to be resistant to corrosion from chloride penetration. The 90-yr service life shall be deemed to have been met by demonstrating that the time taken to reach the corrosion threshold at the reinforcing steel, based on chloride diffusion rates for the concrete and chloride levels present in the groundwater in contact or potentially in contact with the tunnel lining or annular grout , exceeds 90 years. Tests to derive chloride diffusion rates used to demonstrate compliance with 90-yr service life shall be in accordance with test methods in accordance with the Nordtest Method, NT Build 443 (Approved 1995-11), Nordic Innovations Centre, or as otherwise approved by the Owner.

(e) **Abrasion –** Concrete in water passages shall be designed to be resistant to the abrasive action of water flow, entrained ice and debris. For this purpose, concrete in water passages shall be dense, have a low water/cement ratio and be of sufficient strength. Precedents in projects of similar conditions shall be used to establish the required concrete material properties and to assess compliance with the 90-yr service life.

1.6 Safety by Design

1. Design methods consistent with the 'Safety by Design' approach shall be used.

1.7 Equipment Isolation and Interlocks

1. All equipment that can instantaneously release dangerous amounts of energy to personnel maintaining the equipment shall be fitted with adequate isolation devices and lockout mechanism as required by the Owner.

2. Electrical breakers must be lockable in open and closed positions and must have visible contacts (Visibreak). Valves must be lockable in open and closed positions.

3. All safeguarding devices (interlocks) that signal equipment to stop shall comply with the appropriate Canadian Standards Association, American National Standards Institute, International Organization for Standardization or European Norm. The Contractor shall provide documentation to the Owner certifying that all such safeguarding devices have been manufactured and installed in accordance with manufacture's instructions and that the protective devices have been manufactured or modified to meet current applicable standards.

4. For all other safeguarding devices, the Contractor shall provide documentation to the Owner certifying that the protective element is installed in accordance with the manufacturer's instructions and current applicable standards.

1.8 Dam Safety

1. The outlet closure gate equipment will be tested for operation by the Owner at a minimum once yearly after Final Completion Date. For this purpose, the gate equipment shall be capable of being operated over any partial range within its full range of operation.

1.9 Condition Surveys

1. Pre-construction and post-construction condition surveys shall be undertaken by the Owner of all buildings and infrastructure including any active recorded drinking water wells within 300 m of the construction works, including but not limited to the INCW, the PGS station and dykes, and third party properties. Independent consultants, qualified in this work, will carry out the condition surveys. The Contractor shall review and accept the results of these surveys. These surveys will be

used to determine the impact, if any, of the performance of the Work on the surveyed buildings and infrastructure.

2. ENVIRONMENTAL PROTECTION

2.1 General

1. As they relate to the performance of the Work, the Contractor shall be responsible for

   (a) compliance with the EA and the EA Approval, and for fulfilling all associated EA Approval conditions; and

   (b) compliance with Department of Fisheries and Oceans Authorization 5250-43.

2. All necessary Approvals shall be in place prior to undertaking the relevant element of Work.

2.2 Minimum Requirements

1. The Woodlands Reserve Area and meadow identified on the Concept Drawings shall be protected with fencing paid for and installed by the Contractor. Trespassing within these areas by Contractor Personnel is not permitted.

2. Trees to be cut shall be flagged and shall only be cut after approval by the Owner.

3. On-Site burning shall not be allowed.

4. Tree clearing and grubbing shall not occur between May 1 and June 15 to avoid the main bird nesting and raising period, unless approved by the Owner.

5. The Contractor shall demonstrate, through testing, that the areas where the "contaminants" (as defined under the *Environmental Protection Act* (Ontario)) were stored have been remediated to meet the soil, groundwater and sediment standards of Regulation 153/04, Environmental Protection Act (Ontario), for non-potable groundwater criteria for industrial land use sites, as more particularly set out in Table 3 of MOE publication entitled "Soil, Groundwater and Sediment Standards for Use Under Part XV.I of the *Environmental Protection Act* (Ontario)."

6. If fuelling facilities are required on Site, there shall be only one such fuel facility located at the outlet work area. The fuel tanks shall be stored above ground on a concrete pad and shall comply with Technical Standards and Safety Authority Liquid Fuels Handling Code.

7. Sewage holding tank(s) shall be installed to average the flow rates prior to sewage disposal into the City of Niagara Falls sanitary sewer.

8. The Contractor shall take all necessary measures to ensure that hourly equivalent sound levels from construction activities are met at sensitive receptors in accordance

with MOE Publication NPC 205, unless written exceptions have otherwise been obtained.

9. Construction equipment and trucks shall meet the requirements of MOE Publications NPC 115 and 118. They shall be measured at a distance of 7 m (15 m for tracked drills and heavy trucks) according to the standards and procedures prescribed in MOE Publication NPC 103 to confirm their compliance. Measurements shall take place before the equipment is used and annually thereafter. For new equipment where manufacturer's data are available, the first measurement may be waived.

10. Blasting

    (a) All blasting shall be undertaken in compliance with NPC 119 as applicable unless exceptions obtained.

    (b) The Contractor shall establish standard blast warning codes.

    (c) Notice of blasting shall be placed in local newspapers. The Contractor shall develop and submit a protocol for informing immediately affected residents, Niagara Parks Commission, Niagara Helicopters, OPG, Hydro One, Niagara Falls Bridge Commission, City of Niagara Falls and Town of Niagara-on-the-Lake of the blasting schedule.

    (d) Monitoring of all ground vibrations shall be undertaken during all blasting, with special emphasis on the INCW structure, the PGS dyke and the PGS generating station. The peak particle velocity shall be monitored at all structures with the peak ground acceleration also monitored at the downstream toe of the PGS dyke at its closest proximity to the outlet canal excavation. The Contractor shall make his own assessment of the effects on blasting on structures and establish appropriate limits; however, the limits defined in the following table shall not be exceeded.

Limits on Blast Vibrations

Measurement	**Limit**
Peak Partical Velocity (at structure)	<30 mm/s
Acceleration, 2/3 Peak Value (at toe of PGS dyke)	0.04 g

    (e) All blasting material shall be stored in a designated magazine building which shall be securely locked at all times. A weekly audit of blasting material shall be made and reconciled with blasting materials actually used at the Site. The Contractor shall notify the Owner immediately of any missing blasting material.

(f) The Contractor shall comply with DFO Authorization 5250-43 issued under Section 32 of the Fisheries Act for underwater blasting.

3. DISPOSAL OF EXCAVATED MATERIAL

1. The Contractor shall provide a temporary storage pad in the main construction facilities area for holding any excavated material suspected of being contaminated (including formations containing benzene, toluene, ethyl-benzene and xylene). Such materials will be stored until the results of chemical testing are available to determine how the material is to be managed and disposed of to the Approval of the Governmental Authorities having jurisdiction. The storage pad shall have an impermeable base and shall be surrounded by peripheral drains/ditches to capture any runoff. The runoff shall be suitably treated prior to discharge. The storage pad shall be of sufficient size to hold a minimum of 15 working days of excavated material.

2. Where a surge pile or stockpile is provided at the outlet area, including the stockpile at the designated disposal area, any runoff from the surge pile or stockpile shall be directed to a Contractor-supplied water treatment facility that has Approvals prior to discharge into any watercourse.

3. Methods of depositing of material in the stockpile shall ensure good compaction with side slopes, such that the surface provides sufficient slope for drainage at all times, and any ponding of water on the surface does not be occur. The stockpile shall be designed and constructed to be permanently stable on the underlying foundation material with side slopes not steeper than two horizontal to one vertical.

4. At completion of the Work, the Contractor shall ensure that the surface of the stockpile is generally level, such that the difference in elevation over any part of the stockpile shall not exceed 1 m, and the surface shall be graded smooth and crowned sufficiently so as to drain to the edges of the stockpile. The toe of the stockpile shall not encroach on any elevation lower than 180 m, unless approved in writing by the Owner, and shall be no closer than the distance specified on the Concept Drawings to the edge of the existing canals. Stock piles will be revegetated to reduce long-term erosion.

5. The Contractor shall ensure that its stockpiling operations at the disposal area does not cause damage, or limit the Owner's access, to the existing transmission line that is located on the southern edge of the stockpile area. The toe of the stockpile shall be no closer than 5 m from any part of the structure of the towers, or of the location in plan of the overhead lines.

6. The Contractor is required to sample excavated material to determine if contaminants have been introduced by the Contractor during the course of the work. Any material found to be contaminated shall be segregated and treated by the Contractor prior to being delivered to the disposal site.

7. Excavated rock suitable for aggregate production shall be disposed off-site in accordance with Applicable Laws and in a manner to facilitate its use as aggregate.

8. No excavated material shall be spilled into a watercourse.

4. TUNNEL, INTAKE AND OUTLET ALIGNMENT

4.1 Tunnel Alignment

4.1.1 Alignment Constraints

1. The alignment of the tunnel shall satisfy the following requirements:

   (a) the submerged intake of the tunnel shall be located beneath Gate 1 of the INCW at the location and orientation indicated on the Concept Drawings

   (b) the outlet structure of the tunnel shall be located on the northwest side of the SAB2 Canal at the location and at the azimuth indicated on the Concept Drawings

   (c) the horizontal alignment of the tunnel shall remain within the subsurface right of way as indicated on the Concept Drawings. The vertical alignment indicated on the Concept Drawings was the basis for the EA Approval. Deviation from this vertical alignment, indicated on the Concept Drawings, may require an amendment to the EA. The Contractor shall be responsible for obtaining such an amendment.

   (d) the tunnel alignment shall not preclude future construction of a similarly designed tunnel with an intake beneath Gate 4 of the INCW and an outlet structure parallel and located south of the new tunnel outlet structure

   (e) the tunnel alignment shall be such as not to cause a material change in the in-situ stress regime at the existing tunnels or the Toronto Power Generation Station wheel pit as determined by numerical analyses such as PHASE2 or equivalent

   (f) a dewatering station shall be provided at the low point of the tunnel. The shafts shall be located on the Owner's land east of the buried St. Davids Gorge.

5. INSTRUMENTATION

5.1 Purpose

1. Instrumentation during tunnel construction shall be installed and monitored until Final Completion by the Contractor, as required, to

   (a) monitor movements of existing structures and buildings affected by the Work to ensure their protection, structural integrity and safety

(b) monitor the tunnel and response of adjacent rock at a single section to be selected by the Owner during construction, filling and commissioning

(c) monitor response of initial lining to the imposed rock loading at locations as required on the basis of observations during tunneling

(d) monitor groundwater piezometers around the tunnel.

2. Standpipe tunnel piezometers to monitor the tunnel piezometric during tunnel operation.

5.2 Instrument Type

1. Surface movement monitoring point (SMMP)-A surface movement monitoring point is a marker fixed to a surface, and used for the measurement of the vertical and horizontal movements of that surface. SMMP shall be permanent pins on structures or grouted rods in rock. Survey equipment (theodolite, level, electronic distance measuring device, tape extensometer), shall be capable of measuring vertical and horizontal movements of the SMMPs to ±1 mm.

2. Multiple Point Borehole Extensometers (MPBE)-A multiple point borehole extensometer is a device installed in boreholes for monitoring the changing distance between more than two points along the axis of the borehole. The MPBE shall be of the vibrating wire type and shall be capable of determining the relative position of each anchor to the surface installation with a repeatability of ±0.1 mm.

3. Groundwater Piezometer-A groundwater piezometer is a device that is sealed within the ground so that it responds only to groundwater pressures around itself. Piezometers shall be of the vibrating wire type and shall be capable of measuring the head of water at the piezometer tip to a repeatability of ±0.1 m.

5.3 Minimum Instrumentation Requirements

5.3.1. Surface Movement Monitoring

1. Install SMMP on masonry or buildings prior to commencing any excavation. Buildings shall include, but not be limited to, INCW structure Bays 1 to 5 and the INCW control and maintenance buildings.

2. Install a series of SMMPs on the INCW structure on Bays 1 to 3 above the intake excavation with a spacing of no more than 5 m.

3. Install SMMP's at the pier nose of Piers 1 and 2.

4. Install a plumbline at the pier nose of Piers 1 and 2 extending to rock level. The plumbline shall have measuring tables at least three locations.

5.3.2. Excavation Monitoring

1. Install a permanent array of a minimum of one MPBE on each vertical or near vertical rock cut at the intake and outlet structures at approximately the midpoint that shall have, as a minimum, monitoring positions (anchors) at 20, 10, 5 and 2 m from the wall of the excavation. Electrical leads shall be in watertight conduits leading to a lockable watertight box located at the deck level.

2. Monitor tunnel convergence following installation of the primary lining by tape extensometer or survey methods repeatable to ±1 mm as required, dependent on response to imposed rock loads. Number and locations of monitored sections shall be agreed with the Owner.

5.3.3. Instrumented Tunnel Section

1. The following instrumentation shall be installed at one section of the tunnel as selected by the Owner:

   (a) install a permanent array of a minimum of eight MPBEs that shall have, as a minimum, monitoring positions (anchors) at 25, 10, 5, 2 and 1 m radially from the inside surface of the tunnel lining. Installation shall be completed and the initial readings taken before the tunnel face advances more than 25 m beyond the array. This array of MPBE shall be capable of being monitored remotely from the surface during the initial filling and operation of the tunnel.

   (b) install a permanent array of a minimum of six piezometers around the exterior of the tunnel lining and one on the interior of the lining at the tunnel invert. The array of piezometers shall be capable of being remotely monitored from the surface during the initial filling and operation of the tunnel.

   (c) electrical leads for MPBEs and piezometers shall be in watertight conduits, adequately fixed to the tunnel crown and extending up one of the dewatering shafts leading to a lockable watertight box located at the top of the shaft.

5.3.4. Tunnel Standpipe Piezometers

1. Tunnel piezometric levels shall be measured at two locations along the alignment of the tunnel at approximate chainages 30+00 m and 90+00 m. Each location shall consist of two standpipe piezometers, 2 to 20 m apart, extending through the tunnel lining at the tunnel crown to the ground surface. Final locations shall be agreed with the Owner prior to installation.

2. Piezometer holes shall be cased with a corrosion resistant casing with a minimum 95 mm inside diameter. The annular gap between the rock and the casing shall be grouted to prevent groundwater migration between the different rock formations.

3. Detailing of the piezometer fitting at the tunnel crown shall ensure that the velocity head is not measured and that degradation of the adjacent tunnel lining or fitting does not occur. The fitting shall be corrosion resistant.

4. The piezometer shall be embedded in concrete at the surface with adequate detailing to prevent problems of ground movement due to frost heave. A watertight, lockable cap shall be provided.

5. Arrangement of piezometers shall be consistent with flow verification requirements.

6. STRUCTURES AND EXCAVATIONS

6.1 General

1. The Contractor shall establish all design parameters, load cases and load combinations as required by Applicable Laws, codes, standards and guidelines, this Agreement and as necessary for the design and construction of structures fit for their intended purpose, robust, reliable and maintainable, with adequate safety factors and detailed to deal with all conditions throughout their required 90-yr service life. Normal, unusual and extreme conditions of loading shall be considered in determination of the design loads.

6.2 Stability

1. Stability of the structures shall be checked using the limit equilibrium method using guidelines outlined by the United States Bureau of Reclamation or the Corps of Engineers. Load cases shall be developed in the most critical combinations and adequate factors of safety against sliding, uplift, overturning, including base stresses, provided.

2. Passive pressures due to backfill shall not be considered.

3. The weight of rock in a mobilized wedge above the structure shall only be considered in the calculation of uplift stability.

4. Cohesion at the concrete rock interface shall not be assumed.

5. Rock anchors shall not be used to provide the required stability of gravity structures.

6. The stability of the excavations shall be evaluated and provision shall be made in the design for rock support to be installed as identified in the stability evaluation. The evaluation and design of the excavation shall take into consideration the requirements for

   (a) the stability of the INCW

   (b) permanent stability conditions of the vertical faces.

7. Permanent rock support systems, where required, shall be provided with suitable corrosion protection.

6.3 Effects on Existing Structures

1. The Contractor shall investigate the effects of tunnel construction on existing structures, including, but not necessarily limited to,

   (a) the effects of deformation on equipment operation including the INCW gates

   (b) the effects on structural strength and integrity

   (c) the effects on structural stability.

6.4 Excavation

1. The sides of the intake channel and outlet canal excavations shall be line drilled and controlled blasting techniques employed to ensure that the rock beyond the excavation limits is not damaged or destabilized by the blasting operation. Any damaged rock shall be removed and backfilled with concrete adequately tied back to sound rock to produce the requisite excavation lines.

2. Due to the need for blasting at close proximity to the INCW, preset rock reinforcement may be required to be provided prior to excavating for the intake to secure the integrity of the foundation of the control structure.

3. During excavation, methods shall be employed to prevent damage to existing structures and buildings and to prevent detrimental effects to the operation of existing equipment. Blasting velocities shall be carefully controlled and monitored to ensure adequate control.

4. Any exposed shaly rocks or shale layers which are susceptible to deterioration upon exposure to wetting and drying cycles and large temperature differences shall be immediately protected by shotcrete.

6.4.1. Outlet Canal Rock Plug Removal

1. The outlet gate shall be closed and under balanced water conditions during rock plug removal.

2. Excavated material shall be removed from the PGS canal prior to the PGS canal being brought back into operation.

3. A sounding survey of the PGS canal shall be performed before and after removal of the rock plug to verify that no excavated material remains within the PGS canal and the results submitted to the Owner.

4. No material shall be allowed to be carried down the PGS canal during and after removal of the rock plug.

6.5 Intake Structure, Intake Channel and Intake Approach and Accelerating Walls

1. The location and dimensional geometry of the intake channel and intake approach wall are fixed as defined on the Concept Drawings as adjusted for final tunnel slope and diameter. The alignment and dimensional geometry of the ice accelerating wall is generally as shown on the Concept Drawings. The intake channel, ice accelerating and approach walls shall be designed and constructed to convey water smoothly into the intake structure and shall provide satisfactory performance for both open water and ice conditions.

2. The intake structure location, internal dimensional geometry, and transition from the shape at the entrance to the circular shape of the tunnel are fixed as defined on the Concept Drawings. Adjustment to the geometry for tunnel diameter or tunnel slope shall be as indicated on the Concept Drawings.

3. The intake and outlet structures shall be designed and detailed with an appropriate compressible material or other means to accommodate a minimum of 100-mm movement due to time-dependent deformations of the rock.

4. Suitable venting shall be provided at the intake behind the sectional gate to permit aeration of the tunnel during filling and dewatering. Vent sizing shall be such as to limit noise levels during filling and dewatering to the relevant noise restrictions.

5. A cover shall be provided over the top of the sectional service gate openings in the intake structure to avoid the possibility of ice being drawn into the structure. The cover shall be of ample mass to prevent dislodgement and shall be detailed to prevent seizing of the cover after prolonged submergence. Appropriate lifting devices shall be provided on the covers to enable the sectional service gate follower to engage and lift the gate slot cover.

6. The intake approach wall shall be blended into the existing SAB2 intake wall.

7. The accelerating and intake approach walls shall be adequately capped with concrete.

8. The Contractor shall

   (a) provide the facility for bubbling along the river side of the cofferdam in the event that ice starts to form along the cofferdam or sticks to its walls;

   (b) design and construct the cofferdam to minimize impact on flow at the INCW; and

   (c) remove the existing ice accelerating wall and construct the new wall prior to construction of the cofferdam at the intake.

6.6 Dewatering System Shafts

1. Each shaft shall be circular, with a minimum internal diameter of 1.05 m in overburden and 0.915 m in rock to accommodate the Owner's pumping equipment and arrangement. The shafts shall be located on the centreline of the tunnel so that the pumps can be positioned over the tunnel invert. One sump shall be provided at the invert below one of the dewatering shaft locations such that a submersible pump can be positioned below the tunnel invert to achieve the required operating submergence in the final stage of dewatering.

2. The shafts shall be capped for normal operation of the tunnel and the cap shall be protected from pressure surges with air vents.

3. The dewatering shafts shall be lined in the overburden section with a corrosion resistant sleeve.

4. The rock portion of the dewatering shafts shall also be lined with a corrosion resistant sleeve and the annulus between rock and sleeve grouted to prevent groundwater migration between different rock formations.

5. A sump shall be provided at the invert of the tunnel to allow the suction inlet of one pump to be lowered into the sump to provide the necessary operating submergence.

6.7 Demolition of Dewatering Structure

1. Means and methods used in demolition of the dewatering structure shall be such as to minimize impact on the operation of the PGS. Construction activities shall be coordinated with the Owner as indicated in Appendix 1.1(sss), Section 3.1(c).

2. The piers shall be removed flush with the sill. Abutment piers shall be retained; however, any loose sections of concrete shall be removed or tied back to sound rock.

3. Demolished materials shall be removed from the PGS canal. A sounding survey as required by Section 6.4.1.3) shall be performed. No demolished material shall be allowed to be carried down into any of the other existing canals.

4. The relocated waterline shall be constructed to the same standards and details as the existing waterline running over the dewatering structure. The waterline shall either be relocated to run across the PGS canal at the downstream deck of the PGS or near its existing location by means of a pipe bridge. The waterline shall be relocated and in operation prior to the start of demolition of the dewatering structure. The commissioning procedure shall minimize disruption of water supply. Commissioning shall be coordinated with the Owner.

7. INTAKE SECTIONAL SERVICE AND OUTLET CLOSURE GATES, HOISTS AND GUIDES

7.1 General

7.1.1. Intake and Sectional Service Gate

1. A sectional service gate shall be provided to isolate the tunnel from the upper Niagara River GIP at the INCW to facilitate dewatering by OPG. The service gate shall be installed under conditions of no flow when there is a requirement to dewater the tunnel. The top gate section shall be fitted with a manually actuated, non-hydraulic, equalizing valve to allow for equalizing the water pressure across the gate. The gate shall be removed under balanced head conditions once the tunnel is filled.

2. The sectional service gate shall be designed to be installed using mobile cranes situated on the INCW. Mobile crane loads shall be limited to the specified bridge capacity. Outriggers may be situated on the extended piers during lifting; however, outrigger loads shall not cause distress to the structure. Service gate sections shall be sized to match the mobile crane equipment at the required reach and arrangement.

3. The sectional service gate follower shall provide a means to engage and disengage from the gate or slot cover with control from the surface.

4. Removable gate extensions shall be provided to allow for installation of the gates from the surface using the gate follower. The structure to extend the guides shall be rigid enough for this purpose and be designed for gate jamming. The structure shall be fabricated in sections to allow for installation and removal to an off-site storage location. Suitable platforms shall be provided at the top of each guide extension to allow for personnel to guide the gates into place. Suitable handrails shall be provided. The structure may be installed with the use of divers; however, underwater work shall be limited and shall not require divers to manipulate heavy structures underwater.

7.1.2. Outlet Closure Gate

1. The gate shall be capable of safely opening and closing against head and flow conditions, and when closed, withstanding the hydrostatic pressure imposed by the maximum water level in the outlet canal while the tunnel is dewatered.

2. The gate shall be raised and lowered by a dedicated, fixed hoist mounted on a steel structure above the gate location. The hoist shall be designed to maintain the gate in the raised position without dogging. The gate shall have the capability of being dogged in the open position to permit hoist maintenance.

3. The gate shall be articulated and allow the top section to be lifted enabling watering up of the tunnel.

4. Capability for installation and removal of a sectional service gate using a mobile crane operating from the wall of the outlet structure in the future shall be provided for in the layout and design of the structure.

7.2 Design Requirements

7.2.1. Loads and Load Combinations

1. The Contractor shall establish all design parameters, load cases and load combinations as required by Applicable Laws, codes, standards and guidelines and as indicated herein necessary for the design and construction of the gates, hoist and guides fit for their intended purpose, robust, reliable and maintainable, with adequate safety factors and detailed to deal with all conditions throughout its required design life. Normal, unusual and extreme conditions of loading shall be considered in determination of the design loads.

2. In particular, the following loads shall be considered in conjunction with other loads developed for the design of the gates, guides and hoist

   (a) hydrodynamic loading with the gate descending or ascending at applicable design speed for any position of the gate and including the effects of the maximum transient head in the tunnel during gate closure

   (b) structure weight

   (c) roller, seal, bearing bar and static and dynamic spring friction forces

   (d) impact loads of 30%

   (e) lateral loads of 30% of maximum loads acting normal to roller path

   (f) impact loads of 100% on lifting points and dogging devices

   (g) lateral loads acting in the plane of the bearing path generated by gate or steel sectional service gate flexure

   (h) loads due to wire rope hoists developing motor rated torque

   (i) loads caused by a jammed gate at any point in the guides, with locked rotor or motor stall torque, whichever is greater, 100% hoist efficiency and the force being applied to one lift point.

7.2.2. Materials

1. All sealing surfaces shall be stainless steel.

2. Gate roller paths shall be stainless steel.

7.2.3. Gate Hoist

1. The outlet closure gate fixed hoists shall be of the wire rope type and shall be designed to meet the following requirements:

   (a) each gate hoist shall be located in a weather-tight housing on the steel superstructure of the outlet structure

   (b) each hoist shall be equipped with sufficient protection (*e.g.*, limit switches, interlock) to prevent damage to the gate, the outlet structure and the hoist structure

   (c) control of each hoist shall be both local and remote

   (d) each hoist shall be capable of lowering the gate at the maximum speed allowable based on minimizing transient pressures in the tunnel

   (e) a fail-safe braking system shall be installed on each hoist for emergency controlled unpowered lowering of the gate

   (f) the hoist shall comprise two drums, driven through separate drive trains by a common double ended electric motor

   (g) the gate shall be held in the raised position by electrically operated brakes on the input shafts of each gear reducer

   (h) the gate speed for unpowered lowering shall be controlled by centrifugal fan brakes on the high speed shafts of each gear reducer

   (i) the following maximum hoist speeds shall be used

      (i) Raising 0.16 m/min

      (ii) Lowering (Powered) 0.16 m/min

      (iii) Lowering (Unpowered) 0.31 m/min

7.2.4. Gate and Hoist Structural Components

1. For consistency with usual design practice, the working stress design method shall be applied, and AISC Specification for Structural Steel Buildings (ASD) and CSA Standard B167 shall be used.

2. Allowable stresses shall be based on those defined in AISC. A 3-mm allowance shall be made for corrosion. Design stresses for Normal Loading Conditions shall not exceed 90% of those permitted by AISC. For Extreme Loading Conditions allowable stresses may be increased by 33% provided they do not exceed 80% of the yield stress of the material. For hoist design, CSA Standard B167 should be referenced instead of AISC, but otherwise the same restrictions on allowable stresses shall apply.

3. Bolted connections shall be designed using high strength bolts in friction type connections, in accordance with AISC, except that design stresses shall not exceed 90% of those permitted by AISC.

4. Bolted connections must be watertight and shall have bolts at a suitable pitch. Seal welds shall not be used on bolted connections.

5. Maximum deflection of the gates under normal loading conditions shall be limited to 1/800 of the span between main rollers or bearing bars or one half allowable seal flexure at the seals, whichever is less.

6. All welded connections subject to immersion shall be seal welded.

7. Sufficient weight shall be provided in each gate and gate section so that it shall close readily under its own weight during normal hydraulic conditions. The lowering force shall exceed the resistance to lowering, based on static friction coefficients, by a minimum of 25%.

7.2.5. Mechanical Components

1. For normal conditions, design stresses shall not exceed those permitted by CMAA Specification 70, AISE Technical Report No. 6, and AGMA Standard 420.04.

2. For Extreme conditions, design stresses shall not exceed 80% of the elastic limit of the material.

3. The load on wire ropes shall not exceed 20% of the minimum breaking strength of the rope.

4. Main rollers shall be designed in accordance with the criteria outlined in ASCE Paper 3000 "Fixed Wheel Gates for Penstock Intakes" or approved equivalent. The exception shall be that the 'Critical Stress' obtained from the formula on Page 755 of ASCE Paper 3000 shall be multiplied by 0.30 for normal loading conditions and by 0.45 for extreme loading conditions to achieve suitable factors of safety.

5. The roller axles shall be designed in accordance with ASCE Paper 3000. The design of flat and crowned rollers and their supports shall take into consideration the rated radial load acting on the roller and an axial load equivalent to 30% of the radial load acting at the outer rim of the roller and the roller path.

6. The maximum shear stress (in MPa) in rollers and roller paths shall not exceed 2.40 times the minimum BHN of the softer material or 620 MPa, whichever is less.

7. The maximum compressive stress (in MPa) in rollers and roller paths shall not exceed 6.90 times the minimum BHN of the softer material or 1700 MPa, whichever is less.

8. The roller face shall have a surface hardness of 255 to 280 BHN. The minimum roller path hardness shall be at least 50 BHN greater than the minimum roller face hardness.

9. Crowned rollers shall use anti-friction bearings.

7.2.6. Gate Controls, Heating & Electrical

1. The hoist control shall automatically detect and compensate for any creeping of the gate toward the closed position.

2. A slack rope switch shall be furnished that detects rope slacking in the event that the gate hoist closes, but the gate hangs up.

3. Gate, hoist and guides shall be adequately heated to ensure reliable winter operation, and prevent icing of the gate to allow for remote position indication.

4. If the gate is in the open position it shall remain in the open position if power to the gate is interrupted.

5. Gate control shall be interconnected to the Owner's existing plant control system.

6. Hoist motors to be TEFC, CEMA-MG-1, Section 2.

7. Electrical enclosures and junction boxes to be CEMA 4X, stainless steel.

8. Cabling to be steel armoured TECK FT1 with black outer neoprene.

7.2.7. Painting

1. Gate section shall be prepared and painted in accordance with OPG's specification WIP — HO0386.

7.2.8. Maintainability

1. Components subject to wear or deterioration (e.g., bearings, seals, wire ropes) will require servicing and maintenance at regular intervals as recommended by the manufacturers or as dictated by observed conditions. Design and detailing of these components shall be such as to maximize ease of maintenance and minimize maintenance interventions.

2. The design and construction of all equipment and structures shall consider the following maintenance requirements:

   (a) personnel safeguards during all phases of the maintenance work

   (b) partial and full lowering of the outlet gate, once yearly to ensure proper operation

(c) adequate access to all serviceable components

(d) provision for suitable lifting and handling equipment

(e) suitable spare parts to minimize downtime of all systems.

8. TUNNEL

8.1 General

1. The tunnel shall be capable of being dewatered within a specified time of 3 weeks and the tunnel lining shall be capable of resisting all internal and external loads that are anticipated during the service life of the diversion tunnel.

2. The tunnel lining system shall be designed, detailed, fabricated and constructed to deal with the highly corrosive environment that will exist along its alignment.

8.2 Hydraulic Design

1. The hydraulic conveyance system shall extend from intake structure at the GIP to the outlet water level gauge in the outlet canal and include the intake channel, intake structure, tunnel, outlet structure, and outlet canal to the point immediately upstream from the transition at the junction with the PGS channel.

2. The tunnel conveyance system shall be designed, detailed and constructed to provide the optimum hydraulic efficiency.

3. The tunnel shall be capable of delivering a GFA with the hydraulic head and energy grade design level defined in Appendix 1.1(aa) considering the hydraulic conveyance system defined in Section 8.2(1).

4. Transient load analysis shall be performed based on powered and unpowered closure rates for outlet gate and appropriate intake and outlet water levels.

5. Loads determined from the transient load analysis shall be used for input into the design of the outlet gate and structure and tunnel liner. The outlet surge shaft shall be sized to limit the transient load while retaining the upsurge water level within the confines of the shaft.

8.3 Tunnel Lining Design

8.3.1. General Considerations

1. Only the following design approaches are acceptable, individually or a combination thereof,

   (a) a tunnel lining system (either pre-cast or cast-in-place) capable of adequately supporting all loads including those imparted on the lining from long-term rock swelling effects

(b) a tunnel lining system which incorporates an impermeable liner so that long-term rock swelling is prevented from developing.

The Contractor is to provide confirmatory analysis to support that its selected approach meets the requirements of this Agreement.

2. The Contractor's tunnel excavation and lining design may investigate all the above approaches, with the following restriction:

   (a) an impermeable lining system will not be acceptable as the sole design approach, unless a testing method acceptable to the Owner is included to prove that the constructed lining system is impermeable and will not allow the passage of water or chloride ions.

3. Rock support systems shall be provided with suitable corrosion protection.

4. The tunnel lining shall be made of concrete and reinforced as necessary to control cracking during construction and after installation, and to prevent overstressing at the joints in the case of precast lining.

5. The tunnel lining shall be designed to be as watertight as practical under normal operating conditions commensurate with the tunnel design approach.

8.3.2. Tunnel Lining Load Conditions

1. Internal hydrostatic pressure will correspond to the water surface level at the GIP and the transient upsurge due to closure of the outlet gate.

2. Loads to be considered in the design of the concrete lining shall include, but not limited to, the following:

   (a) self-weight of the lining

   (b) rock loading of a loosened slab of thickness not less than 3 m up to the full width of the tunnel and shear deformations along bedding planes

   (c) immediate elastic deformation of the rock mass

   (d) elastoplastic deformations prior to filling of the tunnel

   (e) grouting pressure

   (f) external groundwater pressures prior to filling the tunnel

   (g) loading resulting from stress changes caused by tunnel excavation

   (h) time-dependent rock deformation loading on the lining

(i) internal hydrostatic pressure. Unbalanced hydrostatic pressure at the time the tunnel is filled. Additionally, pressure differential due to closure of the gate.

(j) thermal effects due to differential temperatures between lining and rock at time of installation and between lining and water

(k) full external groundwater pressures following dewatering of the tunnel unless a pressure relief system that is consistent with the selected tunnel lining system design, and acceptable to OPG at its sole discretion, is provided. In any case, the external pressure shall not be taken as less than 50% of the external groundwater pressure.

8.3.3. Load Combinations

1. Loads and load effects in Section 8.3.2 shall be considered in appropriate combinations and take into account the stages and sequences of construction and operation, and ground/structure interaction.

8.3.4. Numerical Modelling

1. The tunnel lining system shall be modeled by appropriate numerical methods. Closed-form solutions are not acceptable. The design shall account for the loads and loading conditions identified in Sections 8.3.2 and 8.3.3.

2. For portions of the tunnel in the Queenston Shale, modeling using FLAC or an equivalent numerical method acceptable to the Owner, is required.

(a) Considerations during analysis and design shall include, but not be limited to,

(i) the accessibility of the rock to freshwater (or high relative humidity) during construction and throughout the lifetime of the structure and the influence of bedding planes on freshwater access

(ii) the variability of the amount and rate of time-dependent deformation along the length of the tunnel and other structures

(iii) the effect of stress on rock swelling rate

(iv) the state of stress in the rock mass after excavation which affects the rate the swelling

(v) swell anisotropy

(vi) non-uniform loading.

(b) The modeling shall include

(i) analyses for both the deepest and shallowest tunnel sections in the Queenston formation

(ii) both unwatered and operational tunnel conditions.

(c) The following parameters shall be included in the analyses:

(i) appropriate rockmass and bedding plane strength and deformability values as given in the GBR

(ii) appropriate in situ stresses as given in the GBR

(iii) Hoek-Brown residual rock mass strength parameters: $m_r = 1.0$, $s_r = 0.001$ (or equivalent)

(iv) plastic shear strain in rock for peak to post-peak: ranging from 0.5% to 2.0%

(v) design line for rock swelling rates as shown in Figure 8.1 (maximum free swell potential of 0.3% per log cycle is based on overall average of all free swell test results)

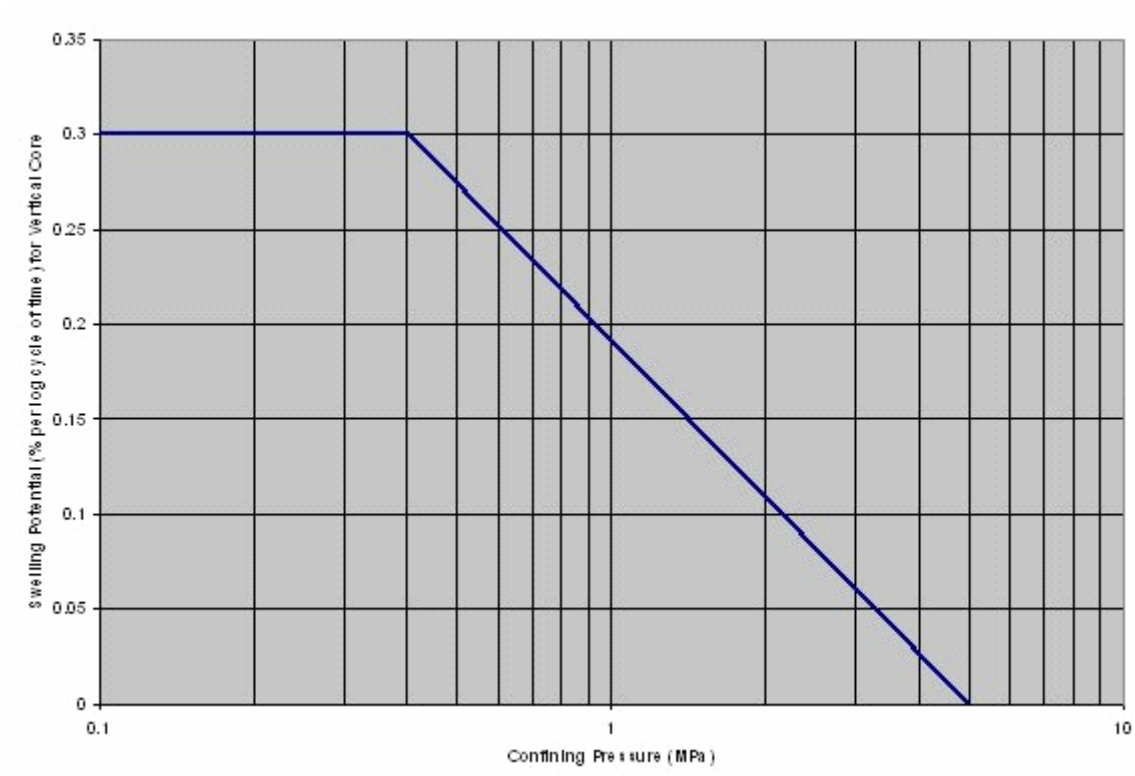


Figure 8.1 - Design Line for Rock Swelling

(vi) time steps up to 4.5 log cycles of time in increments of days

(vii) rock mass permeability of 1×10^{-6} cm^2/s in the plastic zone (after grouting)

(viii) chloride diffusion coefficient of 1.5×10^{-6} cm^2/s for the lower Queenston Formation

(ix) chloride diffusion coefficient of 1.5×10^{-5} cm^2/s for the plastic zone and the upper Queenston Formation

(x) rock swelling commences at a reduction in chlorides of 2%

(xi) horizontal rock swelling is equal to 0.6 the vertical rock swelling.

(d) effective stresses, accounting for 100% of the porewater pressure, shall be used in the calculation of confining pressures for use in analyses of rock mass strengths and swelling loads on the liner.

8.4 Tunnel Excavation and Construction

1. The tunnel shall be excavated by means of a TBM starting from the outlet end of the tunnel. The use of drill and blast method of excavation shall be limited to the following areas only:

   (a) intake structure

   (b) intake channel

   (c) outlet structure

   (d) outlet canal

   (e) other limited areas subject to the acceptance by the Owner.

2. No drop shafts shall be constructed along the tunnel with the exception of the dewatering shafts and tunnel piezometers.

3. In the Queenston Formation, the initial support must be installed within or immediately behind the shield of the TBM and shall provide full coverage to the rock surface. In the rocks above the Queenston Formation, the initial support must be immediate and full where there is potential for slabbing.

8.5 Tunnel Survey

1. Perform an as-built survey in plan and profile of the completed tunnel and related to the final adjusted tunnel traverse. Profiles shall be taken generally at 50-m intervals and at start and end of horizontal and vertical curves, low points of the tunnel and dewatering shafts and tunnel piezometer locations. Profile measurements shall be taken at 45° intervals over the internal perimeter of the tunnel.

2. The final position of the tunnel with respect to the legal limits of the easement must be confirmed by an Ontario Land Surveyor.

3. Reasonable access shall be provided to the Owner to independently audit tunnel TBM guidance systems and tunnel survey.

9. TUNNEL BORING MACHINE

9.1 General

1. Design, manufacture, assemble and test at works, disassemble, deliver to Site, reassemble and test at Site, install and commission a new high-powered, robust, Tunnel Boring Machine (TBM) suitable for safely excavating in the ground conditions as described in the GBR. If the TBM does not have a complete shield, it shall have sufficient shielding and other features necessary to assure safe excavation at all times.

2. Ensure that the electrical components and systems of the TBM, back-up plant and equipment are fully compatible with the site power supply and are suitable for use in a highly corrosive and potentially gassy environment.

3. Use only non-contaminating lubricants.

9.2 Monitoring Equipment

1. Provide remote computer data display and logging systems including real time and historic data capture above ground in the site offices of the Owner.

   (a) Supply a data logging system to comprise a Pentium 4 computer with software, 14-inch color monitor, color printer, modem and CD burner for data.

   (b) Supply communication wiring to provide complete transfer of data of TBM functions.

2. Data transfer and display to include but not be limited to all TBM key functions

   (a) cuttinghead direction, torque, speed and thrust

   (b) gauge cutter pattern

   (c) main bearing lubrication pressure, flow and temperature

   (d) electrical power

   (e) ram pressures

   (f) time, date

(g) stroke

(h) penetration rate

(i) radial pressure on the TBM shield.

9.3 Probing and Proof Drilling Equipment

1. Provide probe drilling equipment suitable for drilling holes for sampling and grouting the rock ahead of the TBM.

2. Provide proof drilling and contact grouting equipment and staging on the TBM backup gantries to enable drilling and grouting through any position around the ring.

9.4 Ventilation Equipment

1. For the purpose of tunnel ventilation equipment design and operation, the tunnel shall be classified as 'potentially gassy' in accordance with US Department of Labour OSHA Part 1926. Provide ventilation systems with reversible fans to meet the requirements specified therein.

2. Provide built-in equipment to monitor continuously, and having the capability of giving audible and visual warning of, any hazardous gas concentration above threshold limit values as required by Applicable Laws.

3. Provide build-in equipment to monitor continuously and having the capability of giving audible and visual warning in respect of oxygen levels except that warning devices shall be activated when level falls to threshold limit value as required by Applicable Laws.

4. Routinely maintain monitoring devices in accordance with manufacturers' recommendations to ensure they are in good working order at all times.

5. Fabricate ventilation ducting from nonflammable material.

9.5 Essential Spares

1. Provide a spare main bearing available for delivery to site within 10 days.

10. TUNNEL WATER-UP PROCEDURES

1. The Contractor shall submit a procedure for tunnel water-up for approval by the Owner, and implement thereafter. Procedure to include testing of sectional service gates, intake and outlet closure gates. Typical tests for gates to include, but are not limited to, checking seal contact and leakage, setting limit switches, setting emergency closing speed, checking hoisting and testing all protection, as appropriate. These tests shall be conducted in dry, wet static and wet flowing conditions, as appropriate.

2. Monitor instrumentation at the instrumented tunnel section during tunnel water-up.

Appendix 1.1(hhh)

Appendix 1.1(hhh) - Project Change Directive Form

PROJECT CHANGE DIRECTIVE

To: **Strabag AG [Insert Contractor address]** (the "Contractor")	Contract: Design/Build Agreement (the "**Agreement**") dated •, 2005 between the Contractor and Ontario Power Generation Inc. ("OPG") Project Change Directive No.: • Date: •

Defined terms used in this Notice have the same meanings given to those terms in the Agreement.

Change to Work

In accordance with Section 5.1(a) of the Agreement, OPG hereby directs the Contractor to make the following changes in the Work:

Expected Change to Contract Price

OPG expects that the changes to the Work set out in this Notice will have the following effect on the Contract Price:

Contract Price, as set out in the Agreement as of the date of the Agreement	$
Total Contract Price, as set out in the Agreement as of the date of the Agreement, as adjusted by all changes in the Contract Price made under all Amendments	$
Total expected change to the Contract Price under this Notice	$

Expected Change to Contract Schedule

OPG expects that the changes to the Work set out in this Notice will have the following effect on the Contract Schedule:

ONTARIO POWER GENERATION INC.

By: _____

Name:

Title:

Appendix 1.1(iii)

Appendix 1.1(iii) - Project Change Notice

PROJECT CHANGE NOTICE

To: Ontario Power Generation Inc. Attn: ■ Fax: ■	Contract: Design/Build Agreement between Ontario Power Generation Inc. and Strabag AG (the "**Contractor**") dated ■, 2005 (the "**Agreement**") Project Change Notice: ■ Date: ■

Defined terms used in this Notice have the same meanings given to those terms in the Agreement.

Change to Work

In accordance with Section 5.2 of the Agreement, the Contractor hereby requests OPG's consent to make the changes in the Work described in Appendix A hereto (the "Proposed Changes").

Impact of the Change

Contractor expects that the Proposed Changes will have the impact on the Tunnel Facility Project described in Appendix B hereto.

Expected Change to Contract Price

Contractor expects that the Proposed Changes will have the following effect on the Contract Price, a breakdown of the details of the change to Contract Price are set out in Appendix C hereto:

Contract Price, as set out in the Agreement as of the date of the Agreement	$_____
Total Contract Price, as set out in the Agreement as of the date of the Agreement, as adjusted by all changes in the Contract Price made under Amendments **[list]**	$_____
Total expected change to the Contract Price under this Notice	$_____
Resultant Contract Price including this change	$_____

Expected Change to Contract Schedule

Contractor expects that the Proposed Changes will have the effect on the Contract Schedule described in Appendix D hereto.

STRABAG AG

By:_____
Name:
Title:

Appendix 1.1(sss)

Appendix 1.1(sss) - Summary of Work

1. WORK BY CONTRACTOR

1.1 General

The Contractor shall

1. Perform the Work as required and implied by the Agreement, as shown on the Concept Drawings and in conformance with the Owner's Mandatory Requirements.

2. Perform the Work in a manner that will assure a service life of 90 years for all the fixed facilities of the Tunnel Facility Project. The Work to be performed by the Contractor includes preparation and submission of analysis and design documentation that clearly demonstrates how the required service life will be achieved and how the Tunnel Facility Project will be constructed in a manner that assures the required service life.

3. Perform the Work in a manner that also ensures compliance with:

   (a) all Applicable Laws, the requirements of the Environmental Assessment (EA) and EA Approval and such other Approvals as the Contractor determines are required for the Project; and

   (b) the requirements of the Community Impact Agreement between OPG and local stakeholders.

1.2 Specific Elements of Work

1. The Work to be performed or provided by the Contractor includes but is not limited to the provision of the following:

   (a) review and consideration of all documentation identified in the Agreement

   (b) identification of all Approvals necessary for the Work, unless specifically excluded in the Agreement, including this Appendix. The Contractor must obtain all such Approvals in a timely manner in order to meet the Contract Schedule.

   (c) final design basis for all elements of the Work including submission of same for review and acceptance by the Owner prior to proceeding with detail design

   (d) geotechnical and other investigations necessary to support the design and construction of the Work

   (e) Specifications for all elements of the Work including submission of same for review and acceptance by the Owner prior to procurement and construction.

Specifications must bear the seal and signature of a Professional Engineer licensed to practice in the Province of Ontario.

(f) engineering analyses and designs for all elements of the Work including submission of same for review and acceptance by the Owner prior to procurement and construction. Analyses and designs must bear the seal and signature of a Professional Engineer licensed to practice in the Province of Ontario.

(g) drawings for all elements of the Work including submission for review and acceptance by the Owner prior to procurement and construction. Drawings must bear the seal and signature of a Professional Engineer licensed to practice in the Province of Ontario

(h) other Submittals required in the Agreement for review and acceptance by the Owner

(i) revision and resubmission of documents for review and acceptance by the Owner, where such documents had previously been submitted to the Owner and found to be incomplete or unacceptable

(j) submission of the Notice of Project and registration for the Applicable Governmental Authority and execution of responsibilities as the "Constructor", except with respect to the INCW Part Project

(k) mobilization of all necessary forces, equipment, supplies and other requirements to Site

(l) on-Site trailer accommodation and parking facilities for Owner at the intake and outlet areas of the Site

(m) water and sewage services including necessary connections to municipal services and water meter and metering house

(n) Site access connection to Stanley Avenue at the outlet area and to Portage Road at the intake area

(o) traffic control at entrances and exits to the Site areas including traffic control devices and traffic control personnel and paid-duty police as necessary

(p) site security, public safety and emergency response in accordance with the minimum requirements set out in Appendix 2.4(g)(3)

(q) provision of all temporary construction facilities and services to enable and facilitate the performance of the Work

(r) environmental protection measures required by the Agreement and required by Applicable Laws

(s) disposal of Hazardous Materials to an off-Site location provided by the Contractor

(t) construction power including connections to appropriate power supplies

(u) emergency power supply at the intake and outlet areas to provide back-up power to all safety systems and other critical Site functions

(v) unhindered access for Owner to the Site, fabrication, manufacturing and test locations associated with or related to the Work

(w) temporary facilities (including temporary structures) necessary and required to facilitate performance of the Work. Submit details, designs and drawings of all temporary works to Owner for review and acceptance, prior to procurement or installation. Submitted designs and Drawings of temporary works must bear the seal and signature of a Professional Engineer licensed to practice in the Province of Ontario. Remove and dispose off-site all temporary works when no longer required for the performance of the Work

(x) in-river approach channel at the intake area

(y) in-river approach wall along the river bank at the intake area

(z) a temporary groyne upstream of the INCW structure to enhance ice flow in the intake channel during construction. Remove and dispose of groyne prior to removal of intake area cofferdam

(aa) modification and extension of the INCW structure

(bb) demolition of the existing in-river accelerating wall at the tunnel intake area and off-site disposal of same at location(s) provided by the Contractor and acceptable to the Owner

(cc) disposal of excavated and other surplus materials from the tunnel intake area at an off-Site location(s) provided by the Contractor and acceptable to the Owner

(dd) in-river accelerating wall at the intake area, including installation of navigation strobe light on new wall with associated cabling and connection to power supply at INCW and installation of fall arrest on new wall

(ee) supply, installation and calibration of intake gauge, acceptable to the Owner

(ff) supply, installation and calibration of intake gauge, acceptable to the Owner

(gg) tunnel intake structure and associated work to interface with and connect to existing structures and facilities

(hh) tunnel intake sectional gate, including removable guide extension to river surface and associated platforms to provide safe installation and removal, and associated requirements including removal of sectional gate after tunnel commissioning and transportation and unloading of same at a facility to be designated by the Owner within 25 km of the Site

(ii) tunnel outlet structures and related facilities

(jj) outlet canal between the tunnel and the existing canal system at the outlet area

(kk) demolition and disposal to off-Site location(s) of the existing dewatering structure in the PGS canal. This element of Work shall be undertaken only at the sole option and direction of the Owner.

(ll) new tunnel boring machine (TBM) and required backup and support equipment to construct the diversion tunnel. Contractor to dismantle the TBM at completion of tunnelling and remove from the Site

(mm) diversion tunnel facility including tunnel driving, water inflow management, probe drilling, ground consolidation and support, installation of tunnel lining, installation of tunnel grouting, tunnel cleanup and tunnel finishing

(nn) material handling and management systems to transport, place, compact and manage excavated material from the outlet area and the tunnel drive to the on-Site Owner-designated disposal site

(oo) leachate collection and handling systems, leachate treatment and disposal systems at excavated material storage areas on Site as required by the Agreement, Applicable Laws and Approvals

(pp) instrumentation necessary for the performance of the Work, including instrument reading, data reduction and provision of data to Owner in a timely manner, at least monthly, and at significant construction events

(qq) instrumented tunnel section

(rr) installation of four tunnel piezometers into the tunnel crown to an average depth of 180 m below grade

(ss) establishment and maintenance of necessary QC/QA for performance of the Work and submission of copies of all QC/QA and related reports to the Owner in a timely manner

(tt) tunnel dewatering shafts and associated civil infrastructure

(uu) tunnel outlet gate and associated hoisting, electrical and control requirements including interconnectors to permanent power supply

(vv) rework necessary to achieve compliance with the Agreement

(ww) maintenance of temporary facilities, services and environmental protection until the later of the Final Completion Date and any date established in any Approvals or Applicable Laws

(xx) water-up and commissioning of the diversion tunnel and associated facilities. Allow for detailed inspection of tunnel by the Owner prior to water-up

(yy) sounding survey in the PGS canal both before and after connection of the outlet canal to the PGS canal, to determine changes in the side and bottom profile of the canal as a result of the Work

(zz) removal of rock and other debris from the PGS canal, deposited as a result of performance of the Work

(aaa) Flow Verification Test

(bbb) restoration of all areas of the Site

(ccc) as-built drawings

(ddd) affidavit(s) of compliance signed by Engineer(s) of Record

(eee) operations and maintenance manuals and training of OPG personnel

(fff) demobilization and removal of all temporary facilities and services from the site

(ggg) any requirements for communications with INCW personnel and other persons affected by Contractor activities

(hhh) support and assistance to Owner with respect to reporting requirements required for compliance with Project Approvals

(iii) support and assistance to Owner with respect to implementation of the Community Impact Agreement

(jjj) obtain necessary exemptions for navigation in the Niagara River

(kkk) administration of the Jagger Hims Limited groundwater monitoring program.

1.3 Environmental Approvals

1. The Environmental Assessment Approval for the Project includes a number of Conditions that must be met during the planning, design and construction of the Tunnel Facility Project. Table 1.1A, in this Appendix, indicates responsibility for developing documentation and obtaining respective Approvals. Table 1.1A is not intended to detract from the Contractor's obligation to comply with the

Environmental Assessment and the EA Approval, and all procedures, programs, plans and clearances thereunder. For purposes of interpreting the "Summary of Condition" column in Table 1.1A, the EA Approval should be reviewed in its entirety.

2. The abbreviations in Table 1.1A have the following meanings:

   (a) P = Primary responsibility for preparing and submitting required documentation, obtaining and implementing Approvals, if applicable

   (b) P1 = Primary responsibility for preparing and submitting initial documentation, and reviewing and submitting final documentation and obtaining Approvals

   (c) P2 = Primary responsibility for finalizing documentation and submitting to OPG for review, and supporting obtainment of Approvals

   (d) S = Support to the Party with primary responsibility for developing documentation and obtaining Approvals including collecting and providing data and information, and attending meetings.

3. Approvals, recommendations and exemptions under the following treaties and acts have been obtained.

   (a) International Niagara Diversion Treaty

   (b) Navigable Waters Protection Act

   (c) Department of Fisheries and Oceans Authorization 5250-43

      (i) Authorization for Destruction of Fish by Means other than Fishing (including Amendment, Amendment #2 and Amendment #3); and

      (ii) Authorization for Works or Undertakings Affecting Fish Habitat (including Amendment, Amendment #2 and Amendment #3).

4. Other environmental Approvals and responsibility for obtaining such Approvals include those shown in Table 1.1B, where P and S have the meaning given in Section 1.3(2) in this Appendix.

5. The Contractor shall abide by the conditions and requirements included in all of the above Approvals, recommendations and exemptions.

2. WORK BY OTHERS

1. The following work is to be undertaken by others and is not included in the Work to be performed by the Contractor:

   (a) subject to Sections 2.15(b) and 2.15(k) of the Agreement, obtaining rights of way

(b) installation of groundwater monitoring wells necessary to achieve compliance with the EA Approval

(c) temporary recreational trail in the vicinity of the intake area

(d) access barriers and parking for operators at INCW

(e) installation of survey control monuments at the intake and outlet areas

(f) OPG manages ice flushing at the INCW. OPG will make its best efforts to ensure that ice is continually flushed past the construction area.

(g) OPG manages Grass Island Pool (GIP) water levels and outflow to meet 1950 Niagara Treaty requirements

(h) pre-construction and post-construction condition surveys of existing infrastructure for review and acceptance by the Contractor and other interested parties

(i) control and operation of the Sir Adam Beck Generating Complex during performance of the Work

(j) construction at the outlet area access road to the right-of-way at Stanley Avenue and Portage Road at the intake area

(k) provision of sewer and water interconnection point at the east side of Stanley Avenue right-of-way at the outlet area

(l) installation of first order horizontal and vertical control monuments at the outlet and intake areas for tunnel set out and survey control.

3. CONSTRAINTS

1. Performance of the Work will be constrained by a number of requirements that include, but are not limited to, the following:

   (a) the drill and blast method of tunnel construction will not be permitted

   (b) access shafts, drop shafts and ventilation shafts will not be permitted along the tunnel alignment

   (c) flow disruption in the power canals will not be permitted except as follows:

      (i) flow may be interrupted in the PGS canal for no more than 6 hours in duration, in any 48-hour period, for Work associated with

         - connection of the outlet canal to the PGS canal

- for Work associated with demolition and disposal to off-site location(s) of the existing dewatering structure in the PGS canal should such Work be directed by the Owner

(ii) Contractor to provide a tentative schedule of any required interruption of flow in the PGS at least 3 months prior to the required interruption

(iii) Contractor's schedule will show, and Contractor's operations will support, a maximum overlap of Work associated with connection of the outlet canal to the PGS canal and Work associated with demolition and disposal to off-site location(s) of the existing dewatering structure in the PGS canal such that the total number of 6-h closures required is at a minimum

(iv) Contractor to provide at least 5 calendar days Notice if it requires interruption of flow in the PGS

(v) in all cases, Owner determines at its sole discretion the specific date and time for allowable interruption of flow in the PGS canal

(d) The more stringent of the following requirements will apply:

(i) On-Site and off-Site activities governed by the Niagara Falls Noise Control By-Law 2004-105 and relating to the performance of the Work shall comply with such By-Law except for TBM tunneling Work and any other exemptions that may be obtained by the Contractor.

(ii) On-Site and off-Site activities governed by MOE Publication NPC 205 and relating to the performance of the Work shall comply with such publication at sensitive noise receptors unless specific exceptions have been approved by MOE.

(iii) Truck traffic to and from the Site at the intake area shall not take place on Sundays unless noise at sensitive receptors are mitigated to OPG's and MOE's satisfaction.

(e) load limits on INCW deck structure - GVW of 90 tonnes for triple axle vehicle, GVW of 36 tonnes for double axle truck

(f) tourist movement, both pedestrians and vehicular

(g) Marine Operation at the INCW

- Tourist Season Flow (TSF) is defined as

(i) April 1 through September 14, inclusive, and during the hours of 08:00 to 22:00, inclusive

(ii) September 15 through October 31, inclusive, and during the hours of 08:00 to 20:00, inclusive

(iii) all other hours during these periods are defined as the nighttime hours.

- Reference Drawing 6-B-214 defines restrictions on ice breaking operation near the INCW structure. These restrictions shall be followed for all marine operations in the river.

- During the TSF, fourteen of the existing eighteen gates must be available to pass the required scenic flows to the Niagara Falls. In the nighttime hours, all bays are normally closed and unrestricted marine operations can take place subject to obtaining approval for nighttime construction activity in this area. However, abnormal streamflow or power entity diversion restrictions may require operation of INCW gates during the TSF nighttime hours.

- The Contractor shall be aware that conditions on the river and the gates in the INCW can change at any time. The Contractor shall interface with OPG regarding operation at the INCW.

- During the period from December 15 through April 30, inclusive, or as otherwise indicated by OPG, no marine based operations or other in-water activities shall take place that affect ice management as determined by OPG.

- Installation of the new Ice Accelerating Wall and removal of the existing Ice Accelerating Wall shall be completed before construction of the cofferdam upstream from INCW Bay 1. A minimum of three bays must be available within the ice channel for ice management at all times.

(h) INCW Part Project Area

The gates at the INCW are required to be under the control of OPG at all times during execution of the Tunnel Facility Project. In addition, OPG requires regular access along the INCW structure to service and maintain the gates. A comparatively small portion of the Tunnel Facility Project requires the Contractor to perform certain in-water elements of Work in an area near and on the INCW structure as shown on Drawing NAW130-D0E-80000-0015 in Appendix 1.1(h) and defined as the "INCW Part Project Area". During the time period when this portion of the Work is performed, OPG will assume the role of "constructor" (as that term is used under the Occupational Health and Safety Act (Ontario)) for the INCW Part Project Area only.

OPG shall only be the constructor in this limited area, and only during the specific times to be agreed upon in advance in writing by OPG and the Contractor, for the performance of the relevant portion of the Work by the Contractor, including

- construction of the new ice accelerating wall and removal of the existing ice accelerating wall
- underwater excavation (if any) for the intake approach channel
- construction of the cofferdam
- placement and or removal of the sectional service gates
- dismantling and removal of the cofferdam.

The Contractor shall only have access to the INCW Part Project Area at the agreed times. The Contractor shall take specific precautions to ensure that it does not access the INCW Part Project Area at any other time.

(i) Regional Roadworks

On behalf of OPG, the Regional Municipality of Niagara will be reconstructing Stanley Avenue (Regional Road 102) from Whirlpool Road to Niagara Townline Road with intersection improvements at Portage Road, the outlet construction site access road entrance, and Thorold Stone Road commencing approximately August 2005. Intersection improvements will also be undertaken at the intake construction site access road entrance on Portage Road south of Upper Rapids Boulevard.

4. SPECIFIC SITE CONDITIONS

4.1 Survey Datum

1. UTM Universal Transverse Mercator
2. NAD North American Datum
3. IGLD International Great Lakes Datum
4. USLS United States Lake Survey
5. Horizontal control for the survey in the project area is a UTM projection based on the NAD83 datum. A second order horizontal control network is represented by several monuments throughout the Site. The Owner grid previously used at the Site shall only be used for reference so that existing drawings can be oriented to the current Work.
6. The coordinates of the tunnel right-of-way defined on Drawing NAW130-D0E-29230-0015 are based on second and third order horizontal control.
7. Vertical control is based on Geodetic Surveys of Canada (GSC), Fifth Edition (1983), vertical datum. Where NAD83 is referred to as a vertical datum, it is meant to be GSC 1983 and are, therefore, considered equivalent within this agreement. However,

the stated elevations on vertical control monuments in the project area vary according to the agency which has previously surveyed the area. To establish a single datum, existing elevation data from the IGLD have been converted to NAD83 by means of the elevation relationships shown in the following table. IGLD55 is an imperial datum while IGLD85 is a metric datum. The conversion between IGLD55 and IGLD85 is geographically dependent with specific conversion defined below for the Material Dock gauge and the cross-over gauge locations.

Table of Values Used for Standardization of Elevation Datum

To Get	From	Additive Constant
NAD83	IGLD55	+0.144 m Material Dock Gauge
NAD83	IGLD55	+0.120 m Cross Over Gauge
IGLD85	IGLD55	+0.164 m Material Dock Gauge
IGLD85	IGLD55	+0.152 m Cross Over Gauge

4.2 Water Surface Elevations

1. Water surface elevations in the GIP and at the Cross-Over are as follows based on NAD 83 (following the 1973 International Niagara Board of Control Directive).

	Design Water Levels (m)	
	GIP	**Cross-Over**
Normal minimum	170.74	164.20
Normal mean	171.19	167.78
Normal maximum	171.65	169.80
Energy emergency minimum	170.58	164.20
Flood allowance maximum	171.80	171.80
200-year flood	172.11	172.11
Probable maximum flood	173.17	173.17

4.3 OPG's Site Office Facilities

1. OPG's offices shall be provided in trailers, GE Capital or equal, and located as agreed by OPG.

2. Provide and maintain an office complex for OPG at the main site area at the outlet with a minimum area of 300 m^2, with floors able to withstand 4.8 kPa live loads, and covered with resilient flooring. The office shall contain a meeting room, storage room, gallery area, reception and secretarial area, lockable air conditioned computer room, washrooms and offices for OPG's staff. The layout of the office shall be determined by OPG.

3. Provide and maintain an office trailer for OPG at the intake Site with a minimum of 60 m^2. The office shall contain a meeting room, gallery area, washroom and offices for OPG's staff.

4. Provide lighting to uniformly deliver not less than 100 footcandles at desk height in all areas except the restrooms. Adequately light and ventilate the change room, complying with code requirements.

5. Locate exterior lighting over the entrance doors. Provide grounded duplex electrical receptacles at approximately 3-m spacings for interior walls, with at least one in each wall except in the restrooms.

6. Provide automatic heating and air conditioning equipment capable of maintaining an ambient office temperature between 20°C and 25°C.

7. Provide drinking water chilled by an electrically operated drinking fountain.

8. Provide separate staff change rooms, with mine safety personnel clothing and equipment storage, for male and female staff. The male washroom to include two urinals, two flush toilets, two wash basins and two showers. The female washroom to include one flush toilet, one wash basin and one shower. Both washrooms to be provided with a mirror, grounded duplex electrical receptacle, soap holder, toilet paper holder, paper towel dispenser, waste basket and related supplies.

9. Provide a hot water heater of not less than 400 L storage capacity.

10. Provide doors and locks for exterior doors to each office and interconnecting doors between offices where applicable depending on the floor plan agreed to by the Engineer. Doors between the central office and the washrooms shall have a privacy lock. Exterior doors shall have cylinder keyed alike, and sixteen keys shall be furnished for each lock.

11. Provide a burglar alarm motion detection systems with a central control box and audible alarm to secure the entire facility. Provide burglar proof bars in all windows. Provide a smoke detector system and alarms.

12. Provide a telephone system consisting of six external lines plus intercom and twelve extensions in addition to a dedicated line for a fax machine. The telephone system shall include a speaker phone with dedicated line, touch tone dialing with hold button feature, plus one phone for the fax machine. OPG will determine the distribution of equipment and telephone service in the office. The Contractor shall pay monthly

charges for the telephone system but long distance calls are for OPG's account. Provide high speed internet connection.

13. Provide office furnishings of the type and quantity listed below.

Quantity	**Description**
6	Double pedestal lockable drawer desk
12	Single pedestal lockable drawer desk
2	Secretarial posture chair
6	Reference tables
16	Swivel arm chairs
14	Credenza cabinets
1	Conference table (20 person capacity) or equivalent
30	Stack chairs
20	Bookcases metal
8	Five-drawer lateral files
2	Fireproof file, four-drawer legal
6	Metal utility cabinet with lock
1	Coat rack (20 coats)
6	Desk lamps
4	Bulletin board (1800 mm x 1200 mm) with metal edge
4	12-stick plan racks
8	Whiteboards wall fixed (1200 mm x 900 mm)
20	Waste baskets
6	Tri-class dry chemical fire extinguisher, 3.9 kg, including service
1	First aid kit and equipment in accordance with the Workers' Compensation Board and the Ontario Ministry of Labour, requirements

	with maintenance and supplies

Table 1.1A (See Section 1.3, Paragraph 2)

EA Condition Number	Summary of Condition	Responsibility for Developing Documentation and Obtaining Approvals	
		Owner	**Contractor**
1.3	Expiration of Approval	P	S
1.4	Implementation Plan for Phased Construction	P	
1.6	Compliance Monitoring Program	P	S
1.8	Implementation Plan for Undertaking	P	
1.10	Notification Procedure for Minor Amendments	P	
1.11	Facilitate information flow requirements under the Community Impact Agreement	P	S
1.12	Provision of public record documents	P	S
2.1	Establish Re-Use of Excavated Materials Committee	P	S
2.2	Preparation of Re-Use of Excavated Materials Report	P	S
2.3.1	Submit plan for disposal of excavated materials on OPG lands	P1	P2
3.1	Disposal Monitoring and Contingency Plan for BTX	P1	P2
4.1	Hydrogeology - groundwater mapping	P1	P2
4.2	Hydrogeology - groundwater monitoring plan	P1	P2
5.1	Construction effects of tunnel and shafts	P1	P2
7.1	Documentation of the effects of flow changes on a number of components	P	
7.2 a	Documentation on effectiveness of mitigation measures to address TSS loadings	P1	P2

7.2 c	Erosion and Sedimentation Control Plans	P1	P2
7.4	Assessment of the effects of reduced flows in the lower Welland River to fish habitat and to adjacent properties/users	P	
7.5	Demonstration that hydraulic grade line in Welland River will remain within present range and not reduce sediment carrying capacity	P	
8.2	Reassessment of Noise assessment	P	S
9.2	Citizen Complaints Procedure	P	S
9.4	Erosion and storm water runoff plan	P1	P2
9.5	Carry out Community Impact Agreement Plans and Programs	P	S
10.1	Aquatic habitat survey and habitat compensation if applicable	P	
10.2	Verification of design to limit fish entrainment at intake	P	

Table 1.1B

Approval	**Key Agency**	**Responsibility**	
		OPG	**Contractor**
International Niagara Diversion Treaty, 1950	International Joint Commission, External Affairs Canada	P	
Navigable Waters Protection Act	Fisheries and Oceans Canada (Canadian Coast Guard) now Transport Canada (Marine)	P	S
Transportation of Dangerous Goods Act	Transport Canada		P
Temporary magazine licence	Natural Resources Canada, Minerals & Metal		P
Authorization of destruction of fish by means other than fishing	Fisheries and Oceans Canada	P	S

Authorization for harmful alteration, disruption or destruction of fish habitat	Fisheries and Oceans Canada	P	S
Work Permits (under Lakes and Rivers Improvement Act, and Public Lands Act)	Ministry of Natural Resources		P
Permit to take water (construction)	Ministry of the Environment		P
Certificate of Approval (AIR)	Ministry of the Environment		P
Certificate of Approval for an Industrial Sewage Works	Ministry of the Environment		P
Generator Registration	Ministry of the Environment		P
Dust Suppressant License	Ministry of the Environment		P
Tree Cutting By-Law	Regional Municipality of Niagara		P
Liaison Committee	Regional Municipality of Niagara, City of Niagara Falls, Town of Niagara on the Lake, OPG	P	S
Transportation Impact Management	Regional Municipality of Niagara/City of Niagara Falls	P	S
Tourism Impact Management	City of Niagara Falls, Town of Niagara on the Lake	P	S
Emergency Services	City of Niagara Falls, Town of Niagara on the Lake, Regional Municipality of Niagara	P	S
Municipal Services	City of Niagara Falls, Regional Municipality of Niagara	P	S
Municipal Approvals	City of Niagara Falls, Regional Municipality of Niagara	S	P

Appendix 1.1(hhhh)

Appendix 1.1(hhhh) - On-Site Total Monthly Trade Labour Hours

MANHOUR BREAKDOWN

Constr. Month	Cal. Month	Year		Manhour per Month
1	8			
2	9	2005		10,243
3	10			10,243
4	11			10,243
5	12			4,390
6	1			19,244
7	2			19,244
8	3			34,357
9	4			34,357
10	5			23,197
11	6	2006		26,695
12	7			26,695
13	8			27,995
14	9			45,756
15	10			45,756
16	11			32,815
17	12			14,565
18	1			28,709
19	2			28,709
20	3			28,709
21	4			31,069
22	5			31,069
23	6	2007		31,069
24	7			31,069
25	8			31,300
26	9			31,300
27	10			31,300
28	11			31,300
29	12			14,859
30	1			31,838
31	2			31,439
32	3			31,439
33	4			31,439
34	5			31,439
35	6	2008		29,079
36	7			36,878
37	8			56,002
38	9			48,203
39	10			48,203
40	11			48,203
41	12			23,318
42	1			46,636
43	2			54,557
44	3			54,557
45	4			54,557
46	5			49,891
47	6	2009		49,891
48	7			49,891
49	8			26,769
50	9			24,023
51	10			4,568
52	11			0
53	12			0
TOTAL MANHOUR				**1,599,071**

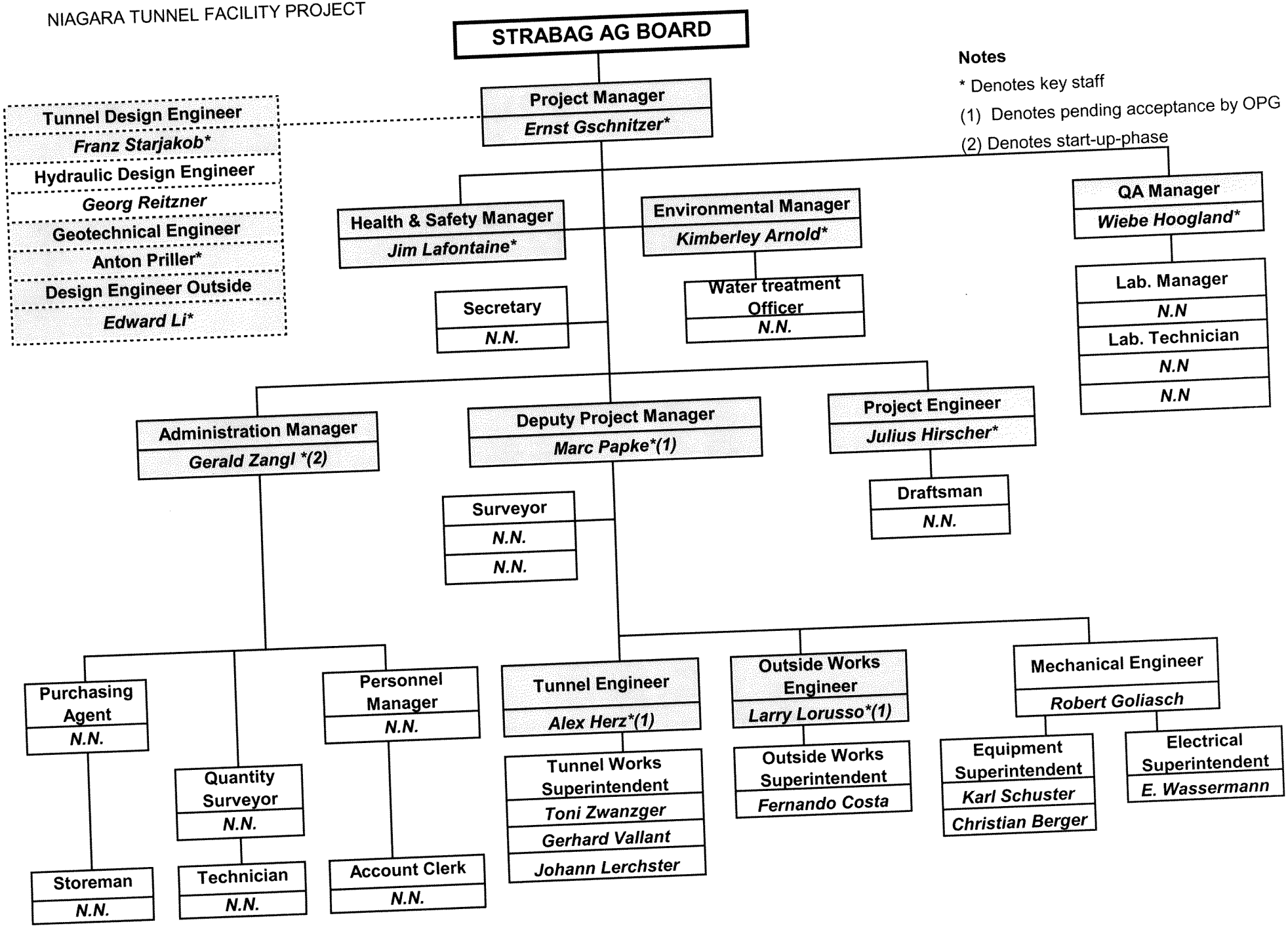
Appendix 2.2(a)

Appendix 2.2(a) - Organizational Chart

[See attached]

ORGANISATIONAL CHART

NIAGARA TUNNEL FACILITY PROJECT



Notes

* Denotes key staff

(1) Denotes pending acceptance by OPG

(2) Denotes start-up-phase

Appendix 2.2(b)

Appendix 2.2(b) - Scopes of Authority for Contractor's Delegates

DELEGATION OF AUTHORITY
(or change in delegation of authority)

To: Ontario Power Generation Inc.
("OPG")

Contract: Design/Build Agreement dated •, 2005 between Strabag AG (the "**Contractor**") and OPG (the "**Agreement**")

Delegation No.: •

Date: •

Defined terms used in this Notice have the same meanings given to those terms in the Agreement. In accordance with Section 2.2(b) of the Agreement, the Contractor hereby delegates authority to the individuals named below for the subject matters and subject to the limitations set out in this Notice. These delegations will continue in full force until revoked by the Contractor in another delegation of authority Notice.

Title	Delegate	Effective Date	Scope of Authority
			•

STRABAG AG

By: _____

Name:
Title

Appendix 2.4(c)

Appendix 2.4(d)

Appendix 2.4(d)- Preliminary Project Specific Site Safety, Security, Public Safety and Emergency Response Plan

[See attached]

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DUFFERIN CONSTRUCTION

RECEIVED JUN 2 3 2005

June 23, 2005

Mr. Harry Charalambu
Hatch Mott MacDonald
Consulting Engineers
2800 Speakman Drive
Mississauga, Ontario
L5K 2R7

Dear Mr. Charalambu:

Re: Niagara Tunnel Facility Project – Design/Build Contract

Please find enclosed the Project Site Specific Safety Plan for the OPG Niagara Tunnel Project as requested during the June 16, 2005 meeting in Mississauga detailing additional submissions requested under 1.11 SAFETY originally noted in the May 20, 2005 "Strabag Question and Answer" document. In addition, a copy of Dufferin Construction Company's Health and Safety Program has been included in conjunction with our Subcontractor, McNally Construction Inc. handling all marine work.

We have attempted to capture an overview of the project's health and safety requirements relating to the project's construction activities. Specific references to the draft Emergency Response/Rescue Plan have been highlighted in the document detailing our intent to implement a comprehensive program which will mitigate and manage any potential emergency situation in the tunnel or those involving surface work. The construction team will be utilizing the expertise and existing tunneling emergency procedures brought to us by the technical experts from Strabag. The Health and Safety team will ensure the standards and processes introduced by Strabag exceed the minimum requirements of Ontario's Occupational Health and Safety Act and the Regulations for Construction Projects.

The Health and Safety Team will incorporate existing best practices from all members of the Design/Build Team's Company policies and develop site specific safe working procedures for the Niagara Tunnel Project. These will include noted concerns regarding the Public Safety and Site Security Plan. The outline details methodology to ensure the existing high level of security and public protection currently in place along the Niagara Parkway remain with the greatest standard of care.

The keys to success of any project require proactive health and safety measures are developed and implemented prior to the start-up of any construction activity. A critical component of a world class safety program will include a formal health and safety orientation training program for all workers as they begin their tasks on the site. The

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Strabag and Dufferin Team will implement such a program and follow-up with on-going hazard awareness training throughout the duration of the project. Training programs will be wide ranging and provide added protection to workers performing the various activities relating to the project. In addition, Supervisory training will be in place to ensure all incidents are reported and actively investigated by competent persons to prevent recurrence. Our staff has received extensive training in Practical Loss Control techniques and has demonstrated the effectiveness of job hazard analysis practices preventing unnecessary harm to people, process, property and the environment.

Our firm is implementing an Occupational Health and Safety system parallel to the ISO 18000 guidelines dealing with people related, process related and management related safety objectives. The OHS Management system program is well underway at St. Lawrence Cement and the Niagara Tunnel Project will provide an excellent opportunity to measure the added value a structured approach to OHS will offer. We anticipate a successful project completion and our goal is to exceed the expectations of OPG should our proposal be accepted.

We look forward to continued discussion and value the input OPG will offer throughout the selection process. Should you require further information or clarification on any safety related matter, please contact the undersigned at any time.

Sincerely,

Dufferin Construction Company
A business unit of St. Lawrence Cement Inc. on behalf of partners at Strabag:

Jim LaFontaine B. Tech., CRSP
Health, Safety and Environmental Manager

Strabag/Dufferin Construction Company Design Build Team – Pre-Start Project Specific Safety Plan
OPG Niagara Tunnel – Niagara Falls, Ontario

Hazard Condition	Associated Process or Phase	Control Procedure	Actions and Dates
Project Administration	All phases of the project	1. Post a. MOL "Notice of Project" b. Strabag/Dufferin Construction Co. Health & Safety Policies c. Copy of the current OHSA & Construction Regulations d. Copy of the current Diving Regulations e. Emergency contact numbers – as part of the Emergency Response Plan f. Emergency response flowchart g. WSIB Poster: "In all cases of injury" h. Registration of Constructors and Employers i. The name of the Constructor's Worker Health & Safety Representatives. Joint Health and Safety Committee (JHSC) – OHSA Sec 9 (2) will be established within 30 days	To be filed by H&S Dept upon contract award and include notification to Ministry of Labour with respect to Diving Regulations; Blasting; Demolition; Marine Work; Tunnelling; Cofferdam;
		2. Provide or ensure Employers and Subcontractors provide access to: a. Health & Safety Policy & Procedures Manual (Program) b. Health & Safety Policy And Reference Manual For Subcontractors (Ontario) c. MSDS sheets d. Traffic Protection Plan e. First-aid kit f. Engineer's drawings of shoring, tunnel liner installation; marine work, bracing and geotechnical reports where applicable g. Fire extinguishers h. Telephone i. Washrooms & appropriate cleanup facilities j. Potable drinking water	Project Management Team and H&S Officer
		3. Conduct health and safety orientation of all construction personnel – program will identify workers who have received the mandatory training via hard hat stickers and Photo ID 4. Conduct health and safety orientation of Subcontractor personnel – including visitor orientation	Program to be established by H&S Officer
		5. Conduct Subcontractor Pre-construction meeting to define expectations. Apply: a. Pre-Construction - Subcontractor Safety Compliance Review (Ontario) 6. Ensure all Strabag and Dufferin Construction Supervision is present on the project at all times while work is performed. a. Alternatively appoint in writing an alternate "Competent Person" to supervise the work in the absence of the primary supervisor	Training in site specific safety plan and Ontario OH&SA to ensure compliance

Hazard Condition	Associated Process or Phase	Control Procedure	Actions and Dates
Project Administration **(continued)**	All phases of the project	7. Ensure Subcontractor Supervision is present on the project at all times while work is performed or an alternate appointed in writing. The alternate shall be a "Competent Person" to supervise the work in the absence of the primary supervisor. 8. Develop safe work plans for Strabag/Dufferin and Subcontractors, addressing: marine activities; diving procedures; blasting procedures; demolition plans a. Application of shotcrete; tunnel liner installation b. Hoisting operational plan, including trial lift procedures c. Demolition plan at for PGS Canal structure; INCW Pier accelerating wall; Hot-Work assignments, Fire Prevention Plan; procedures designed to protect pedestrians and traffic protection plan d. Site Specific Security Plan; e. Fall protection plan f. Post Fall Rescue Plan g. Traffic Management Plan for Intake structure haul roads; Niagara Parks trail Management h. Construction vehicle operational plan, including Reversing vehicle protection plan i. Engineering drawings, including: • Formwork & Falsework drawings • Cofferdams; Shaft design; Marine work; Tunnel liner; • Shoring drawings and slope protection drawings; • TBM design system; conveyor plan; transportation of workers; back end removal plan	Project Management team As part of the Subcontractor Control Policy Project Safety Plan will detail each safe operational procedure and be communicated to workers during orientation program Attached and will be posted in site office Submissions upon award

Hazard Condition	Associated Process or Phase	Control Procedure	Action
Fire Protection	**All Construction Phases of the Intake/Outlet and Tunnel** 1. In particular, fire suppression systems will be part of the water supply lines for the TBM. As a minimum, 40ABC fire extinguishers will be located at hot work operations above and below ground.	1. Fire Protection Plan will incorporate existing Strabag fire prevention policies and utilize the fire brigade system used on projects currently underway by Strabag personnel. 2. Fire Plan will utilize designated fire suppression systems in strict accordance of the Construction Regulations Sections 248-259 3. Workers inside the tunnel will receive site specific training in fire suppression systems and there will be adequate members of the fire brigade team in place for each shift. 4. Ensure Fire Extinguishers are located at various locations and installed on various equipment throughout the project 5. Ensure fire extinguishers are located adjacent to hot work operations 6. Apply a hot work permit system and include a "fire-watch" when performing hot work or when other conditions warrant. 7. Prevent access underneath hot-work activity areas by placing an appropriate barrier and warning signs advising of "Danger Do Not Enter – Hot Work Overhead" 8. Inspect fire extinguishers at least monthly to ensure they are fully charged 9. Supply necessary training in the use of fire extinguishers and area aware of hot-work practices. Request subcontractors to provide training records of all staff regarding use of fire extinguishing equipment. 10. Notify Niagara Regional Police/Fire and Rescue of the Fire Protection plan. Conduct mock rescue with the emergency team to simulate emergency situation. Ensure rescue team is brought to the site and provides comments/concerns of potential issues	Strabag Senior Project Manager in conjunction with H&S Officer
Emergency Response/Rescue Plan	**Tunnel Evacuation, Medical Emergency or other situation**	1. Strabag will institute tunnel entry procedures to include a tagging system identifying every worker who enters the tunnel. In the unlikely event an evacuation of the tunnel is required, a detailed head count will ensure all workers have been accounted for at the evacuation station. 2. Workers will be transported into the tunnel via a shuttle type system which will also allow for extraction of injured or those who suffer any type of medical emergency. First-aid kits will be stationed at various intervals throughout the length of the tunnel. 3. Competent Supervisors in the tunnel will have been well trained in	Strabag and H&S Officer to develop/finalize in detail upon award. Senior Project Superintendent will ensure the Plan is communicated and

Emergency Response/Rescue Plan (continued)		first-aid/CPR. Section 264-273 details rescue of workers; communication and signalling. The site specific emergency plan will as a minimum meet the legislative requirements and will in all likelihood exceed the regulations set down in Ontario. 4. Workers in the tunnel will be performing mock rescues before tunnelling begins and at least once every 30 days. This will include the requirement of having SCBAs readily available for rescue operations 5. Communication to the local EMS team of Niagara Region will be done via two-way from the tunnel to the command post at the Intake or Outlet structure. Local fire rescue/ambulance services will be escorted to the pre-determined extraction point for timely transport to area hospital. 6. Workers will be trained in the master emergency response plan during initial orientation and further via formal training programs detailing location of emergency evacuation station.	in strict compliance with OH& SA regarding tunnel work. H&S Officer will coordinate meeting with local EMS to establish location of the project; emergency access and extraction locations at the Intake and Outlet.
Public Safety and Security	**Outlet Structure** 1. Perimeter fencing	1. Restrict access to project as per contract specs at the Stanely Avenue site entrance 2. Maintain existing perimeter fencing 3. Provide security guards to patrol perimeter and ensure no public access/maintain inspection of barrier. Man access gates to disposal areas and limit unwanted visitor or illegal public dumping. 4. Post signage to alert general public "no trespassing"	H&S Officer to contract with local security firm for duration of project
Public Safety and Security	**Access to the Intake Structure** 2. Construction of new access road 3. Restrict access to project	1. Construct new roadway to Inlet Dock structure 2. Install traffic lights and ensure adequate sightlines for drivers exiting the work site across Niagara Parkway 3. Install temporary noise wall around perimeter of Intake structure to prevent access from public tying into existing chain link fence. 4. Ensure security guard and gated access from Niagara Parkway into project. Guard to ensure all workers entering the site have received orientation training and have visible ID badges. 5. Maintain security presence in conjunction with existing protocol in place at OPG to patrol the perimeter of the work zone and maintain strict prohibited access to water's edge or structures 6. Installation of signage warning of the dangers from construction activity	Dufferin Construction Project Superintendent Upon award of contract
Chemical and Occupational Health Considerations	**WHMIS training/Air Monitoring program** 1. Confined Space Procedures 2. Ventilation of tunnel	1. Communicate WHMIS Procedure to employees during orientation program 2. Obtain a copy of subcontractor's WHMIS policy and all MSDS 3. Ensure all hazardous material containers supplier or workplace	Program to be detailed after award of contract by H&S Officer

Chemical and Occupational Health Considerations (cont'd)		labels 4. Review hazardous chemical data sheets prior to use 5. Ensure training has been provided to all workers relating to hazardous material exposure control: a. Where required due to exposure to hazardous chemical, implement hygiene practices, eye wash station, etc. b. Noise control and protection requirements; c. Welding flash protection requirements. 6. Review procedures to prevent exposure to welding flash, cutting related exposure 7. Notify personnel of hazard control practices 8. Conduct continuous air monitoring to ensure there is no hazardous atmosphere inside the tunnel and cofferdams during construction activities. 9. Develop and implement site specific air monitoring program 10. Develop and implement site specific confined space entry program and procedures 11. Implement engineering controls to ensure adequate air supply using Strabag's proposed ventilation system purging fresh air into tunnel on a continuous basis 12. Maintenance of the fans, blowers, filters as per the manufacturer's recommended guidelines 13. Storage of chemicals, propane, all other compressed gases to be in strict compliance with Trans of Dang Goods, Energy Act, TSSA or other related legislation relating to hazardous substances	Strabag to implement air quality monitoring/ventilation and medical monitoring program in line with OH&SA Regulations and Company policy

Hazard Condition	Associated Process or Phase	Control Procedure	Action
Other Occupational Health Considerations **General Considerations**	**Tunnel Air Quality** 1. Respiratory protection to protect personnel who may be exposed to welding fumes, related cutting fumes, silica dust, diesel fumes 2. Protection of public from generated fumes; 3. Hearing protection when noise exposure may exceed 90 dbA (TWAEV) 4. Protection of workers and public form welding flash;	Strabag/Dufferin and subcontractor to confirm the following: 1. Processes and chemical substance will not create a hazardous atmosphere in or surrounding region. 2. Internal combustion powered equipment is not used within the enclosed tunnel unless adequate supplemental ventilation is provided; 3. Provide wash-up facilities and encourage their use to remove residual dust, welding & cutting fumes that has contacted skin which may pose a hazard 4. Ensure employers provide all exposed workers: a. NIOSH approved respiratory protection when workers may be exposed to hazardous welding fumes, lead based paint dust or	Strabag Project Management Team and Dufferin Project Superintendent in conjunction with H&S Officer/Industrial Hygienist

Other Occupational Health Considerations (cont'd)		fumes, other paint dust or fumes; b. Hearing protection during noise producing operations c. Appropriate safety eye wear 5. Ensure training has been provided to all workers relating to hazardous material exposure control: a. Where required due to exposure to hazardous chemical, implement hygiene practices, eye wash station, etc. b. Noise control and protection requirements; 6. Welding flash protection provisions for the public 7. Notify all personnel of hazard control practices via weekly tailgate training; hazard alert and safety bulletins.	

Hazard Condition	Associated Process or Phase	Control Procedure	Action
Occupational Health Considerations **Asbestos Containing Material**	**Demolition Phase** Asbestos containing material **may** be present in the form of asbestos containing concrete electrical conduit. Conduit may be located in structures and cable trays located in concrete structures **NOTE: owner to advise if asbestos on the project**	Request Asbestos Abatement subcontractor to confirm the following provisions: 1. Develop a plan to support the provisions of the designated Substance Regulation; 2. If a Type 3 operation occurs, notify the Ministry of Labour orally and in writing, prior to the commencement of the operation; 3. Ensure workers are provided with sufficient respiratory protection. Respiratory protection shall conform to the provisions set out in Sec. 10 of the Designated Substance Regulation; 4. Measures and procedures for Type 1 operations shall conform to the provisions set out in Sec. 11 of the Designated Substance Regulation; 5. Measures and procedures for Type 2 and Type 3 operations shall conform to the provisions set out in Sec. 12 of the Designated Substance Regulation; 6. Measures and procedures for Type 2 operations shall additionally conform to the provisions set out in Sec. 13 of the Designated Substance Regulation; 7. Measures and procedures for Type 3 operations shall additionally conform to the provisions set out in Sec. 14 of the Designated Substance Regulation; 8. Train all workers who may be exposed to the hazards of asbestos containing material. Training shall consist of the provisions set out in Sec. 15 of the Designated Substance Regulation; 9. Complete Form 1. Asbestos Work Report for each worker that performs Type 2 or Type 3 operations	To be determined

		10. Notify all personnel of hazard control practices where applicable using weekly tailgate meetings, JH&SC minutes; hazard alerts and safety bulletins.	
Occupational Health Considerations **Spray-on shot crete** **Potential Silica Risk**	**Application of spray-on Shot Crete located along tunnel lining wall behind TBM**	1. Communicate WHMIS procedure 2. Obtain a copy of employer's WHMIS policy and all MSDS 3. Ensure all hazardous material containers supplier or workplace labels 4. Review hazardous chemical data sheets prior to use 5. Ensure training has been provided to all workers relating to hazardous material exposure control: a. Where required due to exposure to hazardous chemical, implement hygiene practices, eye wash station, etc. b. Noise control and protection requirements; 6. Review employer's procedures to prevent exposure to respirable silica dusts and engineering controls to eliminate hazards.	H&S Officer will implement hazard controls at all stages of construction activity

Hazard Condition	Associated Process or Phase	Control Procedure	Action
Blasting	Proximity to INCW Control Building	1. During intake structure excavation phase, blasting is proposed in proximity to INCW building 2. Subcontractor to develop and implement a blasting plan/safe blasting procedures – submit for review to OPG/Constructor 3. Blasting will be in strict compliance with Regulations for Construction projects Section 196-206 4. Subcontractor to utilize geological reports; ensure adequate stemming; blasting mats and that a guarding plan ensures public and worker safety prior to the shot 5. No blasting within pre-determined safe distance to building and gates 6. Storage of explosives in compliance with the SOP and Regulations for transport/ handling and magazine requirements	Subcontractor submit blasting plan weeks in advance of any scheduled shot to Project Management team
Clearing and Grubbing	Felling of Trees for Disposal Area	1. Ensure subcontractor provides safe working procedures for clearing designated lands 2. Obtain training records of all subcontractor employees involved in felling trees using chain saws as per Construction Regulation Section 112 3. Maintain haul road compliance with trucks and delivery vehicles	Project Superintendent for DCC prior to award of subcontract

Utilities	Demolition Phase – PGS Canal Structure Disposal Area clearing and Grubbing Hoisting Activities	1. Identify overhead utilities – High Tension Lines in proximity to construction activity a. Place large double sided warning signs advising of energized electrical or other hazardous utilities 2. Obtain applicable below surface or within-structure utility locates from OPG 3. Review demolition Subcontractor's safe work procedures to confirm adequacy 4. De-energize all energized lines or otherwise protect though insulation or application of safe working distances 5. Implement Contractor/Subcontractor lockout procedures of all energized systems. 6. Obtain subsequent locates as marks are obscured 7. Communicate to all Demolition Subcontractor's personnel: a. Utility locations b. Exposure procedures c. Support procedures 8. Post signs near all energized utilities warning: "Danger Due to Energized Lines, Maintain a Safe Distance" (Distance should be defined) 9. Inspect regularly to ensure maintenance of hazard controls 10. Advise all personnel of hazard control practices using tailgate training talks, safety memos, posters, JH&SC minutes	Project Superintendent for DCC immediately upon mobilization of equipment
Public and Worker Protection During Demolition and Construction Phases	Demolition & Construction Phases	1. Install restrictive fall arrest barriers at perimeter of existing INCW acceleration wall. Possible installation of horizontal life line – TBD 2. Install new navigation lighting at limit of pier 3. Secure access at gate: a. At all times b. Close and secure gates when the contractor is not on site 4. Notify OPG personnel of access control practices 5. Respond to violations of perimeter control; 6. Inspect regularly to ensure maintenance of hazard controls	H&S Officer will review plans and provide input as to safe work procedures

Hazard Condition	Associated Process or Phase	Control Procedure	Action
Marine Work	**Diving Operations** **Installing cofferdam/new INCW acceleration wall**	1. Diving subcontractor will submit a dive plan in strict accordance with the OH&SA Regulations for Diving Operations 2. Plan will detail installation of cofferdam structure at intake structure as per engineered drawings and diving procedures 3. Construction of new acceleration wall at INCW pier 4. Demolition of existing INCW acceleration pier 5. Emergency plan to detail exact working conditions and include rescue of divers, medical monitoring, other emergency services as required	Subcontractor McNally to detail See attached H&S Program
	Working on Water	1. Construction of intake dock as per engineered drawings 2. Placement of cofferdam structure using barges 3. Certification of all marine equipment, marine surveys, emergency plan compliance 4. All workers tied off to anchor system on barge using CSA approved fall arrest systems	McNally Health and Safety submissions
Public and Worker Protection During Hoisting Phase	**Hoisting and Rigging**	1. All operators of hoisting equipment to be licensed by the MTCU, and members of Local 793 Operating Engineers 2. Certificate of Non destructive testing for all hoisting equipment within the last 12 month period. 3. Inspection of crane by competent worker 4. Inspection records for hoisting and rigging equipment – tagged; documentation required 5. Safe hoisting procedures	Procedures for high risk lifts, pumping concrete to be established by Site Superintendent
	Material Transfer	1. Use of conveyor system over PGS Canal to transport muck from TBM at outlet structure 2. Erection of conveyors as per engineered drawings 3. All guarding of conveyor systems in accordance with CSA requirements 4. Training of workers regarding machine guarding awareness/lock-out tag-out 5. Inspection of conveyor system as per guidelines; maintenance of belts, return idlers, tail and head pulleys	Strabag Project Management Team to develop engineered plan upon award of contract

Engineered Structural Support Systems **Engineered Support Systems (cont'd)**	**Cofferdam:** • Intake Structure Construction	1. Design structural support and inspect to ensure cofferdam system is installed consistent with the design 2. Inspect regularly to ensure maintenance of hazard controls 3. Design formwork and falsework to support loads 4. Ensure design work is stamped by a P. Eng 5. Inspect form/falsework by P. Eng or designated competent person to ensure that form and falsework is erected in accordance with the design and will be capable of supporting all loads to be applied 6. Inspect prior to placement of concrete 7. Monitor during concrete placement to identify changes of conditions that may affect form falsework integrity.	McNally to manage marine work – submit approved methodology and engineered shop drawings for cofferdam
Engineered Fall Protection	**All Phases:** • Horizontal lifelines	1. If applicable, design horizontal lifeline systems and inspect to ensure system is installed consistent with the design 2. Inspect regularly to ensure maintenance of hazard controls 3. Install adequate access and egress from the cofferdam	Project Superintendent of Dufferin to ensure all Fall Protection measures in place where workers are exposed to fall hazard > 2.4m.

Hazard Condition	Associated Process or Phase	Control Procedure		Action
Project Illumination	**All Phases**	Adequate illumination will be maintained throughout the project wherever work is being performed. Illumination intensity guideline:		Project Superintendent to ensure at all work areas above ground; Strabag Project Management Team to comply with Construction Regulations for lighting Section 45 and 274 - 276
		Footcandles	Area of Operation	
		5	General construction area lighting	
		3	General construction areas, concrete placement, excavation, waste areas, access ways, active storage areas, loading platforms, refuelling, and field maintenance areas.	
		10	General construction plant and shops (e.g., batch plants, screening plants, mechanical and electrical equipment rooms, carpenters shops, rigging lofts and active store rooms, barracks or living quarters, locker or dressing rooms, mess halls, indoor toilets, and workrooms).	
		30	First-aid stations, infirmaries, and offices.	

Hazard Condition	Associated Process or Phase	Control Procedure	Action
Hoisting Operations	**TBM Erection Phases**	Request Hoisting Subcontractor to confirm the following: 1. Confirm crane operator has appropriate certificate based on crane hoist capacity 2. Confirm crane and rigging hardware has been inspected by a competent worker and is in good condition 3. Confirm rigging is sufficient for the intended loads 4. Ensure appropriate access is provided to gain access (if necessary) to permit safe installation of rigging 5. Ensure hoisted materials are stable and will not shift prior to permitting workers to access from zoom booms or ladders; 6. Ensure that the crane operator can maintain visual contact. Alternatively, ensure: o Appropriate verbal directions can be communicated by a competent signaller via radio; o A competent signaller can communicate appropriate hand signals. 7. Conduct a trial lift prior to commencing a critical hoist operation. 8. Evaluate lifting procedures for compliance	

Hazard Condition	Associated Process or Phase	Control Procedure	Action
Exposure to vehicular traffic	**All phases:** • Material transfer to disposal sites; • Motoring public in vicinity of public roads adjacent to the work area	1. Instruct each affected subcontractors to develop & implement a written Traffic Protection Plan a. Consider mandatory truck haul routes b. Motoring public roadways bordering the project 2. Conduct a hazard assessment to reflect the nature of the vehicular traffic and control strategies 3. Review Dufferin Traffic Protection Plan(s) and communicate integrated plan to all drivers, operators during orientation meeting 4. Train competent worker to install traffic control measures including: • Traffic control provisions should reflect OTM Book 7 where appropriate and meaningful • Sign placement; • Placement of channelizing devices (delineation) in advance of placement of Temporary Concrete Barriers where required • Final placement and adjustment Temporary Concrete Barrier (New Jersey Type) placement during staging transition; • Consider use of Traffic Control Person(s) to coordinate traffic during placement of signs, channelizing devices and protect workers. Ensure competent Traffic Control Person(s) are trained and receive ongoing instruction; 5. Communicate the plan to all affected workers. 6. Provide safety vests to all exposed individuals 7. Inspect regularly to ensure maintenance of hazard controls 8. Install chain link fence atop temporary concrete barrier during changes to placement of barrier as part of the overall security requirements 9. Maintain chain link fence atop temporary concrete barrier as set out in contract specs. 10. Install access gates and hoarding at access points to the construction zone at intake, disposal sites and outlet structure	Project Management Team in conjunction with H&S Officer

Hazard Condition	Associated Process or Phase	Control Procedure	Action
Exposure to other moving vehicle or equipment	**All phases:** • Contractor vehicles; • Subcontractor vehicles; • Mobile concrete trucks; • Material supplier trucks; • Vendor vehicles • Crane to be used during demolition and other hoisting phases	1. Plan, organize and implement a backup reduction plan a. Consider construction related vehicles and mobile equipment 2. Review each Strabag/Dufferin and subcontractor's safe work procedures to confirm adequacy 3. Organize work to eliminate or reduce backup of vehicle 4. Organize work to reduce worker and/or equipment congestion 5. Install barriers where appropriate to restrict access to hazard areas 6. Establish signals 7. Appoint competent signallers to assist in vehicle & equipment movement 8. Train competent signallers 9. Communicate procedures to signallers and vehicle & equipment operators 10. Install warning signs at strategic locations advising of reversing vehicle hazards and control strategies 11. Train workers to understand control strategies 12. Ensure vehicles & equipment (dump trucks) have operational and audible backup warning beepers 13. Provide safety vests to all exposed individuals 14. Inspect regularly to ensure maintenance of hazard controls	Dufferin Project Superintendent prior to mobilization

Hazard Condition	Associated Process or Phase	Control Procedure	Action
Fall Protection Provisions	**All Phases, including:** 1. Installation of falsework and scaffolding; 2. Demolition of existing PGS Canal Structure; INCW Pier	Request applicable Dufferin and subcontractor's to confirm the following: 1. Conduct a fall hazard assessment to reflect: o Guardrail requirements; o Access requirements (ladders, scaffold stairway, scaffolding, swingstage, powered elevating work platforms, manbaskets, etc) o Personal fall arrest and travel restraint systems; o Horizontal lifeline systems o Debris nets 2. Develop & implement a fall protection system specifications 3. Develop & implement a fall protection plan 4. Develop & implement a post - fall rescue plan 5. Implement fall protection system training to reflect the above. Training content should reflect as a minimum content as set by the CSAO, industry practices or ANSI Z359.1-1992 (R1999); 6. Inspect regularly to ensure maintenance of hazard controls, including: o Guardrail systems; o Travel restraint systems; o Fall arrest systems and subcomponents; o Horizontal lifeline systems, etc 7. Notify JH&SC members of hazard control practices	Project Superintendent and H&S Officer

Hazard Condition	Associated Process or Phase	Control Procedure	Action
Additional TBM Tunnel requirements	**All Phases, including:** 1. Assembly of the TBM 2. Launching of the TBM 3. TBM drive	Request applicable Strabag and subcontractor's to confirm the following: 1. Only skilled workers from Strabag and the TBM manufacturer are authorised to work close to the TBM 2. Before launch training of all workers regarding TBM instructions and emergency operations 3. Employment of state of the art technology for protection of the TBM crew. Process instruction for maintenance and operation o Roof drill (bolting) system o Ring beam erector o Probe/Grout drill system o Wire mesh handling system o Shotcrete system including dust protection o Work platforms with guardrail o Access requirements (ladders, stairway, powered elevating work platforms, manbaskets, etc)	Project Management Team in conjunction with H&S Officer
	4. Geological & Geotechnical Report	4. Develop of a work instruction in accordance to the Geological & Geotechnical Report for implementation of the support measures o rockdowels o reinforced shotcrete o steel ribs o wire mesh o dimple membrane or equal	To be determined
	5. Safety installation	5. Employment of safety installation on the TBM Training of all workers and periodic exercises Each worker is obliged to wear safety vests o Fire suppression equipment o Gas detection o Emergency power for lighting o Safety & first aid container for 20 person equipped with oxygen self-rescuers o Lock out / tag out for the TBM conveyor o Lock out / tag out for the TBM cutter head Employment of safety installation outside the Tunnel by the outlet o Emergency power for dewatering and ventilation	
	6. Dewatering	6. Installation and maintenance of piping and pumps for the worst	

	7. Water treatment 8. Traffic	case of water inflow including contingencies 7. Process instruction for operation and maintenance with self-controlled monitoring and advance warning o Each water from the outlet canal is collected on several points and finally in front of the tunnel entrance and conducted with pumps to the water treatment o Each water from the tunnel is collected on the deepest point and conducted with pumps to the water treatment 8. The transport into the tunnel will take place with double-track rail bounded trains. o Rules and signs for the traffic ensure the supply and minimize the risk for accidents o Develop instructions for the decline o Maximum towing loads etc.	

Hazard Condition	Associated Process or Phase	Control Procedure	Action
Additional Tunnel requirements	**All Phases, including:** 1. Final lining and waterproofing	Request applicable Strabag and subcontractor's to confirm the following: 1. Only skilled workers from Strabag and the formwork manufacturer are authorised to work close to the formwork Process instruction for maintenance and operation Each worker is obliged to wear safety vests Oxygen self-rescuers are in the vicinity of the formwork stored Access requirements (ladders, stairway, work platforms, etc) Transport requirements as above mentioned	Project Management Team in conjunction with H&S Officer

Strabag / Dufferin Construction Company Design Build Team - Pre-Start Project Specific Safety Plan – OPG Niagara Tunnel

Additional Points to Public Safety & Site Security

Hazard Condition	Associated Process or Phase	Control Procedure	Actions and Dates
Site Security	Outlet Structure & Access To Intake Structure	1. Develop a policy and program relating to site security taking into consideration. • Security supervisor appointed and accountabilities. • Communication with Niagara Plant Group EMS/Police etc during an emergency. • Public communication and Safety • Ensure all workers entering site have received orientation training & ID badges. • Gated access points locked and patrolled. • Key control for all locked gates and buildings. • Perimeter fencing and signage. • 24 hour site security and monitoring. • Provide adequate lighting security alarms etc. • Security responsible for reporting all non compliances, perimeter patrols etc. Written reports required. • Identification of vehicles entering & exiting site. • Sign in and sign out of visitors, delivery personnel etc. • Loss control program relating to thefts, vandalism, damage etc. • Site emergency plan posted with appropriate emergency phone numbers. • Security matters to be reviewed regularly to ensure compliance with policy & program. • Investigations, discussion and review. • Management review and feedback on program effectiveness.	Upon Award of Contract H&S Department to conduct training. All security matters reportable to site H & S Officer

STRABAG

Contractor Management
Environment, Health & Safety Qualification

STRABAG

Summary
Health, Safety & Environmental Efforts

STRABAG AG
Division IT – Tunnelling 5
Underground mining international
Donau-City-Strasse 9
A – 1220 Vienna, Austria

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STRABAG

Hatch Mott MacDonald
Attn. Harry Charalambu, Project Manager
2800 Speakman Drive
Mississauga, Ontario
Canada L5K 2R7

Niagara Tunnel Project

Health, Safety & Environmental Efforts

We are pleased to inform you that Austria ranks in a top position of the European Member States (among the top 5 countries) concerning the enforcement of EU directives and guidelines for statutory expressed Industrial Safety Standards.

The Austrian legislation obliges every Austrian company to comply with the EU directives and guidelines for Industrial Safety. Any non-compliance is punished with severe civil penalties and fines.

The Safety Training of new hired site personnel before beginning of work is part of the statutory Safety Standard in Austria as well as the periodic training and the instruction on the building machinery and construction equipment.

Every company has to provide a sufficient number of safety personnel who have to attend periodic safety trainings and have to control and enforce the Industrial Safety Standards on each jobsite.

STRABAG Group is the only private company in Austria authorized for training and certification of Safety Personnel in accordance to the EU directives (please refer to attached administrative decision of Austrian Ministry for Work, Health and Social Concerns –Job Safety Agency).
This was one of the reasons for nominating our group for the **State Honour for Work Safety 2003.**

We also like to inform you that STRABAG is certified in accordance to **ISO 14001** for the implementation and maintenance of an Environmental Management System as well as to **SCC°- Safety Certificate Contractors** for application and further development of an effective Safety Management System complying with the requirements of the SCC Standard.

Administrative Decision
Training of Safety Personnel

BUNDESMINISTERIUM
FÜR ARBEIT, GESUNDHEIT UND SOZIALES
ZENTRAL-ARBEITSINSPEKTORAT

GZ: 61.202/58-3/99

Wien, 1. April 1999

Betreff: Sicherheitsvertrauenspersonen und Präventivdienste; Anerkennung der Fachausbildung von Sicherheitsfachkräften gemäß § 6 SFK-VO.

BESCHEID

Dem Antrag der BRVZ Bau-, Rechen- und Verwaltungszentrum Gesellschaft m.b.H., 9800 Spittal/Drau, Ortenburgerstraße 27, vom 19. November 1998, ergänzt durch die Schreiben vom 19. Februar 1999 und 25. März 1999, wird stattgegeben. Die Ausbildung der Sicherheitsfachkräfte laut vorgelegtem Ausbildungsplan wird gemäß § 6 der Verordnung über die Fachausbildung der Sicherheitsfachkräfte (SFK-VO), BGBl.Nr. 277/1995, als Fachausbildung für Sicherheitsfachkräfte

anerkannt.

Für diesen Bescheid ist gemäß Tarifpost 1 der Bundes-Verwaltungsabgabenverordnung 1983, BGBl.Nr. 24, eine Verwaltungsabgabe von S 60,-- (Schilling sechzig) zu entrichten.

Begründung:

Die BRVZ Bau-, Rechen- und Verwaltungszentrum Gesellschaft m.b.H., 9800 Spittal/Drau, Ortenburgerstraße 27, hat mit Schreiben vom 19. November 1998 beim Bundesministerium für Arbeit, Gesundheit und Soziales, Zentral-Arbeitsinspektorat, die Anerkennung der gleichzeitig bekanntgegebenen Fachausbildung gemäß § 6 SFK-VO beantragt.

Das Bundesministerium für Arbeit, Gesundheit und Soziales, Zentral-Arbeitsinspektorat, hat gemäß § 6 Abs. 2 SFK-VO den gesetzlichen Interessenvertretungen der Arbeitgeber/innen und Arbeitnehmer/innen und dem Bundesministerium für Wissenschaft und Verkehr im Verfahren Gelegenheit zur Stellungnahme gegeben.

Seitens der Bundesarbeitskammer erfolgten keine Einwände gegen die Anerkennung der Fachausbildung gemäß § 6 SFK-VO. Das Bundesministerium für Wissenschaft und Verkehr, Verkehrs-Arbeitsinspektorat, verlangte zusätzliche verkehrsspezifische Lehrinhalte. Die Wirtschaftskammer Österreich gab im Rahmen des Anhörungsverfahrens keine Stellungnahme ab.

Abteilung: VI/3, Auskunft: Gerda Ecker, DW: 6323
A-1020 Wien, Praterstraße 31, Tel.:(01) 71100 Fax: (01) 71100 2190, DVR: 0017001

Der Antragstellerin wurde gemäß §§ 37 und 45 Abs. 3 des Allgemeinen Verwaltungsverfahrensgesetzes (AVG) mit Schreiben des Bundesministeriums für Arbeit, Gesundheit und Soziales, Zentral-Arbeitsinspektorat, vom 15. Jänner 1999, Zl. 61.202/6-3/99, Gelegenheit zur Stellungnahme gegeben. Die Antragstellerin wurde darauf hingewiesen, daß sich Defizite beim Umfang der Fachausbildung hinsichtlich der für die einzelnen Themengebiete geforderten Mindeststundenzahl ergäben. Defizite ergaben sich in folgenden Gebieten: Rechtsgrundlagen: 22 Unterrichtseinheiten statt mindestens 32 Unterrichtseinheiten, Organisation und Methoden des Arbeitnehmerschutzes: 17 Unterrichtseinheiten statt mindestens 23 Unterrichtseinheiten, Sicherheit von Arbeitssystemen: 56 Unterrichtseinheiten statt mindestens 60 Unterrichtseinheiten. Die Antragstellerin wurde darauf hingewiesen, daß die fehlenden Unterrichtseinheiten möglicherweise unter anderen Punkten des Ausbildungsplanes enthalten seien, doch ließe sich dies aus dem vorliegenden Ausbildungsplan nicht mit Sicherheit beurteilen. Weiters wurde darauf hingewiesen, daß die im Ausbildungsplan angeführten Prüfungen nicht als Unterrichtseinheiten anerkannt werden können und Angaben über die Zulassung von (sonstigen) Personen zur Fachausbildung fehlen. Informationshalber wurde darauf hingewiesen, daß bei einer blockweisen Durchführung der Fachausbildung den Kursteilnehmer/innen zusätzlich zum Abschlußzeugnis eine Bestätigung über die Teilnahme an den einzelnen Ausbildungsabschnitten auszustellen wäre.

Mit Schreiben vom 19. Februar 1999 teilte die Antragstellerin mit, daß die im Ausbildungsplan als Prüfungen ausgewiesenen Unterrichtseinheiten aus der Gesamtstundenzahl herausgenommen wurden (als Beilage dem Schreiben angeschlossen). Weiters teilte die Antragstellerin mit, daß die Forderung des Verkehrs-Arbeitsinspektorates mit zusätzlich 9 Unterrichtseinheiten berücksichtigt wurde und den Teilnehmern nach jedem Ausbildungsblock eine Kursbestätigung ausgestellt werde. Die Angaben über die Zulassungsprüfung wurden bekanntgegeben.

Laut vorgelegtem und durch das Schreiben vom 19. Februar 1999, ergänzt durch das Schreiben vom 25. März 1999, nach dem Parteiengehör korrigierten Ausbildungsplan, umfaßt die Fachausbildung der BRVZ Bau-, Rechen- und Verwaltungszentrum Gesellschaft m.b.H. 296 Unterrichtseinheiten, welche auf zehn Themengebiete i.S.d. § 1 Abs. 2 Z 1 bis 10 und Abs. 3 SFK-VO wie folgt verteilt sind:

1. Einführung und Grundlagen (mindestens 8 Unterrichtseinheiten):
   8 Unterrichtseinheiten
2. Rechtsgrundlagen und Normen (mindestens 32 Unterrichtseinheiten):
   35 Unterrichtseinheiten
3. Grundsätze der Organisation und der Methoden des betrieblichen Arbeitnehmerschutzes (mindestens 23 Unterrichtseinheiten):
   34 Unterrichtseinheiten
4. Sicherheit von Arbeitssystemen mit Anwendungsfällen (mindestens 60 Unterrichtseinheiten):
   81 Unterrichtseinheiten
5. Ergonomie, Grundlagen und Anwendung (mindestens 24 Unterrichtseinheiten):
   26 Unterrichtseinheiten
6. Schadstoffe, Grundlagen und Anwendung (mindestens 19 Unterrichtseinheiten):
   24 Unterrichtseinheiten

7. Ermittlung und Beurteilung von Gefahren, Festlegung von Maßnahmen (mindestens 10 Unterrichtseinheiten):
   24 Unterrichtseinheiten
8. Kosten-Nutzen-Analyse (mindestens 10 Unterrichtseinheiten):
   10 Unterrichtseinheiten
9. Psychologische und betriebssoziologische Grundlagen des Arbeitnehmer/innenschutzes (mindestens 27 Unterrichtseinheiten):
   28 Unterrichtseinheiten
10. Schnittstellen mit verwandten Sachgebieten, insbesondere dem Verkehrswesen (mindestens 7 Unterrichtseinheiten):
    28 Unterrichtseinheiten.

Im Sinne der Bestimmungen des § 1 Abs. 4 SFK-VO über die blockweise Durchführung der Fachausbildung, wird der Lehrgang in vier Blöcken zu je zwei Ausbildungswochen, durchgeführt. Ein Abschluß des Ausbildungslehrganges ist nach erfolgreicher Ablegung der Abschlußprüfung nach Beendigung des letzten Blockes innerhalb einer zweijährigen Frist des § 1 Abs. 4 SFK-VO gewährleistet.

Die Ausbildungsleitung gemäß § 4 SFK-VO erfolgt durch Ing. Johannes Pestal, welcher über eine Ausbildung als Sicherheitsfachkraft und als ehemaliger Arbeitsinspektor und Vortragender bei diversen Schulungen und Unterweisungen im Bereich Arbeitnehmerschutz über langjährige einschlägige Berufs- und Organisationserfahrung verfügt.

Als Vortragende sind vorgesehen:
Vertreter/innen des Zentral-Arbeitsinspektorats, der Arbeitsinspektion, Vertreter der AUVA der Verkehrs-Arbeitsinspektion, Arbeitsmediziner und Sicherheitsfachkräfte

Die fachliche Qualifikation der vorgesehenen Lehrkräfte i.S.d. § 5 Z 2 SFK-VO ergibt sich aus deren Ausbildung und beruflichen Tätigkeit insbesondere im Bereich des Arbeitnehmerschutzes.

Die Durchführung der Fachausbildung soll in den Räumlichkeiten der Bildungsakademie der Bau Holding AG, 9800 Spittal/Drau, Ortenburgerstraße 27, erfolgen, so daß die entsprechende Ausstattung und die Lehrmittel i.S.d. § 5 Z 3 in den Seminarräumen vorhanden sind.

Die Abschlußprüfung gemäß § 3 Abs. 2 bis 5 SFK-VO wird in Form einer schriftlichen und mündlichen Prüfung durchgeführt.

Die auf Grund der §§ 74 und 90 Abs. 1 Z 1 des Bundesgesetzes über Sicherheit und Gesundheitsschutz bei der Arbeit (ArbeitnehmerInnenschutzgesetz - ASchG), BGBl. Nr. 450/1994, ergangene Verordnung des Bundesministers für Arbeit und Soziales über die Fachausbildung der Sicherheitsfachkräfte (SFK-VO), BGBl.Nr. 277/1995, sieht eine Anerkennung der Fachausbildung mit Bescheid gemäß § 6 Abs. 1 SFK-VO, vor, wenn der laut Antrag gemäß § 5 SFK-VO vorgelegte Ausbildungsplan den Voraussetzungen des § 1 SFK-VO über Inhalt und Umfang der Fachausbildung entspricht und gewährleistet ist, daß die personellen und sachlichen Voraussetzungen der Ausbildungseinrichtung zur Erreichung des Ausbildungszieles gegeben sind.

Gemäß § 1 Abs. 4 SFK-VO kann die Fachausbildung blockweise durchgeführt werden, wobei die einzelnen Ausbildungsabschnitte mindestens zwei Wochen betragen müssen und die Ausbildungseinrichtung zu gewährleisten hat, daß die Fachausbildung bei normalem Ausbildungsgang innerhalb von zwei Jahren abgeschlossen werden kann.

Die Verteilung der Differenz von 68 Unterrichtseinheiten gemäß § 1 Abs. 3 SFK-VO, welche sich aus der Gesamtzahl von mindestens 288 Unterrichtseinheiten und den in § 1 Abs. 2 Z 1 bis 10 SFK-VO verbindlich nach Fachgebieten vorgeschriebenen 220 Unterrichtseinheiten ergibt, auf die Ausbildungsgegenstände der SFK-VO bleibt den einzelnen Ausbildungseinrichtungen nach individuellen inhaltlichen und didaktischen Gesichtspunkten im Rahmen des von der SFK-VO eingeräumten Spielraumes vorbehalten.

Gemäß § 5 Z 2 SFK-VO sind allgemeine Angaben über die fachliche Qualifikation der vorgesehenen Lehrkräfte dem Antrag auf Anerkennung der Ausbildung beizuschließen, eine namentliche Bekanntgabe der Vortragenden ist nicht vorgeschrieben.

Der vorgelegte Fachausbildungsplan in Form eines blockweisen Lehrganges entspricht den Voraussetzungen des § 1 SFK-VO, die personellen und sachlichen Ressourcen erscheinen gewährleistet. Der zur Anerkennung beantragte Fachausbildungslehrgang der Sicherheitsfachkräfte der BRVZ Bau-, Rechen- und Verwaltungszentrum Gesellschaft m.b.H. entspricht den Bestimmungen der SFK-VO.

Gemäß § 1 i.V.m. § 4 der Bundes-Verwaltungsabgabenverordnung 1983 ist für die Erlassung dieses im Interesse des Antragstellers gelegenen Bescheides eine Verwaltungsabgabe von S 60,– (Schilling sechzig) gemäß Tarifpost 1 zu entrichten. Eine Befreiung der Antragstellerin von der Entrichtung dieser Verwaltungsabgabe ist nicht vorgesehen.

Es war daher spruchgemäß zu entscheiden.

Rechtsmittelbelehrung:

Gegen diesen Bescheid ist ein ordentliches Rechtsmittel nicht zulässig.

Hinweise:

1. Die im Spruch des Bescheides vorgesehene Verwaltungsabgabe ist binnen 14 Tagen dem Bundesministerium für Arbeit, Gesundheit und Soziales, Zentral-Arbeitsinspektorat, Praterstraße 31, 1020 Wien, zu übermitteln. Aus verwaltungstechnischen Gründen wird ersucht, sie in Form einer Bundesstempelmarke zu entrichten.

2. Gemäß § 3 Abs. 5 SFK-VO ist das Bundesministerium für Arbeit, Gesundheit und Soziales und das Bundesministerium für Wissenschaft und Verkehr berechtigt, eine(n) Vertreter(in) zur Prüfung zu entsenden und sind daher vom Prüfungstermin zeitgerecht zu verständigen.

Anlagen

Ergeht an:

1. die BRVZ Bau-, Rechen- u.
   Verwaltungszentrum Gesellschaft m.b.H.
   Ortenburgerstraße 27
   9800 Spittal/Drau

2. die Wirtschaftskammer Österreich
   Wiedner Hauptstraße 63
   1045 Wien
   z.g.K.

3. die Bundesarbeitskammer
   Prinz Eugen Straße 20-22
   1041 Wien
   z.g.K.

4. das Bundesministerium für
   Wissenschaft und Verkehr
   Verkehrs-Arbeitsinspektorat
   Radetzkystraße 2
   1030 Wien
   z.g.K.

5. das Arbeitsinspektorat für
   den 11. Aufsichtsbezirk
   Opernring 2
   8010 Graz
   z.g.K.

6. das Arbeitsinspektorat für
   den 12. Aufsichtsbezirk
   Erzherzog Johann Straße 6-8
   8700 Leoben
   z.g.K.

Mit freundlichen Grüßen!

Für die Bundesministerin:

Öller

Für die Richtigkeit
der Ausfertigung:

Contractor Management

Environment, Health & Safety Qualification

Questionaire

ONTARIOPOWER GENERATION

CONTRACTOR MANAGEMENT

Company Name: *STRABAG AG*

Contractor Type: (1) 2 3 4 **(please circle one)**

1. POLICIES & PROGRAM (EH&S)

Does your company have an EH&S policy endorsed by senior management?
Yes [X] No [ ]

Is the policy communicated on a corporate-wide basis?
Yes [X] No [ ]

Is the policy enforced on projects?
Yes [X] No [ ]

Does your company have a corporate EH&S committee?
Yes [X] No [ ]

If so, do they meet regularly?
Yes [X] No [ ]

Do you have a written safety program?
Yes [X] No [ ]
(If "yes", submit a copy for evaluation.)

please refer to attached Annex A
"Work Safety Information – Short Version
"Management System for implementation of the Group Principals"
"Safety, Health and Environmental Protection – SCC"

Does your company implement project-specific EH&S policies and procedures?
Yes [X] No [ ]

2. MANAGEMENT REVIEWS

Are company practices for EH&S discussed in progress review meetings?
Yes [X] No [ ]

How often are review meetings held?
Weekly [ ] Bi-Weekly [ ] Monthly [X] Less Often, As Needed [ ]

Are EH&S meetings held regularly for supervisors only on a job?
Yes [X] No [ ]

If so how often?
Weekly [ ] Bi-Weekly [ ] Monthly [X] Less Often, As Needed [ ]

3. SUB-CONTRACTORS QUALIFICATIONS

Does your company have a program for qualifying sub-contractors?
Yes [X] No [ ]
(If "yes" please provide a copy of the program.)

Does your company have a program for maintaining the quality of sub-contracted work?

Yes [X] No [ ]

(If "yes" please provide a copy of the program.)

please refer to attached Annex B – Program for Qualification of Subcontractors

4. TRAINING AND COMPETENCY

Are the company's rules (safety, fitness for duty, etc.) provided in an employee handbook?

Yes [X] No [ ]

Does your company implement project-specific policies and procedures?

Yes [X] No [ ]

Are employees required to sign an acknowledgement of receipt and understanding?

Yes [X] No [ ]

If formal classroom training given as required?

Yes [X] No [ ]

Is "on-the-job" training provided as required?

Yes [X] No [ ]

Are certification credentials required and checked where applicable?

Yes [X] No [ ]

Are training records kept?

Yes [X] No [ ]

5. ORIENTATION PROGRAM

Do you have an orientation program for new hires?

Yes [X] No [ ]

please refer to attached Annex C "Industrial Safety Information"

"The Blue Book – Safety at Site"

"Information Brochure for New Hires"

(If "yes", submit a copy for evaluation.)

Does it include instruction on the following?

	Yes	No
a. Head protection	[X]	[ ]
b. Eye protection	[X]	[ ]
c. Hearing protection	[X]	[ ]
d. Respiratory protection	[X]	[ ]
e. Working at height	[X]	[ ]
f. Falling objects	[X]	[ ]
g. Hazards and controls	[X]	[ ]
h. Housekeeping and storage	[X]	[ ]
i. Fire and explosion hazards	[X]	[ ]
j. First aid facilities	[X]	[ ]
k. Emergency responses	[X]	[ ]
l. Hazardous materials	[X]	[ ]
m. Trenching and excavation	[X]	[ ]
n. Barriers and signage	[X]	[ ]
o. Electrical safety	[X]	[ ]
p. Craning and rigging	[X]	[ ]
q. Driving vehicles	[X]	[ ]
r. Compressed gases	[X]	[ ]
s. Control of Hazardous Energy (Lockout/Tagout)	[X]	[ ]

6. PROGRAM FOR NEWLY HIRED OR PROMOTED SUPERVISORS

Do you have a competency or qualification program for supervisors?

Yes [X] No [ ]

(If "yes", submit a copy of the program for evaluation.)

please refer to attached Annex D "Supervisors Qualification Program"

Do you have a program for newly hired or promoted supervisors?

Yes [X] No [ ] *please refer to attached Annex D "Supervisors Qualification Program*

(If "yes", submit a copy of the program for evaluation.)

Does it include the following?

	Yes	No
a. Safe work practices	[X]	[ ]
b. Safety supervision	[X]	[ ]
c. Safety regulations	[X]	[ ]
d. Tailboard meetings	[X]	[ ]
e. First aid procedures	[X]	[ ]
f. Accident investigation	[X]	[ ]
g. Fire protection and prevention	[X]	[ ]
h. New worker orientation	[X]	[ ]
i. Due diligence	[X]	[ ]
j. Internal responsibility system (IRS)	[X]	[ ]
k. Emergency procedures	[X]	[ ]
l. Safe work planning	[X]	[ ]
m. Field verification/observation	[X]	[ ]
n. Control of Hazardous Energy (Lockout/Tagout)	[X]	[ ]

7. RISK MANAGEMENT

Does your organization have a program for managing environmental and health & safety risks?

Yes [X] No [ ] *please refer to attached Annex E "Risks Evaluation on Site"*

(If "yes" please provide a copy of the program.)

Does the Risk Management Program have a process for developing programs to control environmental aspects of a job?

Yes [X] No [ ]

Does the Risk Management Program have a process for developing programs to control safety hazards prior to and during the project (e.g. working at heights program, spills control program, etc.)?

Yes [X] No [ ]

Are these programs communicated to the site supervisor's employees and sub-contractors working on the project?

Yes [X] No [ ]

8. INSPECTIONS/AUDITS

Are there regular EH&S audits for a project?

Weekly [ ] Bi-Weekly [ ] Monthly [X] Less Often, As Needed [ ]

Who conducts these audits?

Contractor [ ] Insurance company representatives [ ] Third party consultants [X] Other [ ]

What measures are used to evaluate the effectiveness of EH&S controls?

The effectiveness of EH&S controls is monitored by statistical analysis of occurrences/rates/accidents versus empirical data from comparable projects. Trendlines are regularly monitored and action is taken in case of an adverse trend.

9. CITATIONS FROM OH&SA OR OTHER REGULATORY ORGANIZATIONS

Have any citations been issued to your company in Canada within the last three years from the OH&SA or any other regulatory organization (e.g., Orders to Comply, charges, fines, levies, work refusals etc.)?

Yes [ ] No [X]

If so, by whom and when?

What was the citation issued for?

What corrective actions were taken by Management to address issue?

10. ILLNESS AND INJURIES

*Provide a copy of the WSIB rating for the three most recent years - **Not applicable***

	Last year (2003)	***2 years ago*** (2002)	***3 years ago*** (2001)
a. NEER Rating			
b. MAP Rating			
c. CAD-7 Rating			
d. Firm Cost Frequency Report Rating			

*For work in Ontario and/or Canada: **Not applicable***

	Last year (2003)	***2 years ago*** (2002)	***3 years ago*** (2001)
a. First Aid			
b. Medical Aid			
c. Lost Time Injuries			
d. Fatalities			
e. Hours Worked			

11. ACCIDENT/INCIDENT INVESTIGATION

Does your company have a policy/program for the investigation of accidents/incidents?

Yes [X] No [ ]

(If "yes" please provide a copy.)

please refer to attached Annex F – Example of Accident Investigation Program Manapouri

Are all workers made aware of this program?

Yes [X] No [ ]

Are all workers encouraged to provide reporting information for this program, if required?

Yes [X] No [ ]

12. CORRECTIVE ACTION

Does your company have a program for managing corrective actions resulting from poor performance, inspections, accidents, incidents, etc.?

Yes [X] No [ ]

please refer to attached Annex F – Example of Accident Investigation Program Manapouri

(If "yes" please provide a copy of this program.)

(Corrective actions are part of the AIP)

13. SAFETY MEETINGS

Do you hold site safety meetings for field employees (both manual and non-manual)?

Yes [X] No [ ]

How often?

Weekly [ ] Bi-Weekly [X] Monthly [ ] Less Often, Specify Frequency [ ]

14. SAFETY INSPECTIONS

Do you conduct project safety inspections?

Yes [X] No [ ]

Are these inspections conducted at all levels of management?

Yes [X] No [ ]

How frequently are inspections carried out?

Weekly [X] Bi-Weekly [ ] Monthly [ ] Less Often, Specify Frequency [ ]

Who carries out these inspections?

Site inspections on a daily basis is the responsibility of the Tunnel Manager/Forman/Shift Boss.

Weekly site inspections are performed by the Health and Safety Officer (HSO) jointly with the Tunnel Manager.

The HSO will meet periodically with the Project Manager to review the Monthly Health and Safety Reports and discuss any corrective action required.

How are results documented?

The inspections are recorded on standard Inspection Forms including the recommended corrective actions. The results are included in the Monthly Health and Safety Report.

15. "TAILBOARD" SAFETY MEETINGS

Do you hold craft "tailboard" safety meetings?

Yes [X] No [ ]

How Often?

Weekly [ ] Bi-Weekly [X] Monthly [ ] Less Often, Specify Frequency [ ]

16. HAZARDS/JSA'S

Is a Job Safety Plan/Job Safety Analysis conducted at the start of a job?

Yes [X] No [ ]

Does the Job Safety Plan/Job Safety Analysis include emergency response?

Yes [X] No [ ]

Are hazardous and designated substances listed prior to work commencing?

Yes [X] No [ ]

Are controls/plans implemented to mitigate the identified risks?

Yes [X] No [ ] *please refer to attached Annex G - "Example Job Safety Program"*

(Please provide a copy of your Job Safety Plan/Job Safety Analysis Program.)

17. KEY HEALTH AND SAFETY PERSONNEL

List key Health and Safety personnel planned for this project. Please list name, expected position and safety performance on last three project (Lost Workday Case Incident – LWCI). When a project has not been specified, list key company personnel.

Name	Position	Project	LWCI

please refer to attached Annex H " HS Personnel 2004"

18. CLIENT REFERENCES

List three (3) client references that could verify the quality and management commitment of your safety program.

Name	Address	Phone No.
a. N4 Flüelen Bypass, Road Tunnel, section T1, Switzerland Peter Püntener, Construction Agency Uri, Klausenstrasse 2, 6460 Altdorf (CH), 0041 / 41 / 875 26 20		
b. Lötschberg Railway Tunnel, Lot Mitholz, Switzerland Peter Teuscher, BLS Alp Transit AG, Aarestrasse 38b, 3601 Thun (CH), 0041 / 33 / 225 79 79		
c. Second Manapouri Tailrace Tunnel, New Zealand Ken Smales, Meridian Energy Ltd., 322 Manchester Street, Christchurch (NZ), *64 3 357 9700		

ONTARIOPOWER GENERATION

CONTRACTOR MANAGEMENT — ENVIRONMENT, HEALTH & SAFETY [illegible]

Name:	Title:	Date:
Johannes PESTAL		September 6th 2004
Company Name:	Phone No.	Primary Business of the Company:
STRABAG AG	+43 (0)1 / 217 28 -148	Head of staff department "INDUSTRIAL SAFETY" of STRABAG Group
To be completed by Reviewer:		
Qualified: Yes [X] No [ ]	Reviewer: (Johannes PESTAL)	Date September 6th 2004

STRABAG
STRABAG AG
FOLGARSTRASSE 50
A-1220 WIEN

Pestal Johannes

02 09 2004

STRABAG

Annex A

Work Safety Information

Management System

for implementation of the Group Principals

Safety, Health and Environmental Protection – SCC

Work Safety Information

STRABAG

Work safety Information

Short Version of

SAFETY DIRECTIVES

Work Safety

General

The health and protection of our employees as well as other persons involved are of prime importance

We are aware that there is a particularly high danger potential when the place of work is changed and no precautions, such as ensuring safety at work and providing protective clothing, are taken.

The management of the operating unit is responsible for the organization of safety provisions.

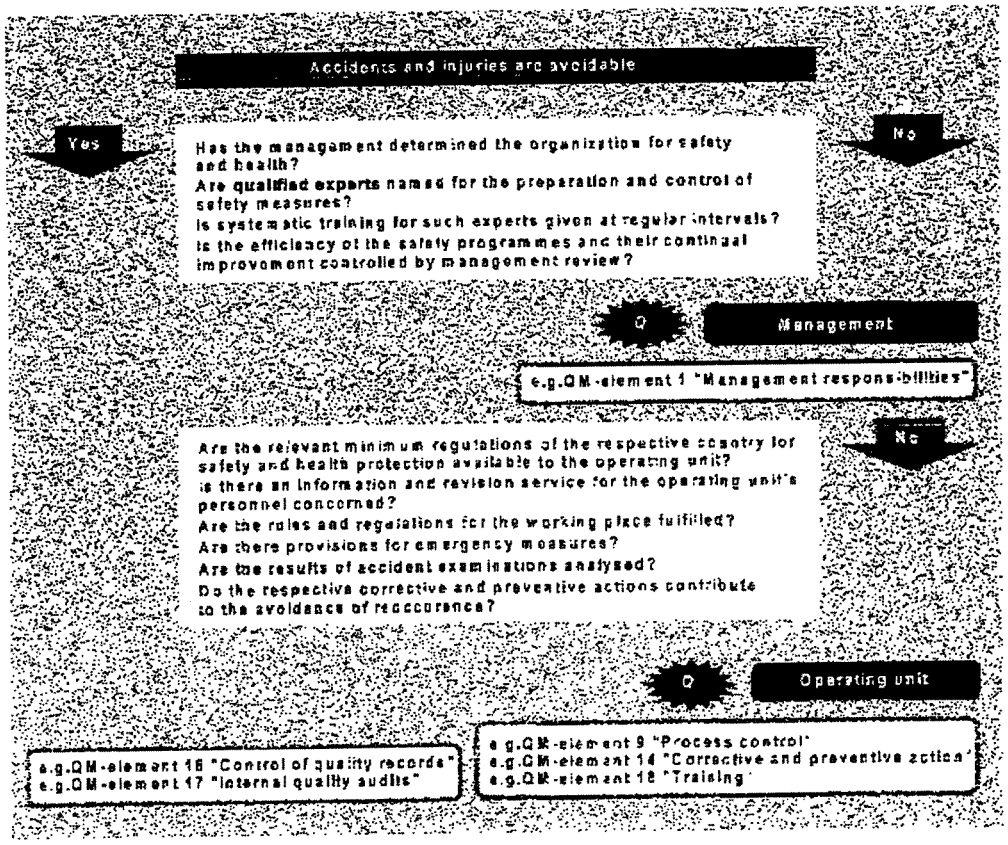
The safety expert appointed by management maintains the specific programmes for safety and health provisions in his area of responsibility and ensures their observance. These programmes are reviewed by management in relation to their capability.

The procedures for safety and health are mainly regulated by the quality system procedures of the *Berufsgenossenschaft Bau -BG* and *Tiefbau -BG*, the *Bergbehörde*, the relevant laws and codes of the particular country, the company and the quality plan.

Internal Conversion

Safety and health principles are based on, e.g.

- all employees accepting direct responsibility for work safety;
- training to improve work safety;
- organization and equipment of work places and routes taking safety into account;
- protection and securing of danger areas;
- immediate remedy of identified safety defects.



STRABAG

STRABAG

BASIC SAFETY INSTRUCTIONS

CONTENTS

(A) INTRODUCTION

(B) CONDUCT

(C) HOUSEKEEPING

(D) SAFETY EQUIPMENT

(E) HAZARDS

(F) CONSTRUCTION SITES

(G) CONSTRUCTION EQUIPMENT

(H) AMENITIES

(I) ACCIDENT INVESTIGATION

(J) ACCIDENT PROCEDURES

(K) CONCLUSION

orientation

STRABAG

PREFACE

The health, welfare and the maintenance of a safe working environment for all employees is a major concern of the STRABAG Group of Companies. This manual has been prepared to ensure that you as an employee, are aware of the group's code of practice and prevention. Read the manual carefully as it may well prevent you or others from becoming seriously injured or could prevent a serious accident.

Remember:

1. Accidents don't just happen - they are caused by carelessness.
2. Safety is never an accident, it is always the result of intelligent effort.

(A) INTRODUCTION

The hazards of the construction industry are more diverse than those in other industries and it is to be realised that one unsafe practice can have disastrous results with often fatal and costly consequences. The provision of safe working areas, safe working practices, the general maintenance of a clean and safe working environment, the operating of equipment in a safe and correct manner and the safe handling of material is the joint responsibility of both the employer and the employee. Safety is the responsibility of all concerned employers and employees, and this manual is intended to provide guidance towards an accident free working environment.

(B) CONDUCT

The manner in which you conduct yourself in the workplace is important to your work mates and will assist in the elimination of work hazards. The following list details some of those aspects of conduct which will not be tolerated by the company and which are unsafe and hazardous acts affecting all personnel on the job.

1. Alcohol will not be permitted on the site.
2. People under the influence of alcohol will not be permitted to work under any circumstances.
3. Fighting, practical jokes, throwing of material etc., or any other act which could lead to injury.
4. Drugs are not to be taken or used on site unless an authorisation for their use by a duly qualified medical practitioner can be produced.

(C) HOUSEKEEPING

Many accidents result from bad housekeeping. Site tidiness is the foundation of a well run job. To enable the maintenance of good housekeeping at all times, the following procedures are to be recognised and complied with by all employees.

1. All areas are to be maintained free of dangerous projections or obstructions and be reasonably free of fire hazards, debris and other extraneous materials.
2. Storing and stacking should conform to recognised safe practices, be neat, orderly and maintained for ease of access.
3. All work areas, elevated platforms, access ways, ladders and workshops shall be kept tidy, orderly and in good repair.
4. Changing and lunch rooms shall be kept free of extraneous materials such as used paper containers, old newspapers or bottles.
5. Housekeeping to be a daily routine and a supervisory responsibility. It should not only be the concern of a clean-up gang.
6. Grease, oil, or other slip hazard materials shall not be allowed to accumulate on workshop floors or work areas. When spillage has taken place, it must be properly cleaned up immediately.
7. The presence of timber, or other materials with protruding nails and protuberances of a similar nature will not be tolerated. Nails etc. must be removed or made safe before stacking.
8. Tools and other gear shall not be left in a position where they may fall to a lower level or cause obstruction to other persons.
9. Safety equipment is to be requisitioned in detail and in conformity with specifications, company requirements and the appropriate standard codes.

(D) SAFETY EQUIPMENT

1. General

The company supplies hard hats, water proof clothing, gum boots, gloves, goggles, visors, ear muffs and in some cases overalls and safety boots. It is your responsibility to look after this equipment, keeping it clean and in good repair. On termination of employment, all protective equipment issued must be returned.

2. Clothing

Wear clothes that are suitable for the job. Do not wear badly torn clothes as they do not give protection. Flapping clothes are particularly dangerous near moving machines. Coloured vests will be supplied and shall be worn when working around equipment.

3. Head Protection

The wearing of head protection throughout all stages of site construction is compulsory. Personnel operating equipment with protective cabins must wear head protection when outside the cabin of the machine. Any person refusing to observe this practice will be requested to leave the site until compliance is accepted.

4. Footwear

The wearing of light shoes, sandals, thongs, slippers or other fancy footwear is prohibited. Substantial footwear must be worn at all times.

5. Gloves

Gloves are to be worn to protect hands from rough, splintery and sharp objects. It is recommended to wear gloves when working or handling cement, lime, concrete, chemicals and acids.

6. Sight Protection

Goggles or visors shall be worn when using grinders, compressed air tools (e.g. jack hammers, chipping hammers etc.), welding and cutting equipment, acid or caustic solutions, riveting tools, tools for the chipping of steel, concrete, bricks etc. and any other operation that could cause damage to the eyes. Never look at a welding arc without protective eye glasses or shield.

7. Hearing Protection

Hearing protection shall be worn in all designated noise areas. The following short list gives an indication of some hazardous processes, however in doubt consult the site or workshop foreman.

(a) Electric Saws
(b) Percussion Drills
(c) Jackhammers
(d) Bench Saws
(e) Grinders
(f) Hammering in confined areas.

8. Lifting

Many serious and painful injuries are caused by attempting to lift loads that are too heavy or awkward. These injuries can be avoided by observing and following the precautions as listed:

(a) Test the load, if it appears to be too heavy or bulky obtain some assistance from a fellow worker or use mechanical means.
(b) Bend the knees and keep the back straight. This places the strain on the leg muscles and reduces the pressure on your weaker back muscles.
(c) Prevention is better than cure, always seek assistance if in doubt.

(E) HAZARDS

1. Air Tools

Care should be taken to ensure that hoses carrying compressed air are secured at the free end so that injuries are not caused by a whipping hose. It is important to check hose fastenings on a regular basis.

2. Excavations

Excavations and/or trenches exceeding 1.5 metres in depth may require shoring to both walls and faces, or some other alternative as required by regulations. Proper access shall be supplied to allow movement to and from all trenches and excavations. All projects containing excavations and/or trenches exceeding 1.5 metres in depth, shall be under the control of a foreman.

3. Explosives

Explosives shall be stored and used in accordance with the State or Local Laws and Regulations. Authorised and qualified personnel only are to handle and use explosives.

4. Hand Tools

All hand tools to be maintained in a safe working condition. Only use the tool for the function for which it is designed, other uses are invariably dangerous. All tools should be properly stored when not in use. All electric hand tools shall be insulated, properly earthed, and maintained. Any malfunction or defect to electric hand tools should be reported to your foreman and the tool returned to the store for repairs.

5. Power Tools

All power tools to be maintained in a safe working condition. Prior to use of any power tool a check should be made to ensure that:

(a) Electrical fittings are secure
(b) Safety guards are in position
(c) Machine is switched off prior to activating electricity supply
(d) Ensure all attachments and fittings are matched to the power tool and that the tool is used for the purpose for which it was designed.

Explosive power tools SHALL NOT be used unless you have obtained a licence stating your competency to do so (piston powered tools are exempt from this requirement). It is imperative to place notices and signs designating the area of operating of this equipment. No tool should be left in a loaded condition. These tools should only be loaded immediately prior to use.

ALWAYS WEAR THE CORRECT PROTECTIVE EQUIPMENT WHEN USING POWER TOOLS

When using electrical equipment, the following conditions are to apply :

(a) All power leads should be raised above floor level
(b) All repairs to electrical equipment, leads and power boxes must be carried out by a qualified electrician
(c) The use of double adaptors on any site should be limited to one per outlet. Piggy backing is prohibited.
(d) Always assume that electrical wire and equipment is alive and treat it with caution and respect.
(e) All damaged electrical installations, wiring and equipment should be removed from service and reported immediately to a qualified electrician or site manager.
(f) Never attempt to extinguish any electric fire with water or a water based extinguisher.
(g) Power tools are not to be used on leads extending more than 36 m from the power box. Power leads are not to be extended to another floor from the floor on which the power box is situated.

6. Machinery Guards

Guards for your protection are included in the design of most machinery. It is imperative that NO GUARDS ARE REMOVED from any machine for any reason other than maintenance. Always check to ensure that any equipment under your control has the appropriate guards, if not it shall be returned to the store for rectification. Ensure the machinery cannot inadvertently be started whilst maintenance is being carried out.

7. Welding and Cutting

Welding and cutting are not permitted on days of Total Fire ban unless a permit has been first obtained from the relevant Fire Authority and all conditions of that permit have been complied with including all necessary fire prevention requirements. Cylinders shall be tied/chained in a vertical position with the turn off/on key attached at all times during use. Empty cylinders shall be plainly marked and treated with caution as some gas may still be contained. If cylinders are to be transported by crane or hoist, they shall be carried in a suitable cradle or trolley and be securely fastened. Never lift cylinders using wire or fibre rope slings. When you leave an oxygen welding or cutting torch, turn off the gas at the cylinders and bleed off the hoses through the torch. This will avoid any danger of gas leak if the hose is damaged while you are away. Welding equipment shall not be used by anyone except a qualified operator. Proper eye protection shall be worn at all times when welding or assisting a welder.

(F) CONSTRUCTION SITES

All new employees and other employees not familiar with the particular site SHALL report to the site supervisor. All job area speed limit, hazard and other warning signs shall be observed. Driving vehicles on haul roads will not be permitted unless authorisation has been received from site management. All persons travelling in vehicles on site shall be seated. No travelling or running boards or standing in vehicles will be permitted. Construction haul roads to be kept clean at all times. Any spillage or other debris must be reported to site management to be cleared in a proper and authorised manner. Excavation adjacent to underground services will not be permitted without the approval of site management. When opening up is approved a person on the ground shall be in attendance. No person is allowed to work alone in trenches exceeding 1.2 metres in depth. Excavations near path or walkways shall be barricaded and where necessary equipped with warning lights. All scaffolding and ladders shall be placed and/or constructed in accordance with the relevant Act/s. All scaffolding shall only be erected, altered and dismantled by persons who are the holders of a current certificate of competency as a scaffolder issued under the relevant act. All scaffolding is to be maintained in an efficient state. Scaffolding is provided for your benefit and is to be used. Kick boards shall be placed around all scaffold platforms and walkways. No running on the site will be permitted unless in an emergency.

(G) CONSTRUCTION EQUIPMENT

Mobile equipment shall be provided with adequate warning devices, such as back up alarm, front and rear lights, where applicable etc. and shall be maintained in an operable condition at all times.

1 Operating Equipment

Only persons duly authorised by the Company are permitted to operate equipment. Safety belts where fitted shall be used. Exercise care when getting on or off equipment. Use footsteps or ladders where provided. Jumping off a machine is not permitted. Ensure cabins and controls are clean and free from rubbish and debris. Oil and grease spillage to be cleaned off cabin floor, foot rungs, ladders etc. Always look behind when reversing. Ensure that where reverse warning systems are installed they are in working order, if not immediately report to supervisor. Take care when working in vicinity of personnel working on the ground. Where loads are to be lifted, do not swing over men at work. Take extreme care when operating in the vicinity of overhead structures, particularly power lines- remember **"Look Up and Live"**. Lifting with cranes or excavators will not be permitted unless fitted with an approved safety device. Pneumatic percussion drills shall be fitted with water storage and supply lines to limit the emission of dust from the drill hole.

2. Working in Vicinity of Equipment

When working around an item of equipment advise the operator of your presence. Under no circumstances walk behind moving equipment or under the jib of a crane or excavator. Avoid working on the blind side of equipment, if this cannot be avoided ensure that the operator is aware of your presence. Under no circumstances will personnel, other than the operator, be allowed on working equipment unless authorised by the Company.

(H) AMENITIES

Mess and changing facilities are provided for your use and convenience. These rooms to always be maintained in a clean and tidy condition. Your assistance in maintaining these amenities will help provide a clean and hygienic place for the consumption of food during rest breaks. Food scraps and other rubbish shall be placed in the receptacles provided. Toilet and washing facilities shall always be maintained in a clean and tidy condition. Under no circumstances will misuse of these facilities be permitted.

(I) ACCIDENT INVESTIGATION

It is most important that all accidents be reported immediately to site or company management and a format report filled in. Investigation of injuries and how they were incurred will be carried out to assess current work practices and changes formulated if necessary to ensure a safer working environment.

Your assistance in providing the accurate information required to complete the necessary reports will lead to the elimination of any potentially unsafe conditions and practices which may develop.

(J) PROCEDURES TO BE ADOPTED IN THE EVENT OF SERIOUS ACCIDENT

1. Do not panic.
2. Ensure there is no impediment to the injured person's breathing. If possible place person on side in coma-position to avoid choking or swallowing tongue.
3. Contact Foreman and/or Safety Officer.
4. Ensure the exact location of accident is given to all persons involved in rendering assistance to the injured person.
5. Do not move injured person unless he/she is in threat of further danger.
6. If the injury involves excessive bleeding, apply pressure to area to reduce blood loss.
7. Attempt to keep injured person calm and warm.
8. In the case of electrical accidents it is imperative to release the person from the electrical current:
   (a) Locate the source and turn off.
   (b) If this is not possible, attempt to remove person from the source of the electrical current by the use of non-conductive material, e.g. timber stick.

UNDER NO CONDITIONS TOUCH THE PERSON WHILST CURRENT FLOWING!

9. In case of electrical fire do not use water or liquid based extinguishers to extinguish.

(K) CONCLUSION

The foregoing provides a basis upon which the company will carry out and expect all employees to carry out the detailed working practices which will enable the working environment to become safer and satisfying in future years.

It is hoped that it will assist the employee to recognise, understand and control the hazards of his job.

Every accident, every injury and every serious incident is a symptom of some inadequacy in the system. It is the intention of the company and our expectation that all employees will, wherever possible, identify and eliminate this inadequacy.

The company will require co-operation to enable the combined improvement of both production and accident prevention methods at all levels.

STRABAG

Management System

for implementation of the Group Principals

MANUAL

Management System for implementation of the Group Principles

As per June 2004

Scope of Application: Group

Put into Force: BHS Board

Responsible for the contents: MS Co-ordination Committee

BAUHOLDING
STRABAG
AKTIENGESELLSCHAFT

Group Principles

Organisation and Management
Employees and Resources
Business Activities
Measurement, Analysis and Improvement

This Management Manual describes the system
for implementation of our Group Principles in all companies of
BAUHOLDING STRABAG AG.

The Boards of Directors commit themselves and the management to supporting the Management System and to providing the resources for further development of Quality Assurance, Work Safety, Environmental Protection and the Management System as such.

All employees are obligated to organise and perform their tasks and duties in accordance with the guidelines specified in this Management Manual.

For the BHS Board

Signed Dr. Hans Peter Haselsteiner

Vienna, 24 June 2004

GROUP PRINCIPLES

Our Group Principles provide the basis for the objectives, strategies and entrepreneurial activities.

Economic Success

In responsibility to our shareholders, customers, employees, suppliers, subcontractors and society, our prime aim is to ensure economic success on a long-term basis.

Targeted activities, early identification of chances and risks and their responsible consideration safeguard the continuity of our companies and protect our shareholders' interests.

Owing to systematic and constant improvement, we will also be able to meet the growing challenges of the future.

Customers

Our activities are focused on satisfying our customers' justified requirements and expectations.

We meet market demands through close customer contact, professionalism, innovative ideas, and competitive prices.

A frank exchange of information and experience with our business partners is also foreseen within the framework of our strategies and objectives, whereby we ensure the required degree of confidentiality and discretion.

Employees

In order to meet our corporate objectives, we rely on competent and efficient employees. We promote the level of know-how within the Group by professional development and training, support the personal development of our employees and provide adequate information and suitable working conditions.

Our employees keep themselves well informed, while harmonising their own objectives with those of the Group and giving Group interests priority.

The health and safety of our employees and all other parties to our activities are among our main concerns.

Suppliers and Subcontractors

For the purpose of furthering quality and the economic efficiency of our services, we also count on the experience and capacities of carefully selected suppliers and subcontractors.

Social Awareness

We respect human rights and promote public welfare.

We observe existing laws and recognise the rules of fair competition.

We are aware of our environmental responsibility. In the execution of our supplies and services, we make every effort to use energy and natural resources economically and reduce noxious emissions and waste.

The BHS Board's stated strategic objective for the 2003 – 2006 planning period:

„Achieving and/or maintaining market leadership in all defined markets and business fields by cost leadership, employee qualification and motivation, and innovative initiative."

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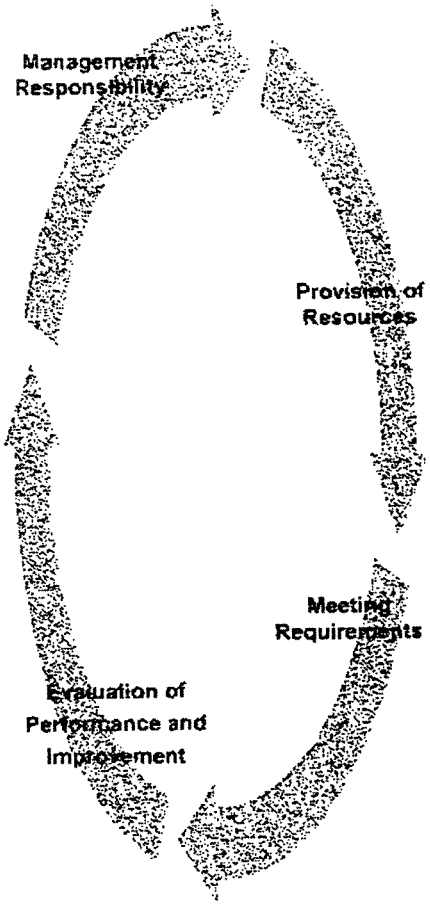

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Issued by:
Management System Co-ordination Committee of
BAUHOLDING STRABAG Aktiengesellschaft and the
Management System Representative in the Country

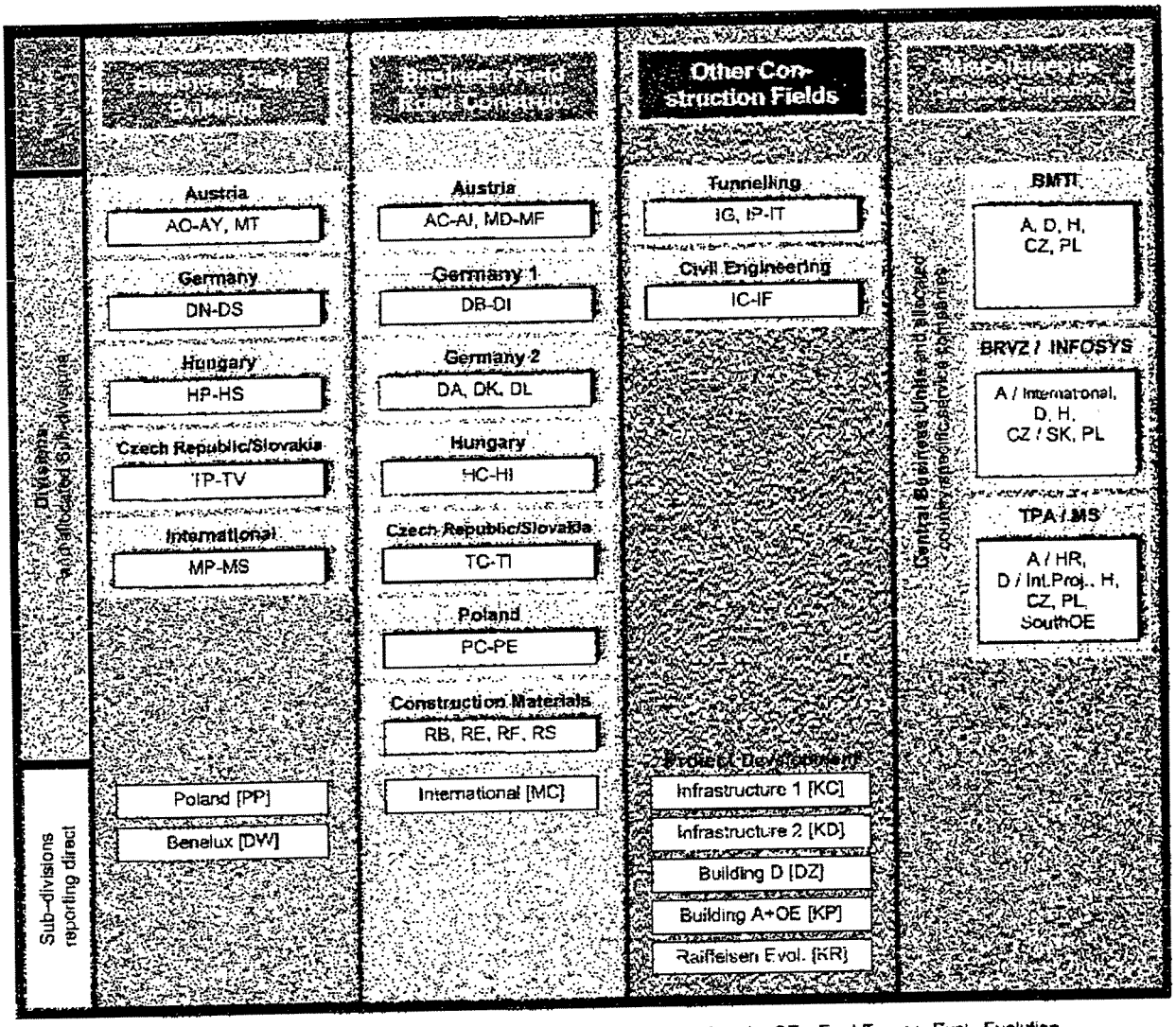
ORGANISATION AND MANAGEMENT

Organisational Structure

Under the auspices of BAUHOLDING STRABAG Aktiengesellschaft, controlling company of the Group, legally independent 'country' companies act in the market within the framework of the overall international organisation.

The Business Field represents the main Group structuring criterion.

The organisational structure permits close to market decisions and provides the co-ordinated and controlled management required for achieving Group objectives. It is detached from commercial law structures.



Abbreviations: D...Germany, A...Austria, OE...East Europe, Evol...Evolution, H...Hungary, CZ...Czech Republic, PL...Poland, SK...Slovakia, HR...Croatia, Int.Proj...International Projects

Business Fields and Fields of Activity

The range of services of the business fields covers all stages of the construction process. The business fields provide co-ordinated and complementary services.

Allocation of the various spheres covered in the fields of activity to the business fields must be implemented on a blanket coverage basis and adhered to. Regional changes to the allocation can only be undertaken with the agreement of the responsible business fields' boards.

Building	Road Construction	Other Construction Fields	
Housing Residential Buildings and Estates **Commercial and Industrial Facilities** Shopping Centres and Business Parks Office and Commercial Buildings Hotels and Banks Multi-storey Car Parks Cinema Complexes Swimming Pools, Thermal Baths Stadiums Airports and Railway Stations Sheds, Warehouses and Production Facilities Industrial Facilities Towers and Industrial Chimneys Industrial Flooring **Public Buildings** Hospitals, Rehabilitation Centres Universities, Schools, Kindergartens Fire and Ambulance Facilities Administration Buildings **Production of Prefabricated Elements**	**Roads, Earthworks** Motorways, Roads and Paths Drilling and Jointing Technologies Paving and Milling Works Road Rehabilitation/Recycling Landfills Recycling of Building Materials Asphaltic Concrete for Hydraulic Structures Test Tracks **Landscape Architecture and Development** **Paving** **Large-Area Works** Runways and Taxiways Reloading and Parking Facilities **Sport and Recreation Facilities** **Sewerage Systems** Sewer Engineering and Pipeline Rehabilitation Pipeline Construction **Protective Structures** Protecting Slopes and Embankments **Production of Building Materials**	**Tunnelling** Conventional and Bored Tunnels Road and Railway Tunnels Galleries and Underground Chambers **Civil Engineering** Underground Traffic Routes **Bridges** Road and Railway Bridges, Foot Bridges Cantilevering and Incremental Launching Methods Special Technologies **Power Plants** Hydroelectric Power Plants River Power Plants Thermal Power Plants Concrete Dams, Earthfill Dams **Railway Structures** Embankments, Tracks **Environmental Engineering** Waste Management Regeneration of Polluted Soils Water and Waste Water Treatment Facilities Sewage Treatment Plants Landfill Operation **Special Foundation Engineering** Soil Investigations and Well Exploration Hydro-jetting and Anchoring Cutoff Walls and Piling Pipe Jacking Bore and Injection Techniques Deep Compaction Diaphragm Wall, Pile Driving	**Project Development Infrastructure** Transportation Motorways and Roads Railways Airports, Multi-storey Car Parks Energy Hydroelectric Power Plants Environmental Protection **Project Development Building** Residential Buildings (Freehold Flats) Multi-storey Buildings Terraced Houses Hotels Office and Commercial Buildings Shopping Centres Multifunctional Projects (Entertainment, Hotels, Shopping, Sports)

Ideally, project acquisition, planning and execution are performed after consultation and in co-operation with partners from within the Group.

Project acquisition across regional borders requires the agreement of the respective BHS Board.

Co-operation with internal partners, customers or subcontractors is contractually agreed.

Management Structure

The BHS Board practises uniform management, and is responsible for maintaining financial equilibrium throughout the Group and safeguarding Group interests.

After consultation with Division Managers, the Board also determines their programme and defines Group strategic objectives.

For management, co-ordination and control of the Divisions or of Sub-divisions reporting directly to the Board (without going through Division Management), the Board acts on the basis of business activities requiring consent.

Within the framework of Group business policy, Division Managers carry out their business independently and on their own responsibility, i.e. it is incumbent on them to achieve objectives defined in the strategic and operative planning and realise the individual measures prescribed.

All operating business is undertaken by the Sub-divisions. They are responsible for the best possible result in the regional markets allotted to them and are usually managed, co-ordinated and controlled by Division Managers.

The supervision of managers of Sub-divisions reporting directly to the Board is the concern of the BHS Boards responsible.

The service companies are organised in Central Business Units and operated by Sub-divisions. Within their area of responsibility they work independently from the operative Divisions and Sub-divisions, with the Central Business Manager being responsible for co-ordination of the regional service companies.

Interfaces and co-operation between service companies and operative units are regulated with service agreements.

Responsibilities, assignments and authorisations of the Boards, Division Managers and Sub-division Managers are defined in the business rules of procedure.

The functions' objectives, and operating and management work within the Sub-divisions are laid down in descriptions of the functions.

For assurance and further development of the Management System representatives are appointed as follows:

Operating Area	Responsibility lies with	Representatives
Group	BHS Board	Co-oordinator (Co-ordinating Committee)
Country (all organisation units)	Division Manager or manager of a Sub-division reporting directly to the Board	Representative for the specific country
Sub-division	Sub-division Manager	Representative for the Sub-division

Company Management

Planning and Controlling

Strategic and operative planning and controlling represent the main Group management instruments.

Strategic planning is aimed at long-term improvement of the market position and construction services and products offered by the targeted use of personnel, financial and technical resources. Sources of loss should be eliminated, existing profit potentials strengthened and new ones identified.

Developed on the basis of analyses, the strategic concept, in which the strategic objectives and planned measures with the respective resources requirement and effects on performance are presented, is approved by the BHS Board after assessment and, if necessary, adjustment.

The strategic framework is rounded off by operative planning comprising foreseen short and medium term business policy targets and measures.

Before the end of the year operative planning for the following year is prepared by the Sub-division / Division Managements and approved by the BHS Board in the month of January of each year after planning meetings with the Division and/or Sub-division Managements with direct reporting access.

Methodically harmonised with the above, controlling follows current business development in the comparison of target and performance.

Assessment

When undertaking Group assessment, the main indicative figures are compared with targets agreed for the respective planning period. Deviations are analysed and assessed and, if necessary, corrective action taken.

Improvement potential is highlighted and used for continuous further development. Analysis and improvement of the Management System is a component of the Group assessment.

Internal Communication

Internal communication and information flow are achieved within the defined structure of committees under agreed chains of information through minutes, reports and electronic information systems. Communications outside the chain of information are identified by source and responsible function.

Committees

Participants as per operating area. X, regularly E, at own discretion B...if necessary	Operating area	BHS Boards	Division Managers	Sub-division Managers	Business Unit Managers	Central Business Unit Managers	Managers of Country Service Companies	Group Co-ordinator	Company Representative	Sub-division Representative	Number per year
								Management System			
Group Conference	Group	X	X			X		X			2
Business Fields Conference	Business Field	X	X			X		X			1
Country Meeting	Country	X	X	X	X	B	X		X		0,5
Sub-division Manager Conference	per country + busin. field	E	X	X		B	B		X		up to 12
Business Unit Manager Conference	per country + busin. field	E	X	X	X	B	B		X		1
Business Unit Manager Meeting	per Sub-division			X	X					X	acc. to plan

Group Guidelines

The Management System is documented in the Management Manual and further guidelines.

Management Manual

The Management Manual contains the comprehensive description of the complete Management System for implementation of the Group Principles.

Further Guidelines

- Internal Agreements
- Resolutions of Group's Board of Directors / Business Field Boards
- Group Guidelines / Procedures
- Resolutions of Division Managers
- Rules of Procedure according to Organisational Structure of the Group
- Service Agreements between Service Companies and Operating Units
- Resolutions of Sub-division Managers
- Directives issued at particular management levels

All guidelines can be identified by titles, dates of issue and, if necessary, number. Applicable guidelines are integrated into the Management System by the respective representative.

EMPLOYEES AND RESOURCES

Employees

The systematic recruitment of qualified and competent employees, their promotion and the support of their personal progress through professional development and training are effected based on a pre-determined procedure. Major personnel development phases include:

- **Human Resources Planning**
- **Recruitment**
- **Introduction and Orientation**
- **Consultations, Development and Succession Planning**
- **Training**

A defined distribution of tasks and co-operation between operating units and BRVZ – Human Resources – ensure effective results.

In order to maintain and develop the Management System, the representatives responsible for quality management, health and safety, environmental protection, hazardous materials etc. are trained, employed and authorised in accordance with their sphere of responsibility.

Information

In addition to internal agreements, information also consists of statutes, regulations, standards, guidelines and market and trade data. For effective use of data and resulting information acquisition, transfer, assurance and confidentiality together with the respective terminology are defined as required.

Infrastructure

To ensure effectual performance by the operating units and economic efficiency throughout the Group, Central Business Units and Staff Units with cross-border competence are answerable to the BHS Board.

These have no authority to issue directives to Divisions or Sub-divisions reporting directly to the Board.

Matters of importance are harmonised by the managers of both Central Business Units / Staff Units and Division Management.

Assignments performed by the Central Business Units and Staff Units under BHS Board supervision:

BMTI (Central Business Unit)

Plant and equipment management (investment policy, leasing and repair management, plant systems, form work management)

BRVZ (Central Business Unit)

Annual financial statements, taxes and accounting, finance, Group controlling / risk management / insurance / real estate, personnel, information technologies

TPA (Central Business Unit)

Technical development policy (quality management / quality assurance, technical know-how / research and development), management systems

Audit Department (Staff Unit)

Control of all entrepreneurial function areas and systems with regard to regularity, expediency and profitability, technical-commercial checks of estimates and construction orders, cartel investigations

Work Environment

In order to provide our employees with suitable prerequisites for efficient performance and to fulfil the statutory requirements regarding health and safety and environmental protection, we monitor and maintain the required work environment.

Construction sites, operational facilities together with their premises and installations, operating procedures, plant and equipment including their erection and provision, utilisation and maintenance comply with the statutory and occupational medical requirements as well as accident prevention regulations.

Responsibilities and procedures are organised and documented in accordance with the relevant national requirements.

Construction Plant and Equipment

In order to perform services and produce materials economically and as required, we ensure that construction sites and production facilities are provided with suitable and reliable plant and equipment. Test and measuring devices are subject to regular monitoring.

BMTI units and locations with their REP workshops, service BOXes and mobile workshops are at the disposal of the operating units on an international basis providing management, maintenance, inspection and repair services and also profitability control for plant and equipment.

Procurement

The aim of procurement is to ensure timely and economic provision of products and services in the desired quality, as well as commitment of subcontractors, service providers and suppliers by long-term partnerships.

The operating units are responsible for procurement, if necessary supported by a central procurement management.

To ensure the success of our services and thereby customer satisfaction, the following activities are performed and documented:

- Clear and complete description of services and products to be procured
- Qualification and (initial) selection of subcontractors, service providers and suppliers
- Agreement on acceptance criteria for products and services
- Systematic evaluation of subcontractors, service providers and suppliers as a decision support for future contract awards.

Business Activities

Our customer oriented business activities are the source of our company's success.

Our objective is to create added value through our activities on the construction market.

Our business activities are aligned and planned based on the Group Principles, strategic targets and requirements resulting from corporate planning. Consequently, their efficiency is evaluated through the analysis of revenues.

Our business activities comprise:

- Acquisition of market data
- Development and marketing of projects
- Realisation of projects
- Production of building materials and components
- Operator / concession models

They are rounded off by fulfilment of our customers' requirements and optimal customer support services.

In the Building sector, Strabag teamconcept integrates the customer as partner during all phases of a project.

Our business activities are performed in accordance with determined responsibilities and documented procedures with planned targets and tasks including related performance criteria.

The procedures are controlled technically, commercially and legally, utilising amongst others controlling tools.

Relevant data are recorded.

Business Processes

Building	Road Construction	Other Construction Fields (such as Tunnelling, Civil Engineering)
Acquisition / Tendering Execution / Production, Warranty and Customer Service		

Other Construction Fields (Project Development)	
Project Development Infrastructure Project Selection and Definition Development, Tendering and Contracting Realisation, Warranty and Customer Service Operation and Maintenance, Marketing	**Project Development Building** Development Design and Planning Preparations for Realisation Realisation, Warranty and Customer Service Operation and Maintenance, Occupancy

Building, Road Construction, Tunnelling, Civil Engineering

Added value is achieved mainly through development of technical design and execution of construction contracts.

Processes

- Acquisition / Tendering
- Execution / Production, Warranty and Customer Service

Acquisition / Tendering

The aim is to prepare offers which are profitable for the customer and the company, convince the customer and lead to the award of contracts.

Acquisition / Tendering comprises:

- Marketing / acquisition
- Review of documentation received from the customer regarding completeness, discrepancies and feasibility
- Technical, commercial and legal review of documentation regarding requirements listed
- Evaluation of the effects of contractual obligations on quality, deadlines and costs
- Determination of production costs
- Determination and listing of risks and opportunities, definition of surcharges for risk and profit
- Documentation of processes and results of contract reviews and estimation in order to ensure traceability of all pricing factors

Within the limits of the reporting obligations, the Business Unit concerned decides on acceptable projects.

Enquiries exceeding the core interests and capacities of the Business Unit are placed within the Group by the Sub-divisions in order to provide competent customer support at this very early stage.

Successful acquisition / tendering is concluded by preparation of the contract estimate.

Efficiency of acquisition / tendering is measured by the ratio of tenders submitted and contracts awarded.

Taking into consideration the targets determined in the corporate planning, further parameters may be evaluated.

Execution / Production, Warranty and Customer Service

The aim of job execution is to hand over the project to the customer in compliance with the contract, without defects, on time, and within the economic objectives for the project.

Depending on the requirements of the project, the working design is performed by the operating unit, supported by internal service companies or subcontracting to external design offices.

Subcontracted and / or customer-provided design services are reviewed in terms of completeness, technical feasibility, economic efficiency, and deadlines.

In order to create suitable conditions, the required works processes, responsibilities and resources are already determined during works planning:

- Ensuring information status of the persons responsible for execution of the work during an internal commencement meeting / kick-off meeting,
- Inspection and test plans and tests according to quality characteristics,
- Monitoring of costs and deadlines based on periodic performance and progress reports,
- Controlling action in case of deviations from target figures,
- Identification and processing of amendments / additions to the contract.

Adequate project documentation including monitoring of subcontractors' performance ensures traceability of relevant project data.

Risks, opportunities, defects and measures identified during project review and/or analysis of project data are evaluated and passed on to the respective functions.

Efficiency of performance is measured by adherence to deadlines and fulfilment of technical requirements, without exceeding the budget costs (work estimate).

Customer satisfaction is monitored systematically and evaluated by the managers in accordance with the management structure.

Project Development
Infrastructure

Added value is achieved through acquisition of additional contracts by developing infrastructure projects (transportation, power and waste management) including the procurement of funding and contract management in the realisation, operation and marketing.

Processes

- Selection and Definition of Projects
- Development, Tendering and Contracting
- Realisation, Warranty and Customer Service
- Operation and Maintenance, Marketing

Business activities are performed in close co-operation with operating Group partners, observing the reporting obligations towards the Board of Directors.

Achievement of the overall target is measured by the degree of customer satisfaction and the rate of return.

Project Development
Building

Added value is the result of development, design, realisation, successful marketing and, if required, operation of immovable property

Achievement of the overall target is measured by the degree of customer satisfaction and the rate of return.

Processes

- Development
- Design and Planning
- Preparations for Realisation
- Realisation, Warranty and Customer Service
- Operation and Maintenance, Occupancy

The business activities are carried out in close co-operation with operative partners within the Group, based on pre-determined procedures.

Process and results of individual stages are evaluated and controlled by comparison with the specified targets.

MEASUREMENT, ANALYSIS AND IMPROVEMENT

We measure the results of our processes and the achievement of our aims.

Following analysis and evaluation, control and/or corrective measures are implemented where necessary.

Preventive and Corrective Action

Preventive and corrective actions shall ensure safeguarding or quick re-establishment of target conditions in respect to processes and systems.

Preventive measures are undertaken in particular in the field of work environment, environmental protection, and risk assessment during tendering, contracting and work planning.

Measures and results are recorded and passed on to the responsible functions for evaluation.

Improvement Process

By means of programmes and activities, we raise the level of performance, processes, systems and internal structures (infrastructure, information, communication) in order to further develop the company.

Targets, measures and results are recorded and passed on to the responsible functions for evaluation.

Proposals for Improvement

A documented procedure gives all employees the opportunity to make proposals and submit ideas for improvement, rationalisation, simplification and facilitation of operations, increased profitability of the company, increased work safety, or improved quality of our performance and supplies.

Inspections

Process performance is monitored through inspections.

In accordance with the contract and for the purpose of a responsible internal quality control, inspections are performed as follows:

- Inspections upon receipt of materials/equipment in order to verify conformity of both procured or customer-provided performances and supplies
- In-process inspections, if processes do not permit later inspections or risks can be detected and minimised at an early stage
- Final inspection of the contracted performance / supply prior to handing over to the customer.

Administrative Audits

As part of the risk management, process-independent and neutral internal administrative audits are performed to detect and avoid risks and assess the legality of our processes.

These assessments are performed during both tender stage and execution of construction works, in accordance with documented selection criteria.

Audit reports are distributed to the operating units, Division Management, Board of Directors and, if necessary, the public accountant.

Information regarding the Management System is distributed to the Country Representative.

Quality Audits

Quality audits assess the effectiveness of the Management System, determine whether procedures are suitable for the achievement of targets and are observed, and whether the processes can be improved.

Measures and results are recorded and distributed to the responsible functions for evaluation.

Corrective, preventive and improvement actions are monitored and evaluated with respect to their implementation and effectiveness.

ATTACHMENTS

1. Code of Practice
2. Behavioural Standards re Integrity in Business
3. Safety Regulations for IT Applications
4. Principles of Personnel Development

(2. – 4. are available in German and filed in the data bank under "Management System")

COUNTRY-SPECIFIC ATTACHMENTS

[from page 14]

Code of Practice

When marked as **requiring approval**, the following business transactions of the Sub-divisions (Dir.) or Divisions (UB) call for prior consent by the Division Management or the BHS Board, if necessary following agreement with the Central Business Unit Manager.

Applications for approval re. business transactions must be submitted in writing to the Division Management or Executive Board. This is also applicable for lower level Group companies.

Application for approval must be made early enough to allow time for decision making.

Furthermore, certain business activities are marked as being expressly **prohibited** for Division and Sub-division Managements.

Within the framework of de-central and central reporting to the Division Management or the responsible BHS Boards and/or the regional service companies, Management must ensure that all data are reported in compliance with the dates foreseen throughout the complete organisation using the information and communication paths set up.

In addition, the following **reporting obligations** must be complied with.

No.	**Business transactions** (proh.=prohibited, req.app.=requires approval, rep.obl.=reporting obligation)	**for Dir.**	**for UB**
1	Strategic planning	req.app.	req.app.
2	Operative planning with investment and financial planning	req.app.	req.app.
3	Basic changes to the organisational structure	req.app.	req.app.
4	Procurement, production and sale of mobile tangible fixed assets where the costs exceed EUR X in an individual case and are not part of the approved investment planning	req.app. > 10 K	req.app. > 2 mill.
5	Acquisition and sale of participations and capital increases if the value exceeds EUR X in an individual case or an increase in capital results in a share majority being acquired	req.app.	req.app. > 1 mill.
6	Resolution on adoption of the annual accounts and appropriation of net income in shareholders' meetings or meetings of lower level Group supervisory boards	req.app.	
7	Acquisition, sale and encumbrance of land plots or leasehold rights where the value in an individual case exceeds EUR X	proh.	req.app. > 2 mill.
8	Business transactions which are to be submitted to the BHS Supervisory Board or General Meeting for decision	proh.	req.app.
9	Amendments to the Code of Practice and Business Distribution Plan for Division Management	-	req.app.
10	Personnel		
10.1	Appointment and dismissal of technical and commercial Business Unit managers	req.app.	
10.2	Appointment and dismissal of technical and commercial Sub-division managers	-	req.app.
10.3	Determination of management salaries and rises in as far as these deviate from the standard terms	req.app.	
10.4	Introduction and amendment of company pension schemes and exceptions therefrom	proh.	req.app.
10.5	Granting of powers of procuration	req.app.	
10.6	Introduction/amendment of or deviation from rules governing employee profit sharing, bonuses and voluntary social security benefits	req.app.	req.app.
10.7	Granting of loans or advance disbursements and standing surety for employees, in so far as these exceed the scope usual within the Group	req.app.	
10.8	Employer's pension commitments or other forms of employee pension schemes	req.app.	
10.9	Commencement and conclusion of negotiations re. accommodation of conflicting interests and social plans	req.app.	
11	Award of contracts to		
11.1	Management consultants, where the value per successful bidder exceeds a total of EUR X per annum	req.app.	req.app. > 250 K.
11.2	Personnel consultants	req.app.	
11.3	Chartered accountants	req.app.	req.app.
11.4	Independent lawyers (exclusively by Staff Unit 'Legal Affairs')	proh.	req.app.
12	Sale and assignment of receivables	proh.	req.app.
13	Conclusion of compensatory and triangular deals	req.app.	req.app.
14	Conclusion and termination of long-term tenancy and lease agreements	req.app.	req.app.
15	Transactions which, in individual cases, result in claims with a total life of over 4 years	req.app.	req.app.
16	Taking out credits, standing surety, or similar liability obligations and the assumption of obligations arising out of bills of exchange	proh.	req.app.
17	Taking on and granting of loans and the assumption of obligations of others and guarantees for such obligations in favour of third parties, in particular suretyships	proh.	req.app.

No.	**Business transactions** (proh.=prohibited, req.app.=requires approval, rep.obl.=reporting obligation)	for Dir.	for UB
18	Amendment of Group allocation principles	proh.	req.app.
19	Provisions in the operating result for structural measures and imminent losses	proh.	req.app.
20	Acceptance of contracts with specific risks, i.e. particularly		
20.1	Funding	req.app.	
20.2	Assumption of unrestricted building land risk not included in or over and above the soil investigation report	req.app.	
20.3	Exceptionally long or unusual warranty periods / special warranty of over five years (exception: 10 years in connection with maintenance contract)	req.app.	
20.4	Contract penalty of over 5%, per diem rates of over 0.1% of the contract sum with contracts of over EUR 2.5 million	req.app.	
20.5	Construction „for stock", i.e. to own account	req.app.	
20.6	Major contracts of over EUR 15 million for building, tunnelling, civil engineering and project development, and EUR 7.5 million for roadwork	req.app.	
20.7	Construction where clients must obtain official approval	req.app.	
21	With private clients, waiving of payment security in the case of contracts amounting to at least 10% of the gross contract value and where the contract sum exceeds EUR 1 million. The approval obligation does not apply to contracts from major European banks and bank-related companies, insurance companies, and major industrial or trading concerns.	req.app.	
22	Pre-tax assignment (in the form of bank / client guarantees)	req.app.	
23	Bringing on actions and filing of other petitions to courts and arbitrators, and defence of corresponding actions and petitions by others where the value exceeds or could exceed EUR 1 million for building and EUR 100.000 for roadwork	req.app.	
24	Transfer of ownership by way of security and pledging of fixed and current assets and rights	req.app.	
25	Conclusion of license and sub-license agreements	req.app.	
26	Purchase, sale or encumbrance of land or leasehold rights	req.app.	
27	Preparation of tenders with a contract value of over EUR 15 million for building, tunnelling, civil engineering and project development and EUR 7.5 million for roadwork	req.app.	
28	Conclusion of contracts outside the EU	req.app.	
29	Deviations from the basic capitalisation prohibition where variation orders have not been applied for in writing	req.app.	
30	Project-related co-operation (formation of construction teams) between several national and/or international Sub-divisions	req.app.	
31	Donations to political parties	req.app.	
32	All transactions outside the usual course of business, particularly stock market, futures or speculative transactions	proh.	proh.
33	Transactions where it is planned to make use of a tied financial credit and STRABAG is partially liable	proh.	proh.
34	Change of banking reference	proh.	
35	Inquiry reports for all tenders worth over EUR 3.5 million for building, tunnelling, civil engineering and project development and EUR 1.7 million for roadwork	rep.obl.	rep.obl.
36	Unusual events, individually and unfailingly	rep.obl.	rep.obl.

IQNet®

THE INTERNATIONAL CERTIFICATION NETWORK

CERTIFICATE

IQnet and ÖQS

hereby certify that the organization

Strabag AG

A-9800 Spittal/Drau, Ortenburgerstraße 27

Scope of application:
Building and Structural Engineering Austria, Building and Structural Engineering International
Road Construction International, Tunnelling International
Civil Engineering and Special Foundation Engineering International

has implemented and maintains a

Quality Management System

which fulfills the requirements of the following standard

ISO 9001:2000

Issued on:	**2003-07-14**
Validity date:	**2006-05-29**
ÖQS certified since:	**2000-05-30**
Registration Number:	**AT-1828/1**

Dr. Fabio Roversi
President of IQNet

Viktor Seitschek
President of ÖQS

IQNet Partners*

[illegible]

* The list of IQNet partners is valid at the time of issue of this certificate. Updated information is available under www.iqnet-certification.com

OQS

OQS-CERTIFICATE

OQS Certification and Evaluation Ltd. awards this OQS Certificate to the following organisations:

STRABAG

STRABAG AG
A-9800 Spittal/Drau, Ortenburgerstraße 27

Scope of application:
Building and Structural Engineering Austria
Building and Structural Engineering International
Road Construction International
Tunneling International
Civil Engineering and Special Foundation Engineering International

The validity of the OQS Certificate will be maintained via annual surveillance audits and three yearly renewal audits.

This OQS Certificate confirms the application and further development of an effective

QUALITY MANAGEMENT SYSTEM
complying with the requirements of standard
ISO 9001:2000

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Registration No.: 1828/1
Date of initial issue: 30 May 2000
Valid until: 29 May 2006

Vienna, 14 July 2003

OQS Certification and Evaluation Ltd.

TR Ing. Viktor Sattschek
President

Konrad Scheiber
General Manager

STRABAG

Safety, Health and Environmental Protection – SCC

Purpose and Objective

To create the organisational and human resource conditions and ensure availability of the necessary resources for compliance with legal safety engineering and industrial medicine requirements and accident prevention regulations, as well as additional requirements for obtaining and maintaining the "SCC" certificate with regard to
- building sites and operating sites as well as their rooms and equipment,
- work processes,
- building machinery, plant and equipment, including their acquisition, use and maintenance or construction.

The definition of the necessary steps, responsibilities, standards and results must be viewed as supplementary to the generally valid Management System regulations.

Scope

Organisational units (in Austria) wishing to obtain or maintain an SCC certificate.

Procedure and Responsibilities

See following tables for the sections

1. **SHE Policy and Organisation, Management Commitment**
2. **Hazard Assessment and Evaluation**
3. **Human Resource Selection**
4. **Information and Training**
5. **Safety, Health and Environmental Protection Communication**
6. **Rules, Regulations, Project Safety Plan**
7. **Safety, Health and Environmental Protection Audits**
8. **Operational Health Sector**
9. **Purchasing and Testing of Machinery, Resources, Materials and Services**
10. **Reporting, Registration and Investigation of Accidents / Near-Accidents and Unsafe Situations**

J. Pippich Group Coordinator Management System for the responsible Director	J. Pestal Industrial Safety Coordinator for Austria	A. Popelak Management System Officer for Austria

Terms / Abbreviations

WO	(Direction) Waste Officer
IP	Industrial Physician
MLA	Manpower Leasing Act
SM	Site Manager
QMO	Direction SCC Officer, usually = Management System Officer
AM	Area Manager
BRVZ PW2	Human Resources / Training and Development
DH	Direction Head
SE	Senior Employee
GM	Group Manager
FM	Foreman
SCC	Safety Certificate Contractors
SO	Safety Officer
SHE	Safety, Health and Environmental Protection
ISC	Industrial Safety Coordinator for Austria
SOM	Safety Ombudsman
CQM	Management System Officer for the country

Valid Regulations

as listed in "Table of Contents VA (Operational Instructions)" for the relevant organisational unit

Forms and Checklists

as listed in "Table of Contents FB/CH" for the relevant organisational unit, in particular:

FB	3.4-STO-02	Instruction of Employees
FB	3.4-STO-03	Appointment of ARB in Absence of the Supervisor
FB	3.4-STO-04	List of Instructions Issued
FB	3.4-STO-05	Driving Permits
FB	3.4-STO-06	Information for Visitors
FB	4.4-QW-01	Progress Report
CH	3.4-STO-01	Safety Engineering Checklist for SO
CH	3.4-STO-02	Building Site Checklist FM / Operational Instructions
CH	3.4-STO-03	Reporting Schedule for Work Accidents
CH	3.4-STO-04	Accident Causes / Codes
CH	3.4-STO-04a	List of Work Accidents
CH	3.4-STO-05	Accident Causes – Evaluation
CH	3.4-STO-06	Alarm Plan for Accidents
CH	3.4-STO-07	Alarm Plan for Fire
CH	3.4-STO-08	Disposal Concept for Building Sites
CH	3.4-STO-09	Building Site Bulletins
CH	3.4-STO-10	Building Site File Industrial Safety
CH	3.4-STO-11	Cover Sheet Document, Construction Coordination Act
CH	3.4-STO-12	Information Sheet, Construction Coordination Act
CH	3.4-STO-13	Inspection Report Building Site Coordinator
CH	3.4-STO-14	Safety Engineering Checklist for Senior Employees
CH	3.4-STO-15	Emergency Phone Numbers

Explanations on the Following Tables

Column 1: Reference to SCC structure – checklist of the Sector Committee SCC Austria

Column 4: <Standards and >Results of the process steps
(<Standards/Results): only as required or if applicable

1 SHE Policy and Organisation, Management Commitment

[illegible]	Process Steps	Responsibility	<Standards >Results
1.1	Creation / updating of policy statement (principles)	Executive Board BHS	>Current principles in Manual
	Presentation of the scope of SCC validity	DH	>Direction organisation chart or similar
1.2.1	Presentation of SHE organisation, including	CQM / ISC	>Organisation "Officers" in Annex to Manual
	Description of duties and responsibilities of senior employees (SE), officers and preventive services, and assignment within the Direction	BRVZ-PW2, CQM / ISC DH	<Job descriptions <VA 3.4-STO-02 >Organisation chart, matrix of responsibilities
1.2.2	Appointment of Safety Officer (SO) and report to authorities	DH ISC	>Report to labour inspector >SO list
1.2.3	SO assignment to projects	SM	<>CH 3.4-STO-06
1.2.4	Appointment of Industrial Physician (IP)	BRVZ / ISC	>Work contract
1.2.5	Appointment of Waste Management/Environmental Protection Officer	DH	>Organisation chart
1.3.1	Building site visits by senior employees (SM or more senior) - Definition of focuses and frequency - Implementation of building site visits	QMO / SO / ISC SE (SM or more senior)	<Accident statistics, >Action plan, <>CH3.4-STO-14
1.3.2	Annual meetings with SE on SHE issues: - Industrial Safety Committee (1 x Group) - Industrial Safety Committee (1 x Direction) - Others (as required)	Organisation by ISC QMO / SO QMO / SO	<Invitation / Agenda >List of participants >Minutes
1.4	Annual assessment of senior employees - based on accident statistics in various bodies	SO / ISC	<Accident statistics >Record
1.5	SHE Action Plan - creation (definition of targets) - evaluation of implementation	DH/SO/QMO	<Accident statistics >Action Plan as part of "QM Evaluation / Targets"

2 Hazard Assessment and Evaluation

	Evaluation:	ISC	<ÖBEV Programme
2.1	- Assessment and evaluation of hazards	SM / SO	>Evaluation report incl.
2.2	- Definition of measures based on evaluation and implementation monitoring	SM / SO	>Checklist, (>Info sheets). >Instructions <>FB 3.4-STO-02
2.3	Personal safety equipment:		
	- Selection and definition "Start Package"	SO / ISC / IP / Works Council	>Start Package
	- Purchasing	Group infrastructure	>Content list
	- Distribution (incl. to leased manpower as defined in MLA) - Replacement	SM / FM	>Distribution list

3 Human Resource Selection

3.1	Create / update records of employee qualifications	BRVZ PW2	>Employee database >Qualification certificates (>Safety Pass or similar)
3.2	Project-related personnel appointment	SM	>Human resource deployment planning (>Building site organisation chart)

[No.]	Process Steps	Responsibility	<Standards / >Results
	Verification of special training / qualifications (incl. leased manpower as defined in MLA)	SM / FM	<Certificates (crane, forklift, driving permits, blasting permits, SOM, First Aiders, etc.)
3.3	Ensuring adequate communication (employees that speak a foreign language)	SM / FM	<Human resource deployment planning >Suitable instruction
4	**Information and Training**		
4.1	Building site-related instruction for new employees (incl. leased manpower as defined in MLA)	SM / FM	<Results evalutation (<Building site code) <>FB 3.4-STO-02 (>FB 3.4-STO-04)
4.2	SHE training and knowledge test for operational employees such as (skilled) workers, mechanics	QMO / ISC	<Personnel list <Training planning >Records of contents and participants of training
4.3	SHE training and knowledge test for senior employees (FM, SM, possibly GM)	QMO / ISC BRVZ PW2	<Organisation chart <Training plan >Employee database >Certificates
4.4	Instruction of employees for activities with special hazard potential	SM / FM	<Results evaluation <>FB 3.4-STO-02 >Documentation
4.5	Records and documentation of training and qualifications	BRVZ PW2 Employees Direction	>Employee database >Certificates, permits (>Safety pass or similar) >Copies as required
	Records of results of preventive examinations in industrial medicine	ISC / IP	>Records Safe Med
5	**Safety, Health and Environmental Protection Communication**		
	Information and communication on SHE issues		
5.1	- Industrial Safety Committee (1 x / year Group) - Industrial Safety Committee (1 x / year Direction)	ISC QMO / SO	<Invitation / Agenda >List of participants
5.2	- Other bodies (fixed item on the agenda, topics as required)	Chairman of meeting	>Minutes
5.3	Instructions - operational employees (at least 2 x / year) (incl. leased manpower as defined in MLA) - administrative personnel (at least 1 x / year)	SM / FM / SO IP	<Accident statistics <Evaluations <>FB 3.4-STO-02 >Safe Med event reports
5.4	Special activities on SHE issues - Definition of issues / targets - Reports / evaluation	QMO / SO / ISC DH	<Accident statistics >Action Plan as part of "QM Evaluation / Targets"
6	**Rules, Regulations, Project Safety Plan**		
6.1	Create/update or procure SHE regulations - Operational instructions (Industrial Physicians Ordinance) - Assembly/operating instructions	ISC SM / BMTI	>Building site file Industrial Safety as set out in CH 3.4-STO-10
	- Safety data sheets	SM / SO	<Evaluation, >FB 3.4-STO-02
6.2	Create / update / demand Safety & Health Plans	SM	>Safety & Health Plan
	Maintain building site file "Industrial Safety"	SM	<CH 3.4-STO-10

No.	Process Steps	Responsibility	Information / Records
6.3	Safety meetings / instructions on commencement of building site / project		<CH 2.2-HSB/ITB-01 <CH 2.4-HSB/ITB-01or 02
	- with Client pursuant to Construction Coordination Act	SM	<CH 3.4-STO-12, Construction Coordination Act >Safety & Health Plan
	- with own personnel (incl. leased manpower as defined in MLA) and with subcontractors if applicable	SM / Building Site Coordinator	<CH Int. Site Set-up Meeting <>FB 3.4-STO-02 >Records, bulletins
6.4	Waste management concepts for plants (sites) > 20 employees	Direction Waste Officer	<Waste Management Act >Waste management concept
	Disposal concept for building sites	SM	<CH 3.4-STO-08 <Safety data sheets >Disposal concept >Disposal records
6.5.1 6.5.2	Preparation for emergencies	SM	<>CH 3.4-STO-06 or 07 <First Aider list / >Documentation
6.5.3	Training in how to use fire extinguishers if required by official notice or project specifications	SO / SM	>Training, list of participants
6.5.4	Ensuring the availability and maintenance of the required first aid equipment and fire extinguishers	SM	(<Building site set-up plan) >Inspection records

7 Safety, Health and Environmental Protection Audits

7.1	Planning and implementation of safety inspections at least once a month or as required by the occasion, with	FM SM SO	<>CH 3.4-STO-02 <>CH 3.4-STO-14 <>CH 3.4-STO-01
7.2	implementation of measures resulting from safety inspection, monitoring and info to QMO	FM SM	<>CH 3.4-STO-02 <>CH 3.4-STO-14
7.3	Evaluation of the above records	QMO	>QM evaluation/targets

8 Operational Health Sector

8.1.1	Assessment of need for regular examinations	IP	<Evaluation >Reporting of needs
8.1.2	Regular examinations and report to employer, employee, labour inspector, where applicable	IP	>Medical report >Reporting
8.1.3	Opportunity for voluntary health examinations	IP	<Newsletter

9 Purchasing and Testing of Machinery, Resources, Materials and Services

9.1 9.2	Acquisition / contracting with consideration for industrial safety and environmental aspects in the specifications	in accordance with VA 3.2-XXX-01/02 SO / ISC / IP	<Industrial Physicians Ordinance, including standards <Safety data sheets <Evaluation
9.3	Documented service / maintenance of machinery and equipment in compliance with the inspection periods	in accordance with VA 3.2-HSB-03 and VA 3.2-ITB-03	<Operational instructions <Maintenance/inspection mark >Maintenance/insp. reports >Labelling >Records, rep. history
9.4 9.5	*Use of subcontractors in compliance with SHE criteria and personnel services in accordance with SCP inspection criteria*	*obligatory as of 01.08.03* SM QMO	*>Targets 2003 !!* <Documentation SHE System or <>SCC assessment sub

10 Reporting, Registration and Investigation of Accidents / Near-Accidents and Unsafe Situations

No.	Process Steps	Responsibility	Records / Records
	Reporting / registration and investigation of		
10.1.1	- accidents	SM / QMO / SO	<CH 3.4-STO.03
10.2.1	- occupational disease	IP	>Reporting,
	- damage to property and environment	SM	>Accident statistics >Insurance report
10.1.2	Publication of code numbers ad 10.1.1 within the corporation	ISC, SO, WO	Industrial Safety Committees Divisional/DH meetings
10.1.3 10.2.2	*Registration and investigation of near accidents / unsafe situations*	*obligatory as of 01.08.03* FM/SM/SO/QMO	*>Targets 2003 !!* <>FB 4.4-QW-01 >Reports/measures
10.3	Possibility to continue employing victims of minor accidents in similar workplaces in coordination with the physician	IP	>Event-related decision

OQS

SCC

OQS CERTIFICATE

OQS Certification and Evaluation Ltd. awards this OQS Certificate to the following organisations:

STRABAG

STRABAG AG
A-9800 Spittal/Drau, Ortenburgerstraße 27

Scope of application:
Including all Business Units (Groups per unit) listed in the appendix.

The validity of the OQS Certificate will be maintained via annual surveillance audits and three yearly renewal audits.

This OQS Certificate contains the application and further development of an effective

SAFETY MANAGEMENT SYSTEM OQS
complying with the requirements of standard
SCC** OQS
The security certificate contractors' standard of the Austrian sector committee for workplace protection OQS

Registration No.: 071/1
Date of initial issue: 14 July 2003
Valid until: 29 May 2006

Vienna, 14 July 2003

OQS Certification and Evaluation Ltd.

TK Ing. Viktor Sedschek	Konrad Scheiber	Ing. Alfred Huber
President	General Manager	Specialist representative

STRABAG

Susan.

Annex C
Industrial Safety Information
The Blue Book – Safety at Work
Information Brochure for New Hires

STRABAG

Industrial Safety Information

1. PURPOSE

To ensure that the valid laws and regulations and the engineering rules with regard to accident prevention and health protection on building sites are complied with.

2. SCOPE

Valid for BAUHOLDING STRABAG AG / Austria /
Valid for Joint Ventures if STRABAG is responsible for technical / commercial management

3. TERMS AND ABBREVIATIONS

See *CH 3.3-STO-03 - Abbreviations*

4. DESCRIPTION

4.1. ORGANISATION

The Engineer is generally responsible for compliance with safety regulations on the building sites. He shall be assisted by other persons authorised to issue instructions (foreman, assistant foreman, overseer, etc.), whereby such assistance is limited to the work areas assigned to these persons.

Pursuant to the *Industrial Safety Act* the Employer shall, in order to increase the efficiency of safety and health protection, appoint **Safety Officers**, Industrial Physicians and **Safety Ombudsmen** as well as First Aiders. Furthermore, three **Responsible Officials** shall be appointed for the entire Bauholding Strabag AG concern. One Responsible Official shall be responsible for compliance with the **Aliens Employment Act**, one for compliance with **industrial safety regulations**, and one for compliance with other administrative regulations.

The **Safety Officers** of Bauholding Strabag AG as the Employer's representatives shall be responsible for providing advice and assistance in the field of industrial safety and workplace design to the Direction Head and his executives, the employees, the Safety Ombudsmen, and the Works Council, as well as collaborating with the Industrial Physicians and the Works Council, inspecting the workplaces / building sites together with the Safety Ombudsmen / Works Council for compliance with the safety regulations at regular intervals, and reporting any deficiencies observed thereby to the Direction Head for remediation.
The Direction Head shall appoint a sufficient number of **Safety Ombudsmen** in accordance with the number of employees and the existing safety and health hazards at the workplaces / building sites, and shall notify these to the Industrial Safety Coordinator, who shall notify them to the authority with the approval of the Works Council. Furthermore an appropriate number of First Aiders shall be trained.

The Safety Officers and Safety Ombudsmen shall report to the **Industrial Safety Coordinator** as the central staff officer for industrial safety at STRABAG. As the responsible official pursuant to § 9, Administrative Penalties Act in conjunction with § 23, Labour Inspection Act, his duty is to continuously improve operational safety on the building sites and in stationary operations within the economically reasonable scope, and to ensure compliance with laws and regulations.
He is authorised to issue instructions for this purpose.

Duties of the Coordinator:

- Central concept design, consulting, assistance and coordination in all issues of safety engineering
- Monitoring of compliance with laws / regulations and documentation (see *CH 3.4-STO-01 – Safety Engineering Checklist for Safety Officers*)
- Evaluation and forwarding of information to the responsible offices
- Cooperation with authorities and accident prevention services
- Planning of accident prevention programmes
- Preparation and maintenance of statistics, as well as analysis and evaluation
- Information, training and instruction
- Organisation of Industrial Safety Committee meetings in the Directions (as required) and in the Group (at least 1x/ year)

4.2. Objectives of Industrial Safety

Primary Corporate Objectives:

- Compliance with valid laws and regulations
- To reduce the number of accidents at work / occupational diseases
- To minimise risks
- To promote self-responsibility / motivation, and to train all employees in order to improve industrial safety
- To remedy any observed safety deficiencies without delay and to develop measures for improvement
- To improve the corporate image
- Customer satisfaction

4.3. Safety Planning

During the work preparations for a new building site, the potential safety risks shall already be assessed and safety-relevant workflows shall be planned in such a way that the safety and health hazards are minimized for all employees working on the building site.

Generally, this shall include the following steps:

- Preparation and evaluation pursuant to § 4, Industrial Safety Act – see ÖBEV / EDP programme
- Early coordination with the Labour Inspector – working hours, hazardous work, responsible supervisors, etc. –
- Alarm plans for accidents, fire, flood, definition of escape routes, emergency lighting, fire safety, ventilation, firedamp, etc.
- Installation survey

- Static assessment – building pit sheeting, work and safety scaffolding, falsework, etc.
- Planning of building site illumination and ventilation for underground construction
- Hazardous substances – chemicals, explosives, liquid gas, harmful refuse, etc.
- Electrical safety – licensed electrician, person responsible for high voltage, ÖVE, grounding, contactors, electrical safety in underground construction, explosion safety, etc.
- Use of resources on building sites – inspection requirements
- Human resource planning – equipment drivers – driving permits

Difficult workflows must be planned in advance and instructions for the handling of safety problems must be developed.

4.4. CONSTRUCTION WORK

All construction works on the building site shall be coordinated with the corporation, subcontractors and other external suppliers on a permanent basis to exclude any mutual hazards.

Basically, the following must be observed:

- Report to the Labour Inspector (building sites > 5 workdays)
- Laws that must be made available to the workers must be posted visibly
- AUVA folder "Safety on the Building Site" must be kept available in the manager's office
- Evaluation pursuant to § 4, Industrial Safety Act
- Instruction of the building site workers and responsible executives of the SUB on existing project requirements (FB 3.4-STO-02)
- Appointment of a deputy in the event of absence of the supervisor (FB 3.4-STO-03)
- Nomination of the required number of Safety Ombudsmen and First Aiders
- Maintenance of the "Building Site Checklist" POL / VA pursuant to CH 3.4-STO-02
- Securing of the building site as set out in the permit notice or relevant ordinance
- Sufficient illumination and ventilation of the workplaces
- Production and maintenance of safety barriers
- Posting of the alarm plan for accidents / fire
- Observation of the ban on juvenile employment, maternity regulations
- Compliance with the Aliens Employment Act (see *Data Sheet Aliens Employment* issued by the legal department at BRVZ).
- Act to combat illegal employment –
- Accident reports analogue to "Reporting Plan for Work Accidents" as set out in CH 3.4-STO-03

4.5. SAFETY EQUIPMENT

The Employer is under obligation to provide all the safety equipment required on building sites by law, such as:

Personal protection equipment:
Protection for the head, ears, eyes, respiratory system, skin, hands, feet, against weather, waterproof clothing, lifebelts, safety ropes.
Fencing and protection of the building site from unauthorised access, etc.

First Aid:
First aid kit, stretcher, rescue equipment, etc.

Fire safety:
Sufficient fire extinguishers, extinguishing water connections, gas detector, fire doors, etc.

Safety Engineering Inspections and Certifications:
See list of equipment on building sites + Annex

Licenses for activities requiring permission:
Driving license, crane operating license, internal driving permit, blasting permit, etc.

4.6. SAFETY TRAINING

The training as Safety Officer (288 hours), Safety Ombudsman (24 hours) and First Aider (16 hours) shall be provided within the scope of the training programme of BRVZ Academy.

In addition, one-day training on the principles of industrial safety, principles of evaluation and coordination of construction works is offered.

5. EXPLANATIONS

None

6. OTHER VALID DOCUMENTS

Laws subject to posting in companies
AUVA Folder "Safety on the Building Site"

The Blue Book – Safety at Work

Sicherheit am Bau

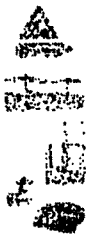
Einleitung

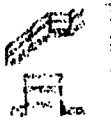
Inhalt

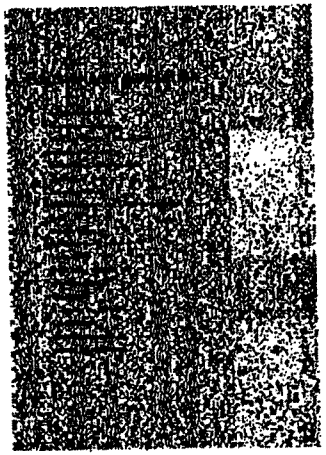
Vorwort

Koordination

Checkliste für Koordination von Bauarbeiten







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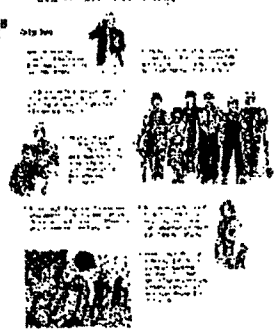

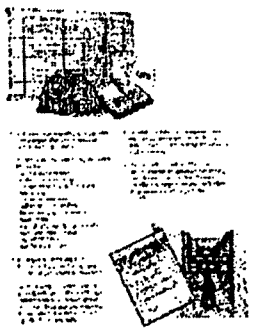

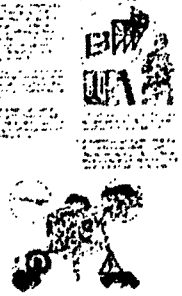

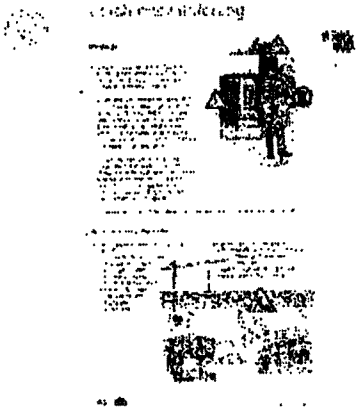

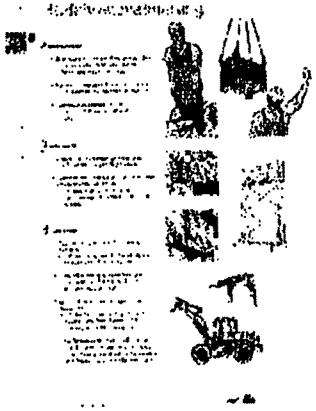

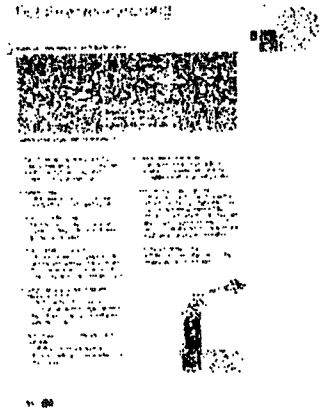

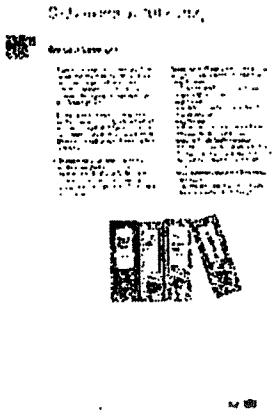

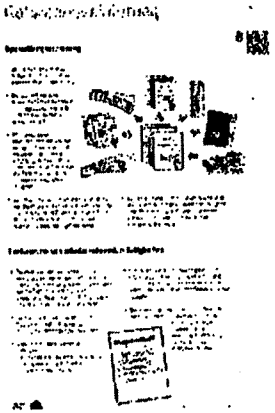

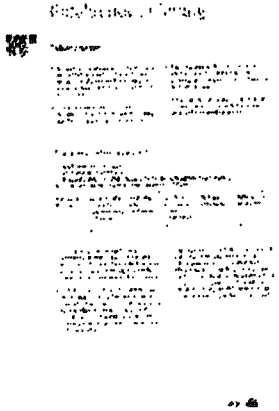

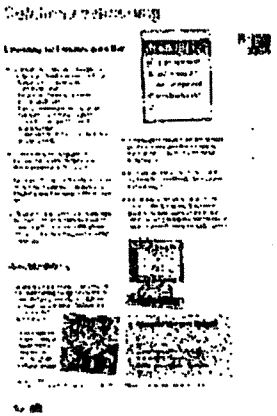

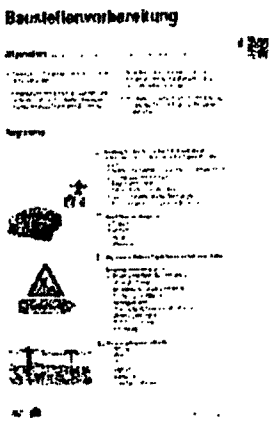
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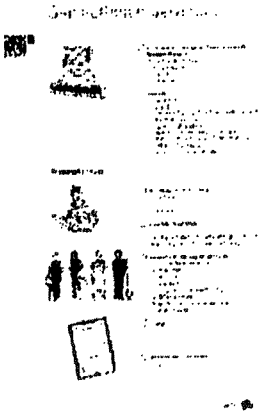

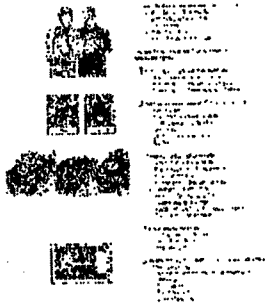

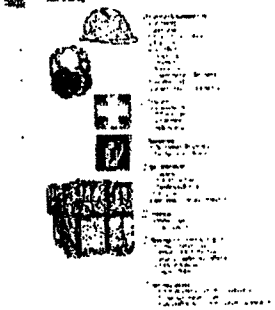

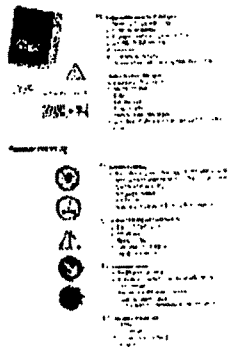

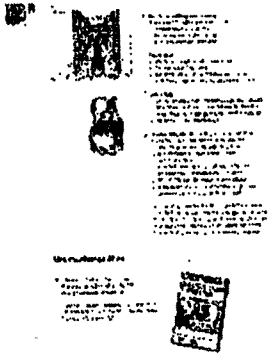

Meldung, Aufsicht, Zusammenarbeit

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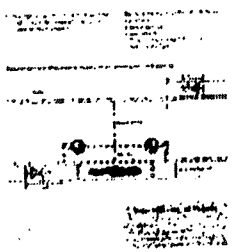

Schutz erdverlegter Leitungen

Zugänge und Wege

Baustellenverkehr

Aufenthaltsräume und Sanitäreinrichtungen

Erste Hilfe

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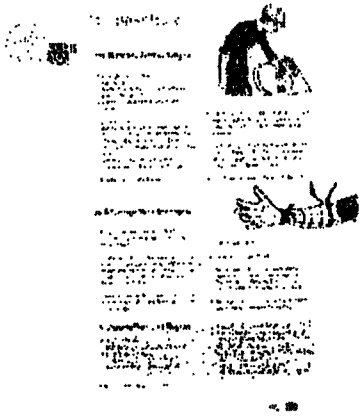

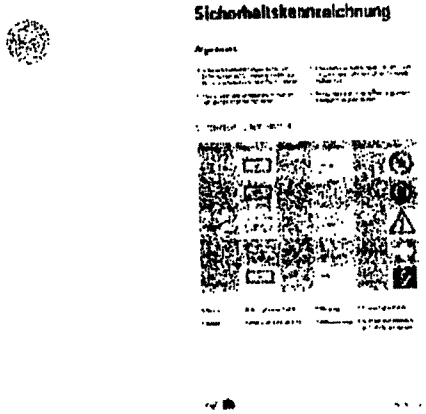
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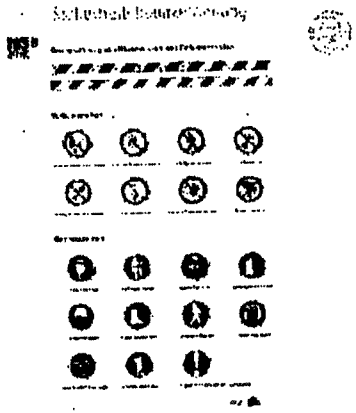

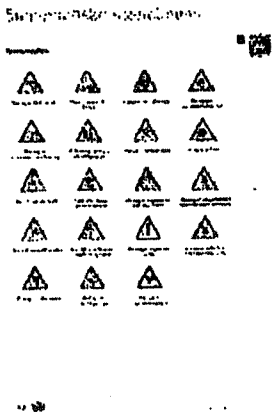

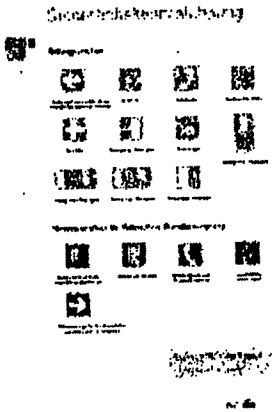

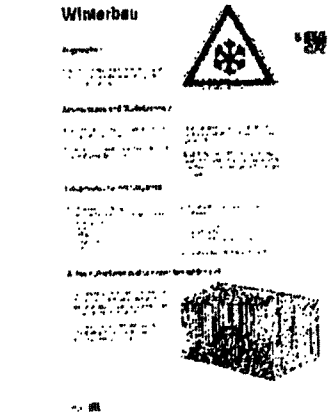
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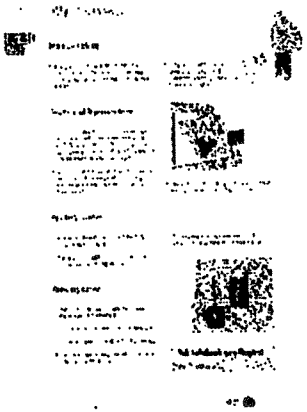

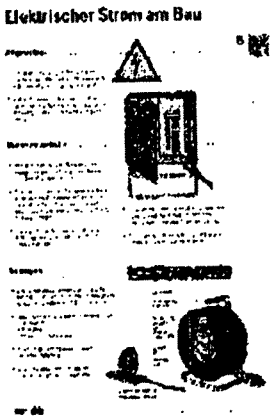
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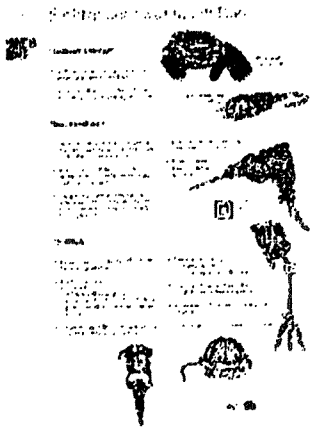

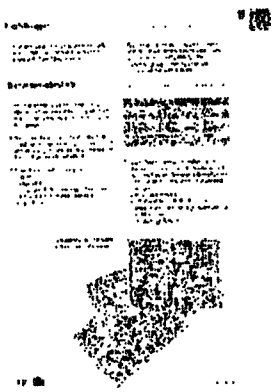

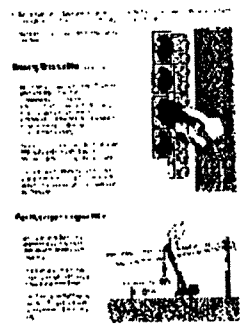

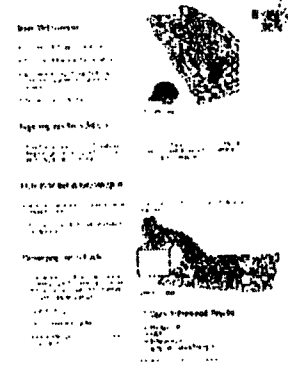

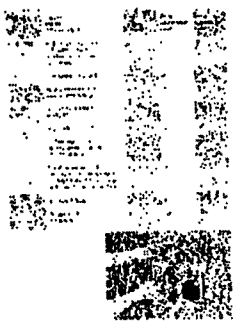

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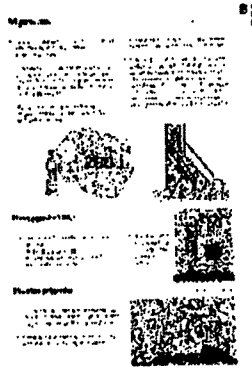

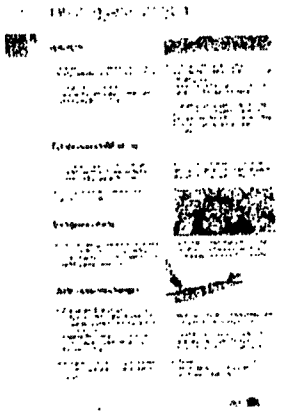

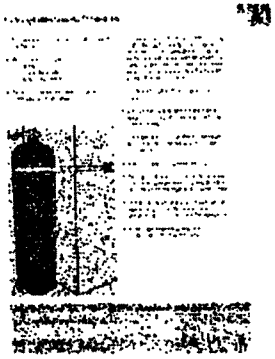

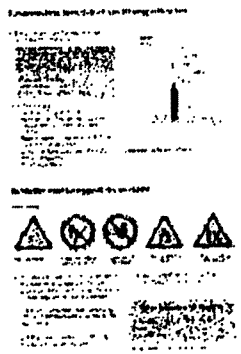

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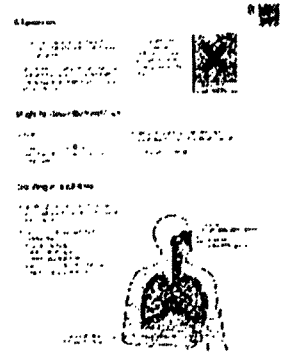

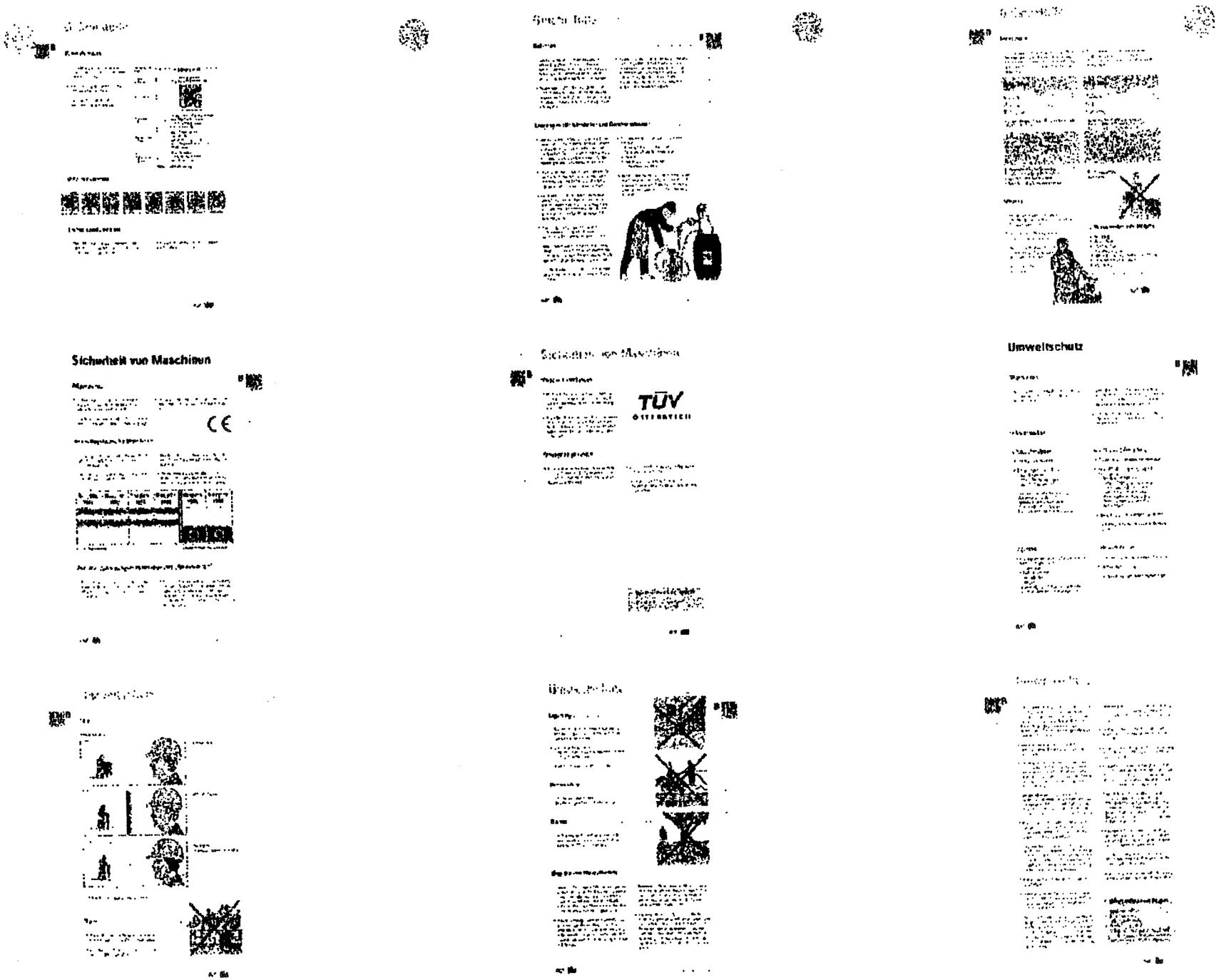
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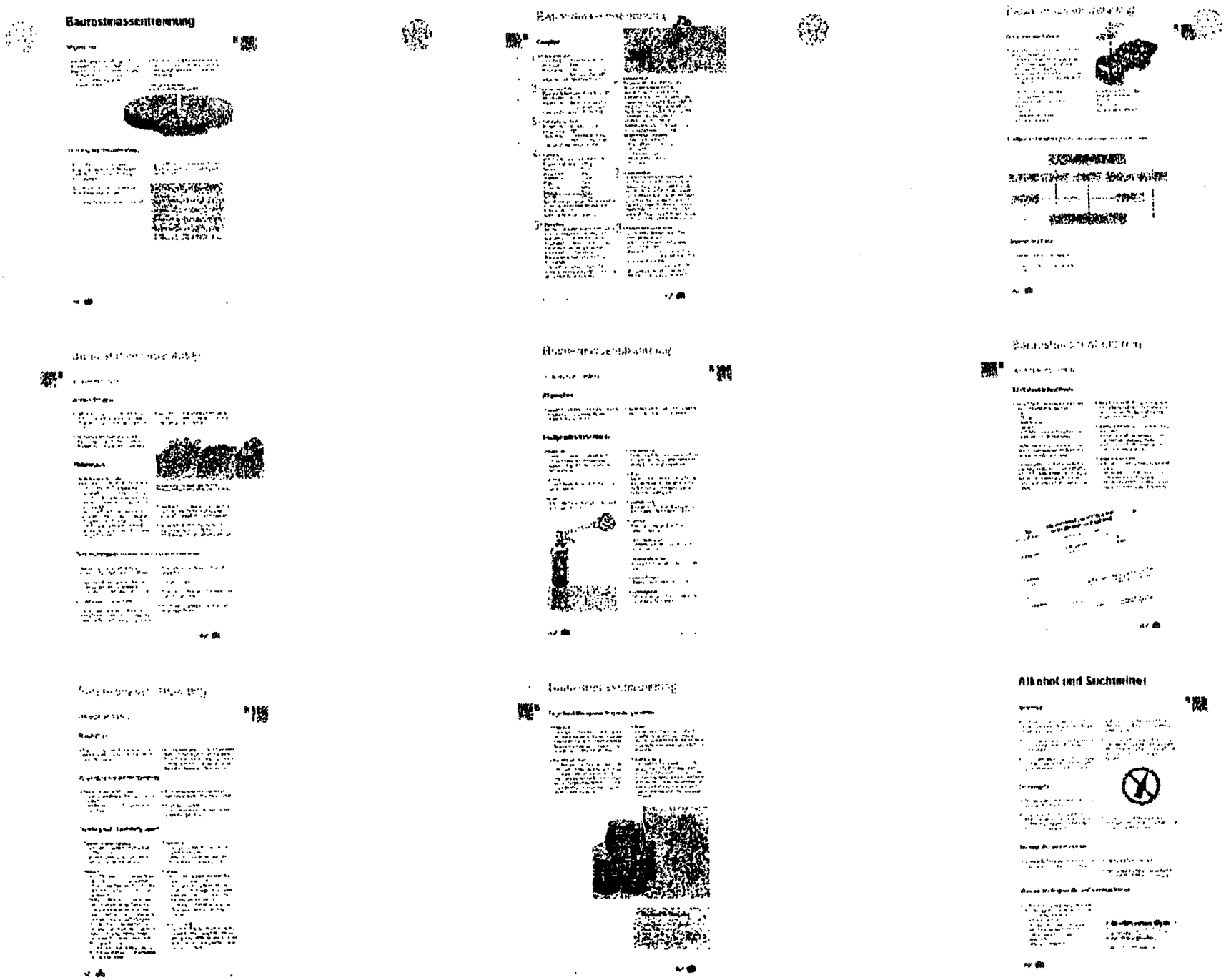
TÜV
Umweltschutz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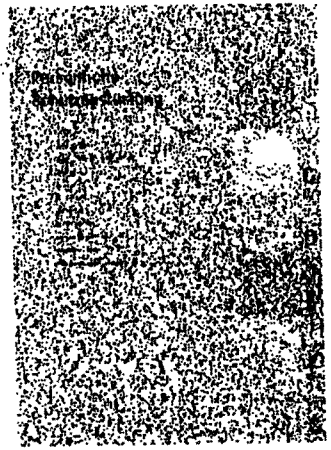
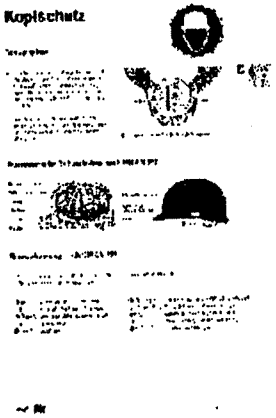
Alkohol und Suchtmittel

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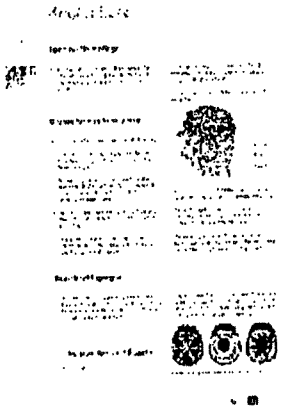

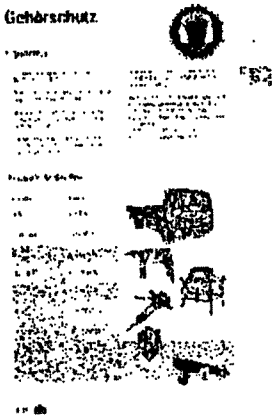
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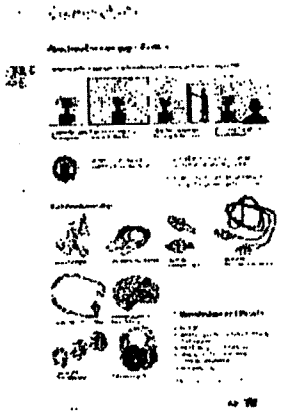
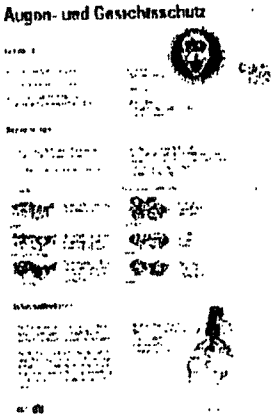
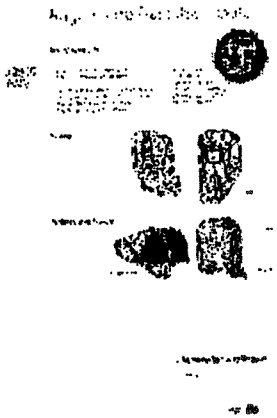
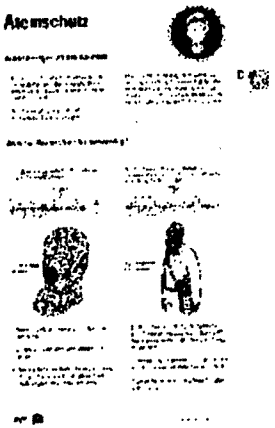
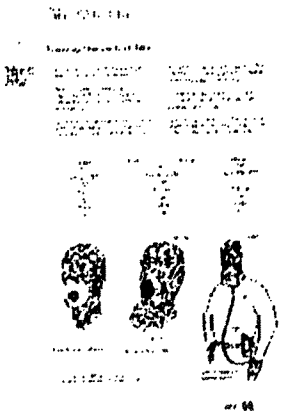



Augen- und Gesichtsschutz




Atemschutz



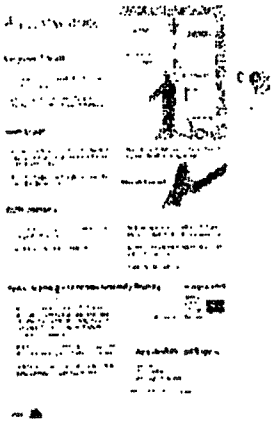
Handschutz

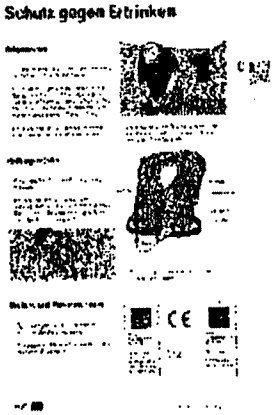
Hautschutz

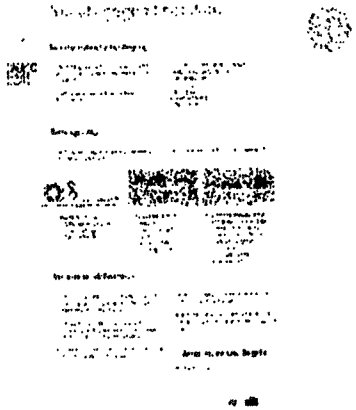
Fußschutz

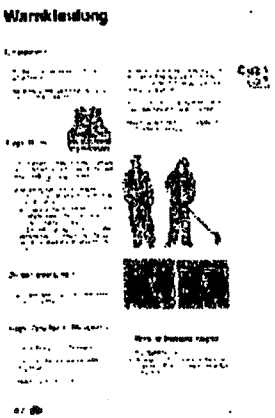
Augenschutz

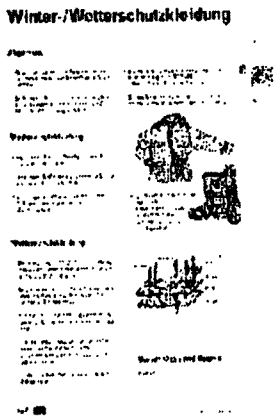
Anseilschutz

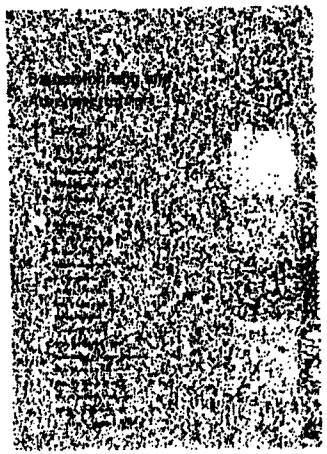


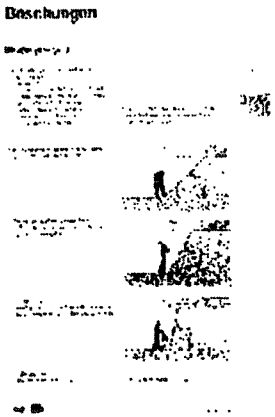

Schutz gegen Ertrinken

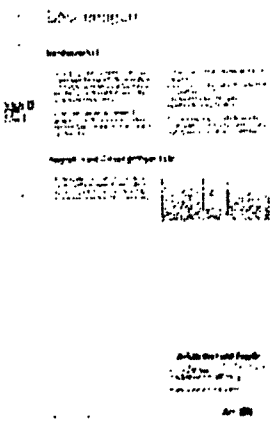


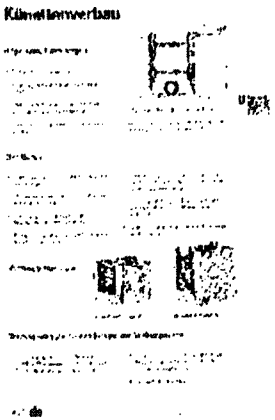

Warnkleidung

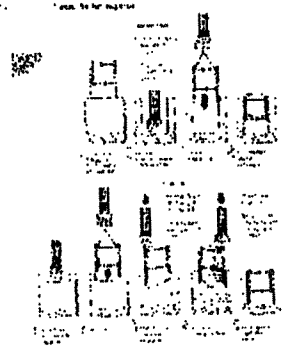

Winter-/Wetterschutzkleidung

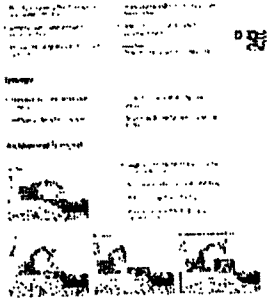


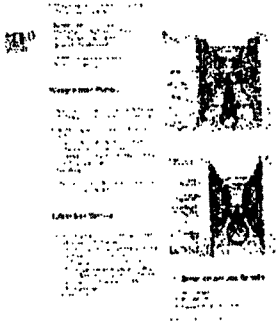

Beschungnn



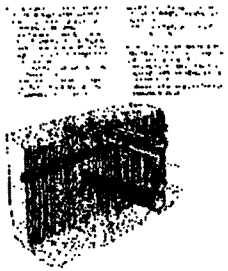

Kanaltenverbau



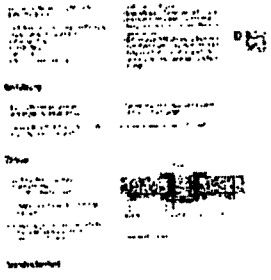


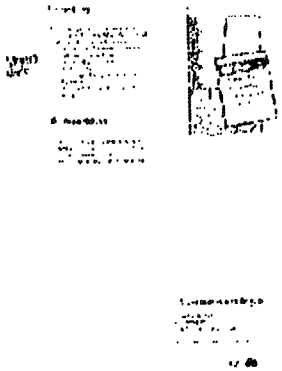


Leitungssicherung

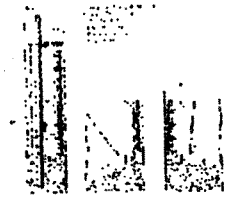


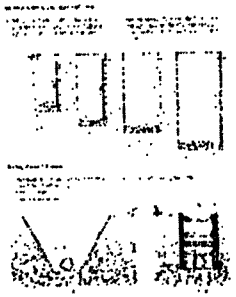
Baugrubenverbau

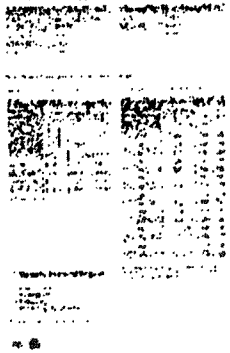




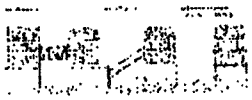
Arbeitsraumbreiten

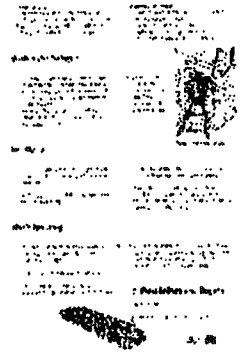


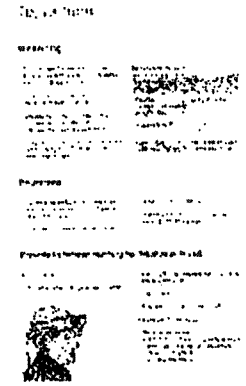


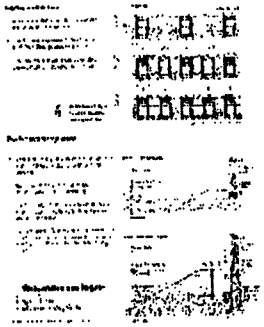


Unterfangungen

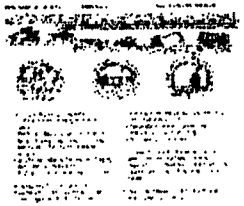


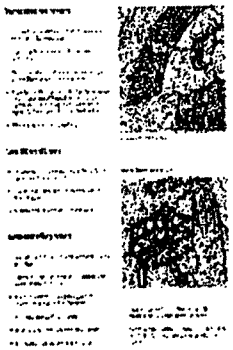




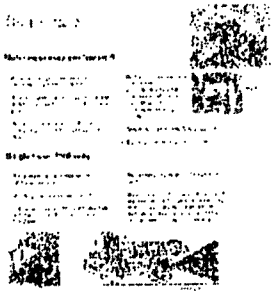


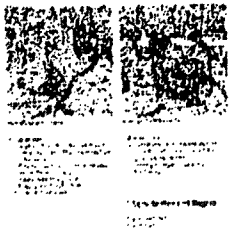
Tunnelbau



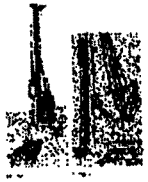


Rohrvortrieb

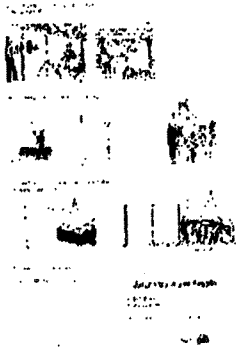




Bohr- und Rammarbeiten



Schalarbeiten

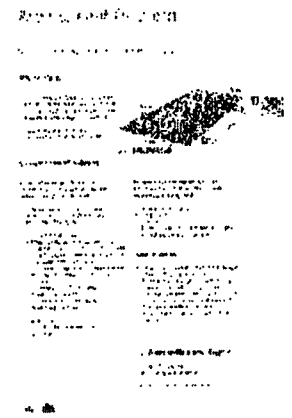


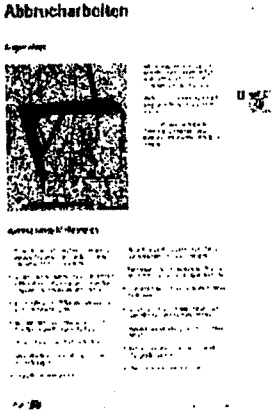
Bewehrungsarbeiten

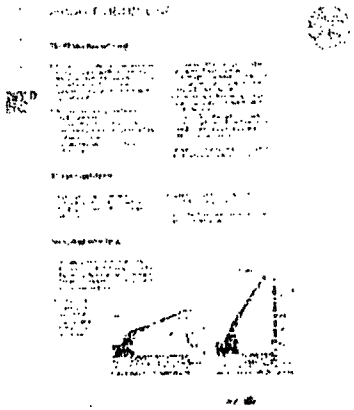
Betonierarbeiten

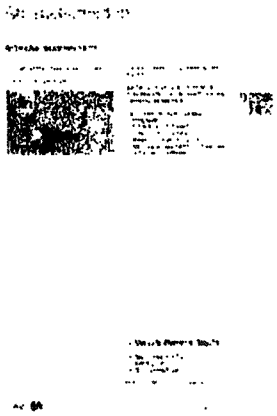
Fertigteilmontage

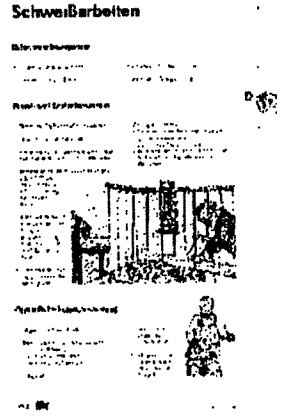
Arbeiten auf Dächern

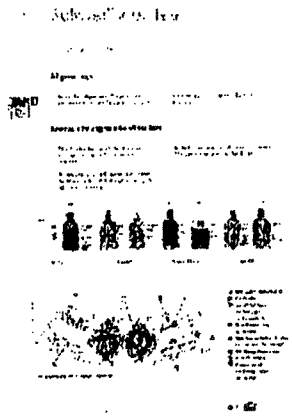


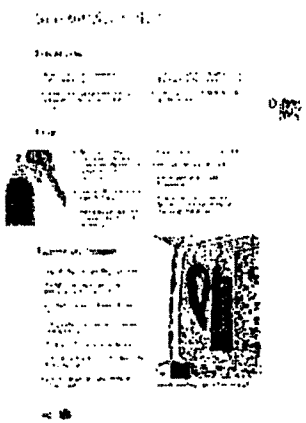

Abbrucharbeiten

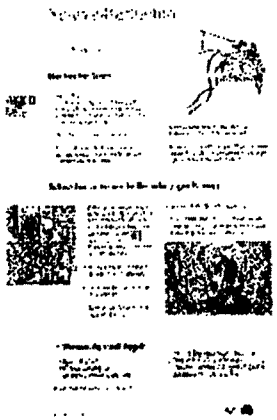


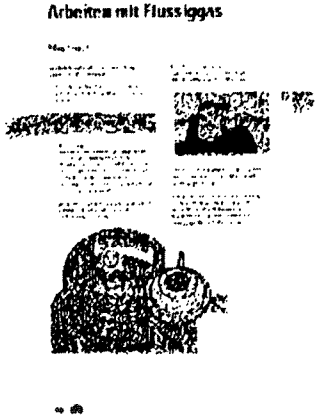


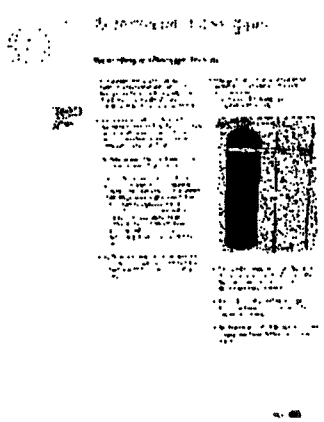

Schweißarbeiten

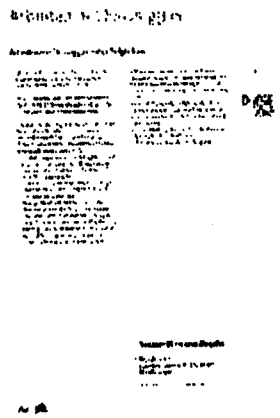


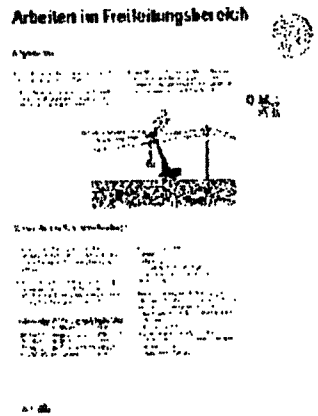


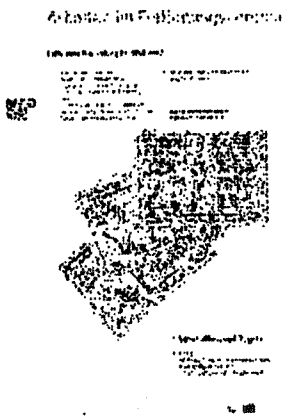


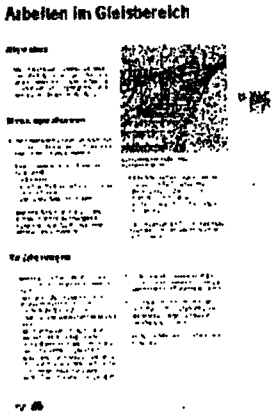

Arbeiten mit Flüssiggas

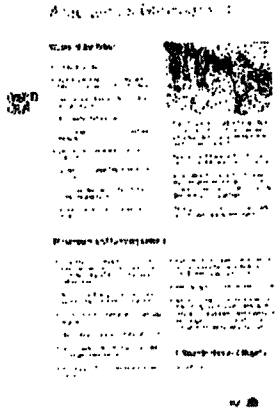


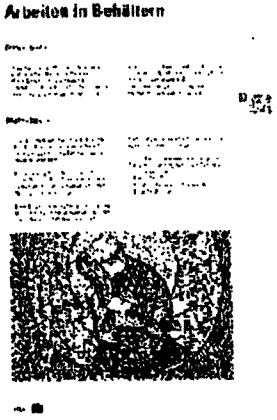


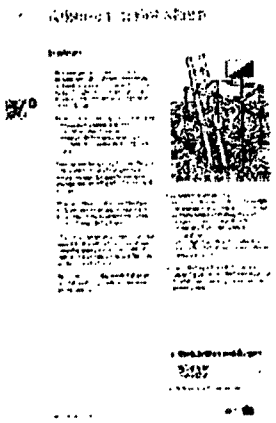

Arbeiten im Freileitungsbereich

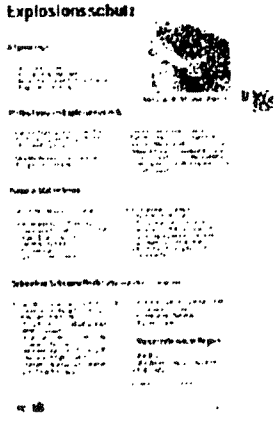



Arbeiten im Gleisbereich




Arbeiten in Behältern

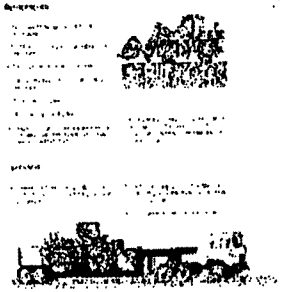


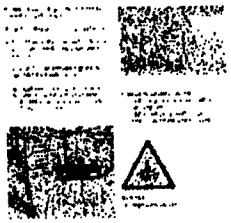

Explosionsschutz

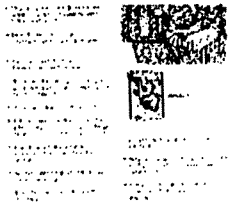
Kentaminierte Borniche

Transport/Ladungssicherung

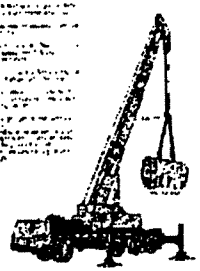
Baumschinen

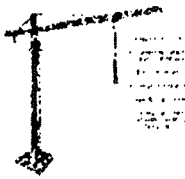


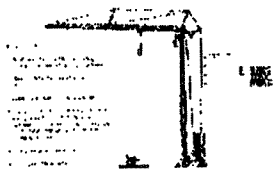


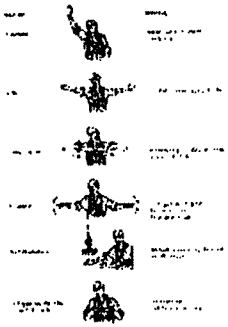


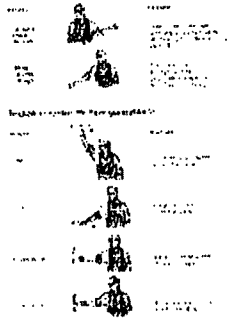
Krane

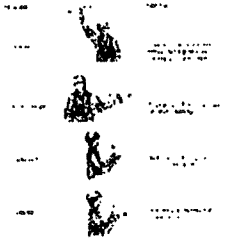




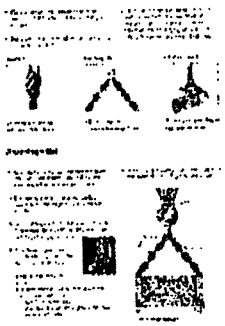


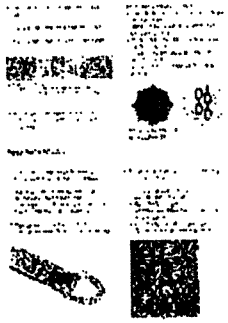


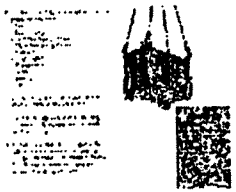


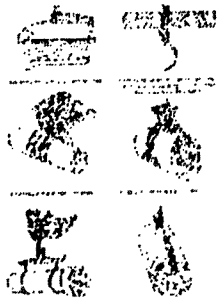


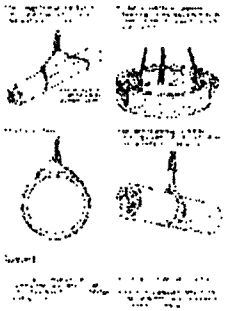
Anschlagen von Lasten

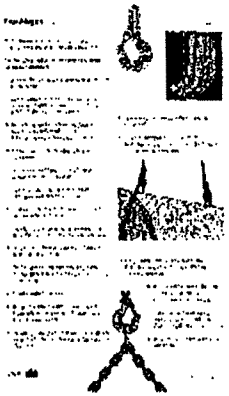


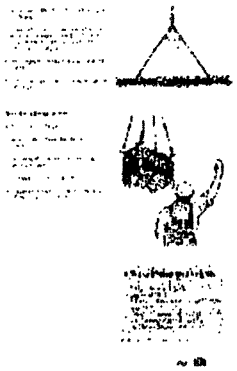












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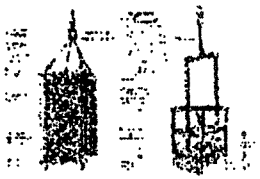
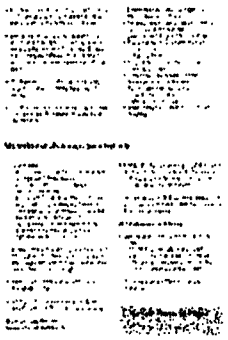
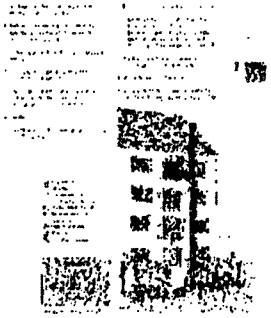
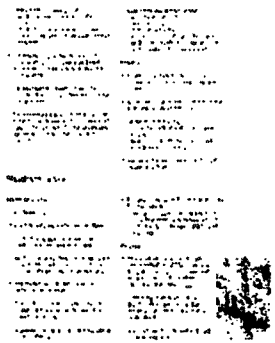
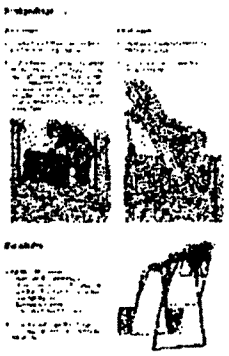


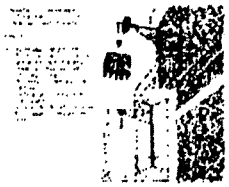


Bauaufzüge



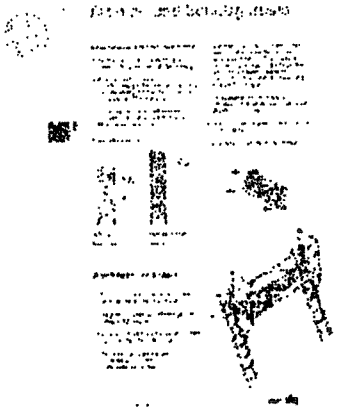


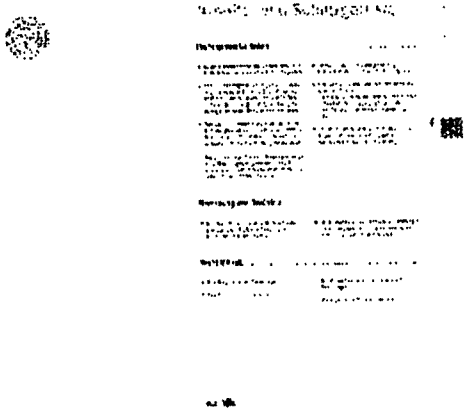


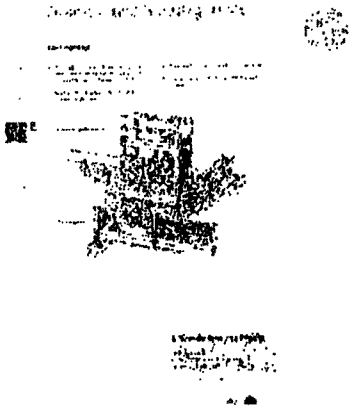


Absturzsicherung

Arbeits- und Schutzgerüste







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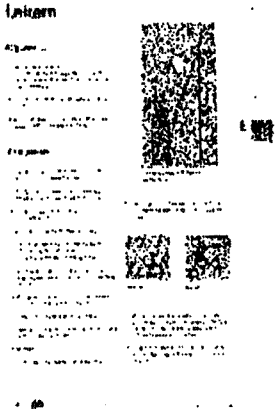
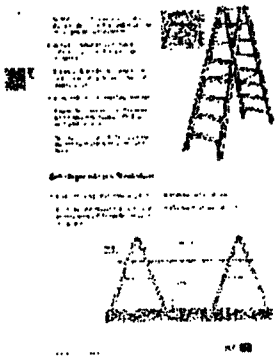
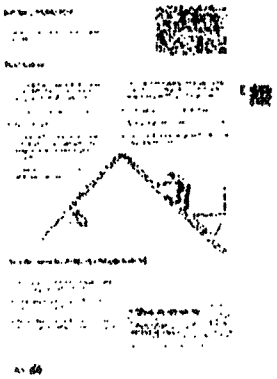
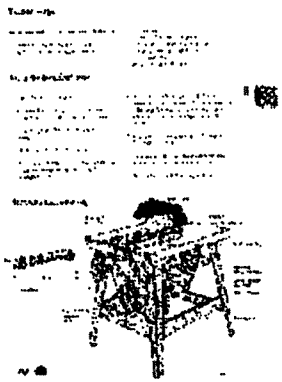
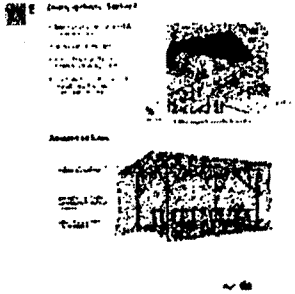


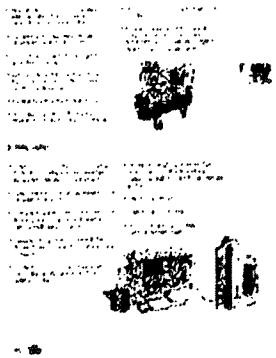


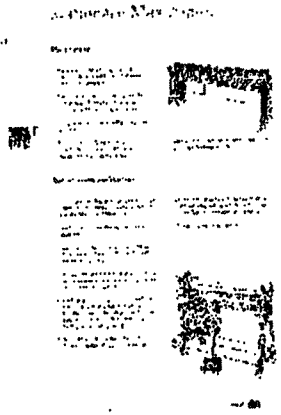


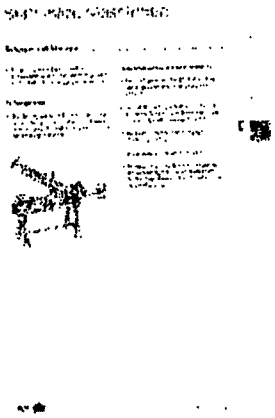
Stationäre Maschinen

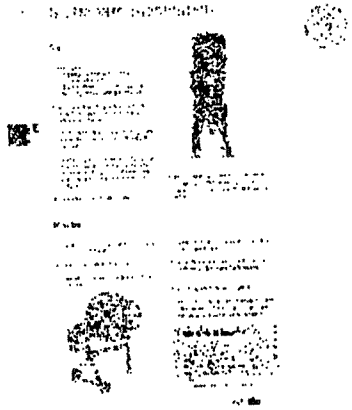


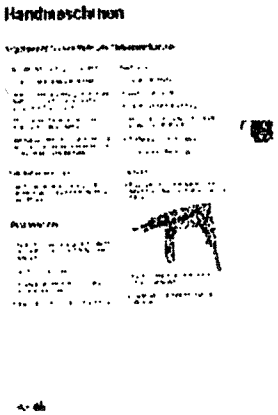


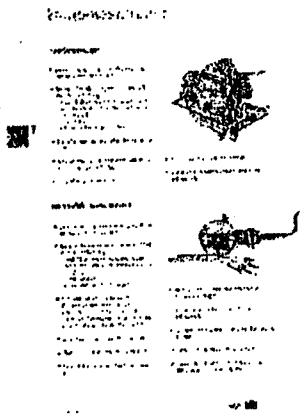


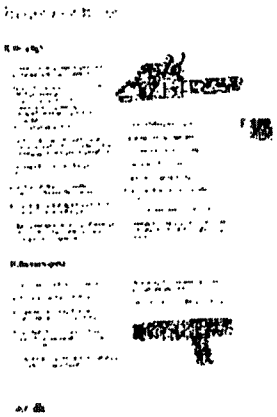


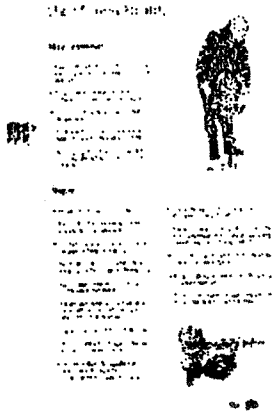


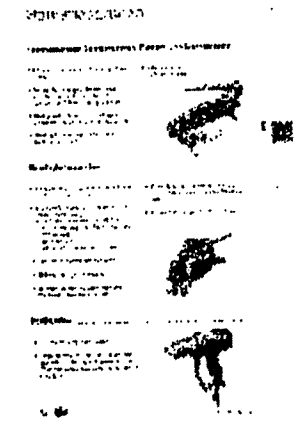


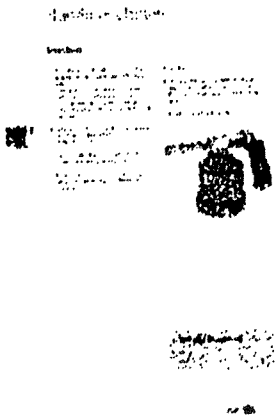




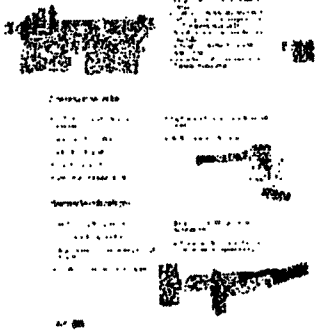


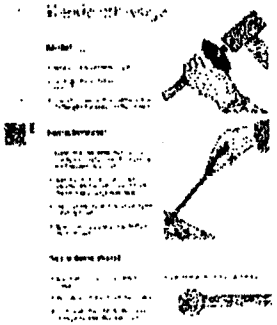


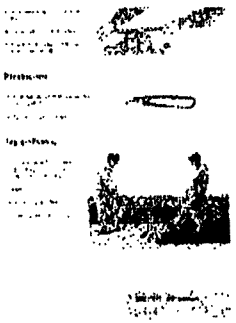




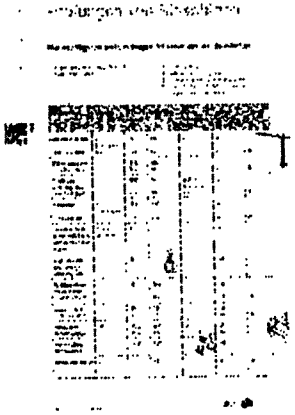
Handwerkzeuge

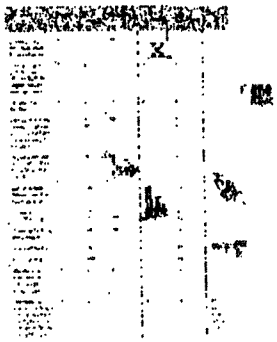


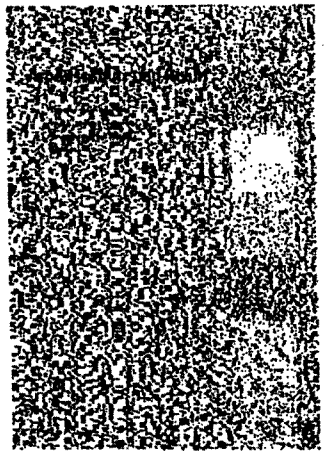




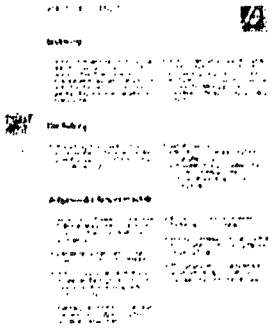
Prüfungen von Maschinen

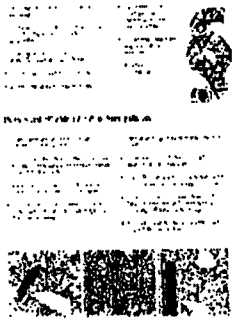


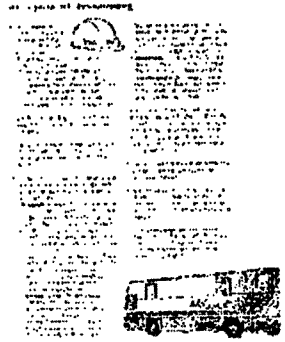


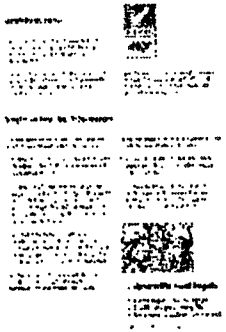


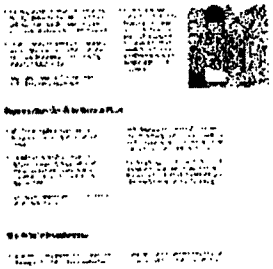
Das Arbeitsschutzsystem

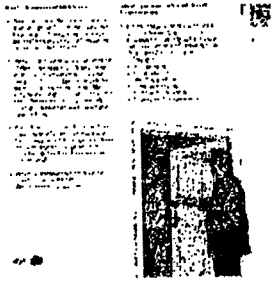




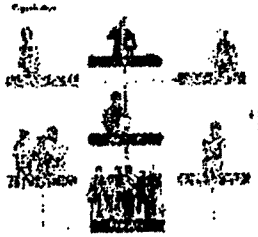


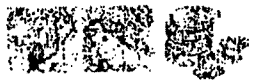


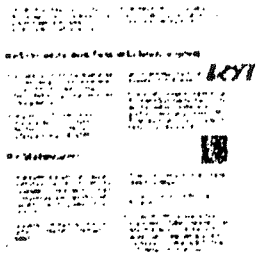


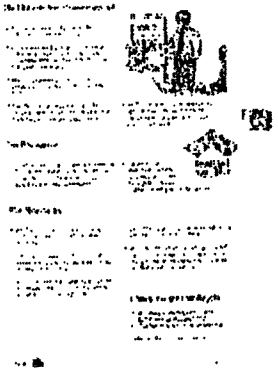


Arbeitssicherheit im Betrieb

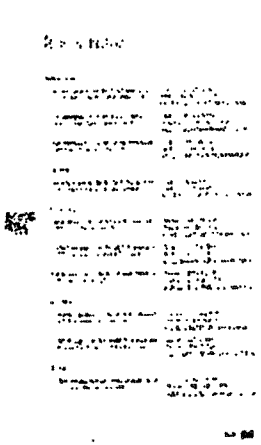


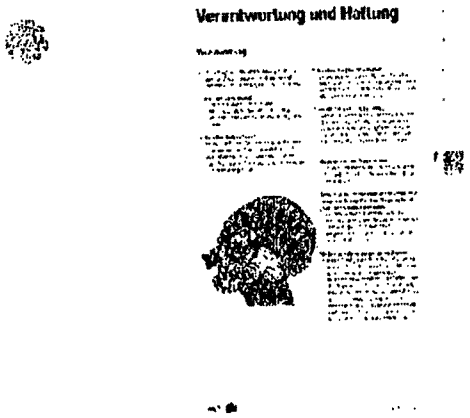




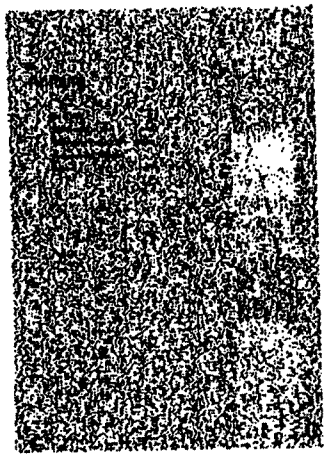


Schwarzarbeit

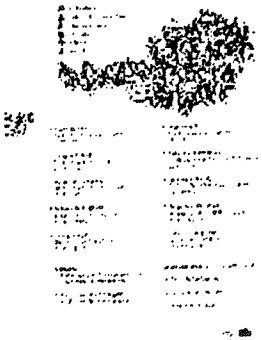




Verantwortung und Haftung



Rat & Hilfe

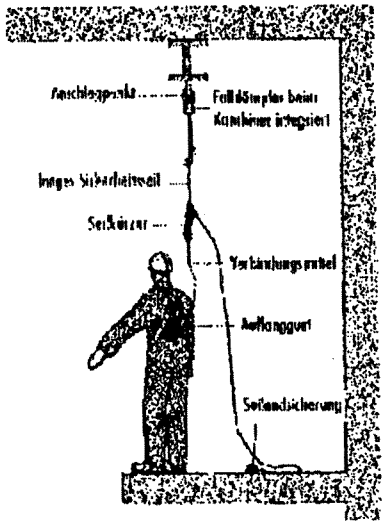


Untall – was tun?

Persönliche Schutzausrüstung (Anseilen)

Die Anbringung der primären und sekundären Absturzsicherungen kann entfallen, wenn der hiefür erforderliche Aufwand unverhältnismäßig hoch ist gegenüber dem Aufwand für die durchzuführende Arbeit. Bei Dacharbeiten ist die Sicherung mittels persönlicher Schutzausrüstung ausreichend bei geringfügigen Arbeiten, wie Reparatur- oder Anstricharbeiten, die nicht länger als einen Tag dauern, und sofeme es sich um Dachneigungen über 20° handelt, bei Arbeiten am Dachsaum und Arbeiten im Giebelbereich:

- **Sicherheitsgeschirre**
  mit Höhensicherungsgeräten oder Einrichtungen zur Verminderung des Fangstoßes (Sicherheitsseil, Seilkürzer und Falldämpfer).
- Sicherheitsgürtel
  dürfen nur als Haltegurt (z.B. bei Arbeiten auf Masten) oder als Sicherung gegen Abrutschen (z.B. bei Arbeiten auf geneigten Dachflächen, wenn ein Absturz über die Traufe ausgeschlossen ist) verwendet werden.



- Sicherheitsgeschirre und auch Sicherheitsgürtel sind **einmal jährlich** durch eine fachkundige Person zu überprüfen.

Gesetzliche Grundlagen

Bauarbeiterschutzverordnung - BauV,
BGBl. Nr. 340/1994

§ 7 Absturzgefahr
§ 8 Absturzsicherungen
§ 9 Abgrenzungen
§ 10 Schutzeinrichtungen
7. Abschnitt - Gerüste
11. Abschnitt - Dacharbeiten

Hinweis

Beschäftigte im Baubereich sind einem besonders hohen Unfall- und Gesundheitsrisiko ausgesetzt. In der Europäischen Union steht das Baugewerbe mit jährlich über 1.000 Unfalltoten an der Spitze der unfallgefährdeten Sektoren. Die häufigsten Unfallursachen im Bau sind europaweit Stürze von erhöhten Standorten.
Die Europäische Union hat sich daher auf eine europaweite Kampagne über Arbeitssicherheit auf Baustellen im Jahr 2003 geeinigt. Dazu wird eine Informationskampagne zu den Schwerpunkten Bauarbeitenkoordination und Absturzsicherung durchgeführt; begleitet wird die EU-Baustellenkampagne von einer Schwerpunktaktion der Arbeitsinspektion.

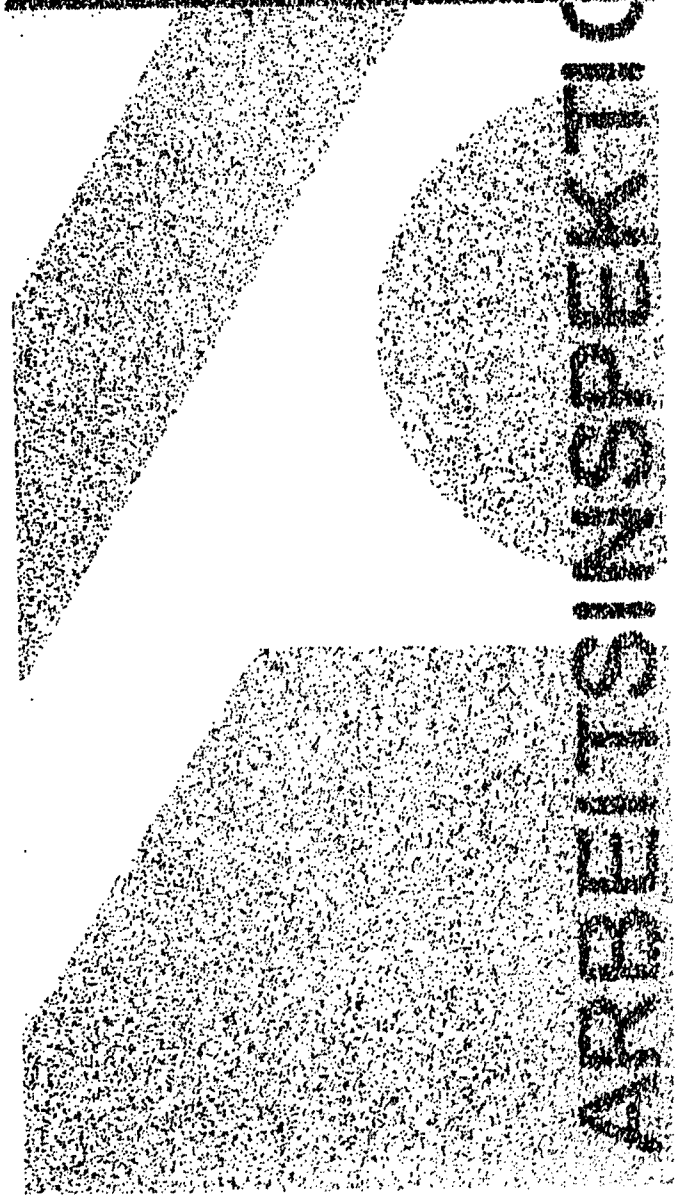
ARBEITS INSPEKTION

Weitere Exemplare dieses Folders erhalten Sie kostenlos bei Ihrem zuständigen Arbeitsinspektorat oder beim Zentral-Arbeitsinspektorat.

Ihr zuständiges Arbeitsinspektorat berät Sie gerne

Herausgeber: Bundesministerium für Wirtschaft und Arbeit
Arbeitsrecht und Arbeitsinspektion, 1040 Wien, Favoritenstraße 7
Mitarbeit: Dipl.-Ing. Dr. Peter Petri, Dipl.-Ing. Peter Bemsteiner
Ein Produkt der mio
Erhebt keinen Anspruch auf Vollständigkeit
Stand: April 2003

Vermeidung von Absturzunfällen



Vermeidung von Absturzunfällen

Der Absturz von erhöhten Standplätzen ist die häufigste Ursache von schweren und tödlichen Arbeitsunfällen auf Baustellen.

Wann sind Maßnahmen gegen Absturz gesetzlich gefordert?

- Bei Öffnungen in Decken und im Boden (Installations-, Lichtkuppelöffnungen, Schächte, Künetten,etc.),
- an Stiegenläufen und Wandöffnungen über 1 m Absturzhöhe,

- an Arbeitsplätzen und Verkehrswegen über Gewässern (oder Stoffen, in denen man versinken kann),

- bei Dacharbeiten über 3 m Absturzhöhe,

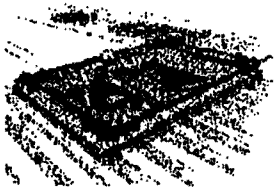
- an allen übrigen Arbeitsplätzen und Verkehrswegen über 2 m Absturzhöhe.

Welche Maßnahmen gegen Absturz gibt es?

Primäre Absturzsicherungen

verhindern den Absturz von Arbeitnehmern und Gegenständen:

- Abdeckungen von Öffnungen, Abdeckungen müssen tragsicher und unverschiebbar ausgeführt sein



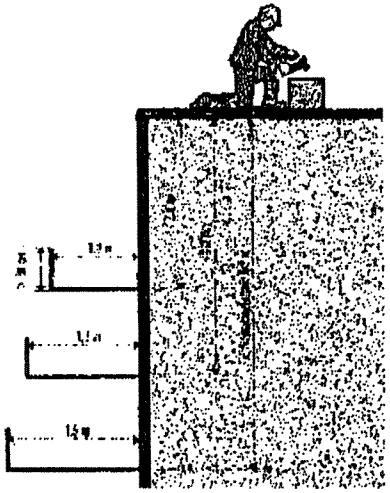
- **Umwehrungen** an den Absturzkanten (Deckenkanten, Gerüstlagen, etc.) bestehend aus Brust-, Mittel- und Fußwehren,
  Brustwehren: in mindestens 1 m Höhe (Ausnahme: bei Fensteröffnungen ist eine Parapethöhe von 85 cm ausreichend)
  Fußwehren: mindestens 12 cm hoch
  Mittelwehren: zwischen Brust- und Fußwehr, der lichte Abstand beträgt maximal 47 cm

- **Abgrenzungen** durch Brustwehren in 1,00 bis 1,20 m Höhe,
  Abgrenzungen sind bei Loggien und Balkonen an den Zutrittsöffnungen, ansonsten generell in ca. 2 m Entfernung von der Absturzkante anzuordnen.

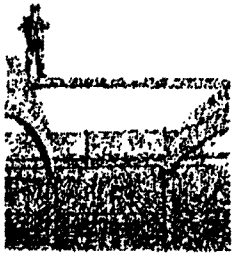
Sekundäre Absturzsicherungen

Wenn primäre Absturzsicherungen aus arbeitstechnischen Gründen nicht verwendet werden können, müssen sekundäre Absturzsicherungen, die abstürzende Arbeitnehmer und Gegenstände auffangen sollen, verwendet werden:

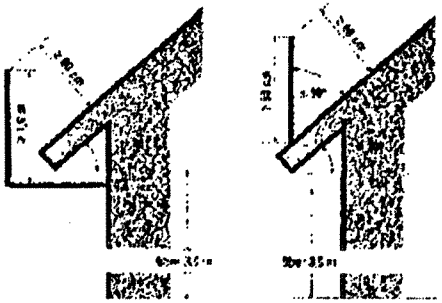
- **Fanggerüste**
  ausgebildet als Ausschussgerüst, als Konsolgerüst oder in Verbindung mit einem Fassadengerüst,



- **Auffangnetze**
  vorwiegend im Hallenbau eingesetzt,



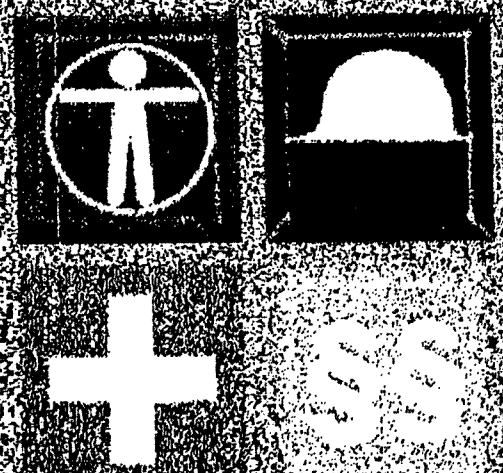
- **Dachfanggerüste und Dachschutzblenden.**



HUB - M 226 - 0801 Aktualisierte Auflage

M 226

Sprengarbeiten



Medieninhaber, Herausgeber und Hersteller:
Allgemeine Unfallversicherungsanstalt
Adalbert-Stifter-Straße 65, 1201 Wien

Sicherheitsinformation der
Allgemeinen Unfallversicherungsanstalt

Sprengarbeiten

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Sprengarbeiten

Was alles zum „Sprengen" gehört.

Tätigkeiten, die als Sprengarbeiten gelten

- Ausgeben von Sprengstoffen und Zündmitteln aus dem Betriebslager
- Transportieren der Sprengmittel vom Betriebslager zur Verwendungsstelle und zurück
- Verwahren der Sprengmittel in der Nähe der Verwendungsstelle
- Laden und Besetzen
- Herstellen und Prüfen des Zündkreises
- Abtun der Schüsse
- Beseitigen von Versagern
- Vernichten von Sprengstoffen und Zündmitteln

Bei Sprengarbeiten dürfen nur die dafür unbedingt notwendigen Personen anwesend sein!

Abtun der Schüsse

Allgemeine Ausbildung für Sprengarbeiten

Nur ein Sprengbefugter darf Sprengarbeiten ausführen. Er trägt für alle Vorkommnisse und Anordnungen im Zusammenhang mit Sprengarbeiten die volle Verantwortung. Der Sprengbefugte hat alle Sprengarbeiten mit Umsicht und unter Beachtung der notwendigen Sicherheitsmaßnahmen durchzuführen. Er allein ist berechtigt, Anordnungen zu treffen. Seine Weisungen müssen unbedingt befolgt werden.

Besondere Ausbildung für bestimmte Sprengarten

Bestimmte Sprengarbeiten dürfen nur von einem Sprengbefugten ausgeführt werden, der darüber eine besondere Fachausbildung abgeschlossen hat. Dies ist für folgende Sprengarbeiten notwendig:

- Tiefbohrlochsprengung,
- Unterwassersprengung,
- Sprengen in Serien-Parallelschaltung,
- Lawinensprengung,
- Sprengen von heißen Massen und
- Metallsprengung

Manchmal genügt die Ausbildung zum Sprengbefugten allein nicht.

Arbeiten, die der Sprengbefugte selbst ausführen muss:

- Unterweisen der Sprenggehilfen und Absperrposten
- Überwachen der Arbeit der Sprenggehilfen
- Sprengstoff- und Zündmittellager beaufsichtigen
- Begleiten des Transportes von Sprengmitteln
- Verwahren des Schlüssels zum Tagesmagazin bzw. zur Schießkiste
- Prüfen der elektrischen Zünder auf Stromdurchgang und Stromwiderstand bzw. der Brenndauer der Zeitzündschnüre
- Verbinden der Sprengkapsel mit der Zeitzündschnur bzw. Einbauen des Sprengverzögerers in die Sprengschnur
- Fertigmachen der Schlagpatronen oder Zündpatronen
- Beseitigen der Schlagpatronen oder Zündpatronen
- Festlegen des Streubereiches und die Anordnung der Absperrungen
- Prüfen der Zünderdrahtverbindungen
- Verwahren des Zündmaschinenschlüssels bzw. der Zündmaschinenkurbel
- Prüfen der Zündmaschine

Der Sprengbefugte hat viel zu tun.

- Prüfen des elektrischen Zündstromkreises mittels Zündkreisprüfer
- Anordnen der Sprengsignale
- Verbinden der Zündmaschine und der Zündleitung
- Betätigen der Zündmaschine
- Sprengort nach dem Abtun auf nicht detonierte Sprengstoffe untersuchen
- Feststellen, Kennzeichnen und Beseitigen von Versagern
- Auftauen von gefrorenen Sprengstoffen
- Vernichten von Sprengstoffen und Zündmitteln

Sprenggehilfe

Sprenggehilfen sind befugte Hilfskräfte, die ein Sprengbefugter zu solchen Sprengarbeiten heranzieht, die er nicht selbst verrichten muss. Sprenggehilfen müssen mindestens 19 Jahre alt und in jeder Hinsicht verlässlich sein. Darüber hinaus sind Sprenggehilfen vom Sprengbefugten über die Ausführung ihrer Arbeiten und die damit verbundenen Gefahren zu unterweisen.

Sprenggehilfen dürfen nur die ihnen vom Sprengbefugten übertragenen Arbeiten ausführen. Auch sie haben dabei mit Umsicht und unter Beachtung der notwendigen Sicherheitsmaßnahmen vorzugehen.

Streubereich grundsätzlich mit 300 Metern festlegen. Bei Metallsprengungen mit 1000 Metern.

Streubereich

Der Sprengbefugte muss dafür sorgen, dass bei Sprengungen niemand gefährdet wird. Bei der Festlegung des Streubereiches ist auf die Streuweite der Sprengstücke und auf die Druckwirkung zu achten (z. B. bei Verwendung von Auflegersprengstoffen die maximale Lademenge pro Zündzeitstufe beachten – siehe mitgeliefertes Sprengstoffmerkblatt).

Falls bei Sprengungen über Tag keine Deckungen zur Verfügung stehen, muss der Streubereich mit mindestens

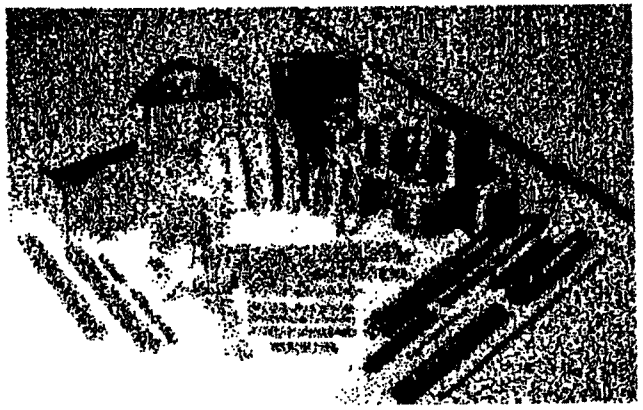
300 m festgelegt werden (bei Metallsprengungen mit mindestens 1000 m). Der Sprengbefugte hat außerdem zu veranlassen, dass der Streubereich von Warnposten abgesperrt wird. Dazu sind nur verlässliche Personen heranzuziehen, die über ihre Aufgabe besonders belehrt werden müssen. Warnposten sind mit roten Fahnen, Armbinden, Funkgeräten und Schutzhelmen auszustatten. Befinden sich elektrische Leitungen, Bahn-, Seil-, Sende- oder Radaranlagen im Streubereich, ist der jeweilige Anlagenbetreiber zu verständigen, um die notwendigen Maßnahmen gemeinsam zu veranlassen.

Streubereich mit Warnposten absperren!

Sprengstoffe und Zündmittel

Verwenden Sie nur Sprengstoffe und Zündmittel, die behördlich zugelassen und in ordnungsgemäßem Zustand sind. Überprüfen Sie vor der Ausgabe den ordnungsgemäßen Zustand. Verdorbene Sprengstoffe und schadhafte Zündmittel müssen ausgeschieden und sachgemäß vernichtet werden.

Nur zugelassene Stoffe und Mittel in ordnungsgemäßem Zustand verwenden!



Sprengstoffe

Pulversprengstoffe

- Schwarzpulver

brisante Gesteinssprengstoffe

- gelatinöse Sprengstoffe,
- Emulsionssprengstoffe,
- pulverförmige Sprengstoffe,
- Wettersprengstoffe,
- plastischer Sprengstoff,
- ANFO-Sprengstoffe

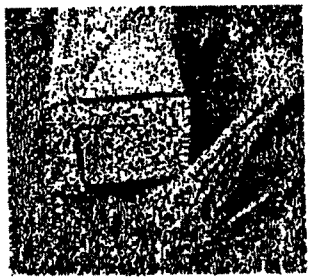
Initialsprengstoffe

- Ausschließlich in Zündmitteln enthalten

Zündmittel

Sprengkräftige Zündmittel

- Sprengkapsel
- Sprengschnur
- Sprengverzögerer
- Elektrischer Sprengzünder (Moment- und Zeitzünder)
- Elektronischer Sprengzünder
- Shock-Star-Zündsystem



Elektrische Zünder

Nicht sprengkräftige Zündmittel

- einfacher elektrischer Zünder
- Zeitzündschnüre
- Oberflächenverzögerer für das Shock-Star-Zündsystem

Zündschnur

Besonderheiten bei Zündmitteln

Zündmittel müssen grundsätzlich schonend behandelt werden. Darüber hinaus sind sie vor Frost, Feuchtigkeit und Nässe zu schützen.

Jeder elektrische Zünder ist vom Sprengbefugten nach Übernahme mit einem zugelassenen Zündkreisprüfer außerhalb des Lagers auf den Zünderwiderstand zu prüfen. Sprengkapseln müssen vor ihrer Verwendung vom Sprengbefugten durch Sichtkontrolle geprüft werden.

Zündkapseln

Zulässige Zündungsarten

Bohrlochtiefe bis 3,0 m	alle Zündarten
Bohrlochtiefe mehr als 3,0 m	elektrische Zündung, Sprengschnur, Shock-Star-Zündsystem

Maßnahmen bei elektrischen Zündern

In einer Zünderkette nur gleichartige Zünder verwenden!

Werden elektrische Zünder zu einer Zünderkette zusammengeschlossen, sind sie hintereinander zu schalten. In einer Zünderkette dürfen nur gleichartige Zünder verwendet werden, wie hoch unempfindliche Zünder (= HU-Polex-Zünder) oder unempfindliche Zünder (= U-Fiduz-Zünder).

Die Auswahl der Zündmaschine richtet sich nach Zündertype, Anzahl der Zünder und Gesamtwiderstand des Zündkreises.

Der Widerstand des Zündstromkreises darf den auf der Zündmaschine angegebenen höchstzulässigen Widerstand (Grenzwiderstand) nicht übersteigen.

Geräte, Hilfsmittel und Werkzeuge

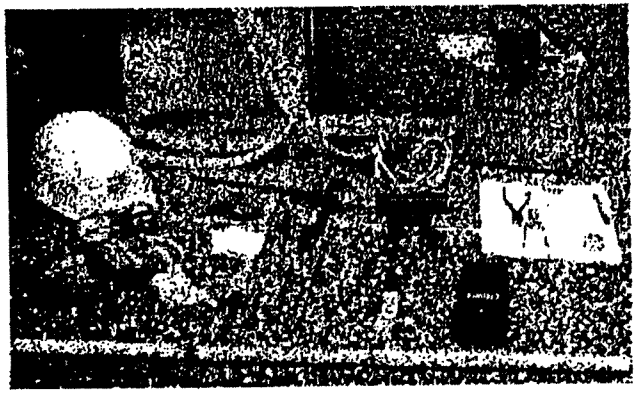
Alle Geräte und Hilfsmittel müssen in ordentlichem Zustand sein. Zündmaschinen und ihre Prüfgeräte, Zündkreisprüfer und Geräte für das Einbringen von Sprengstoffen bzw. des Besatzes (z. B. Pressluftgerät, Übersteckhülsen, Sprengkapselzangen, Ladeschläuche) sowie Sonderverpackungen für Sprengstoffe müssen behördlich zugelassen sein. Ladestöcke aus Holz und Räumkratzen aus nicht Funken ziehendem Material sind davon ausgenommen.

Werkzeuge und Hilfsmittel für Pulversprengmittel müssen aus nicht Funken ziehendem Material (Holz, Aluminium, Zink etc.) bestehen.

Erlaubt ist der Gebrauch von

- Zangen und Schraubenziehern zum Öffnen der Behälter
- Messern zum Schneiden der Zeitzündschnüre und Sprengschnüre (Holzbrett als Schneidunterlage)
- Sprengkapselzangen zum Anwürgen der Sprengkapseln

Beim Hantieren mit Sprengmitteln dürfen stählerne Werkzeuge wie Hämmer und Brecheisen nicht verwendet werden.



Geräte, Hilfsmittel und Werkzeuge

Transport

Transport von Sprengstoffen und Zündmitteln auf öffentlichen Verkehrswegen

Sprengstoffe und Zündmittel auf keinen Fall in der Kleidung tragen!

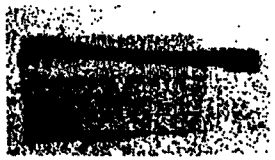
Wenn Sprengstoffe und Zündmittel in Verkehrsmitteln, wie Eisenbahnen, Seilbahnen, Schrägaufzügen oder generell Motorfahrzeugen transportiert werden, beachten Sie die Bestimmungen der Sprengarbeitenverordnung sowie die Bestimmungen der ADR (Europäisches Übereinkommen über die internationale Beförderung gefährlicher Güter auf der Straße) und GGBG (Gefahrgutbeförderungsgesetz).

Transport von Sprengstoffen und Zündmitteln vom Lager zur Sprengstelle

Transportieren Sie Sprengstoffe und Zündmittel entweder mit geeigneten Tragmitteln in ungeöffneter Lieferverpackung oder in verschlossenen Behältern aus nicht Funken ziehendem Material mit Schultertrageband (Schießkiste). Trennen Sie außerdem Zündschnuranzünder von Sprengstoffen und anderen Zündmitteln für den Transport.

Sprengstoffe und Zündmittel dürfen Sie auf keinen Fall in der Kleidung tragen, auch nicht in geringsten Mengen!

Grundsätzlich dürfen Sprengstoffe und Sprengschnüre einerseits und sprengkräftige Zündmittel andererseits nie von einer Person oder im selben Fahrzeug oder im selben Fördergefäß transportiert werden.



Schießkisten

Ausnahme - Transport mit Schießkiste:
In einem Behälter aus nicht Funken ziehendem Material (Schießkiste) dürfen 5 kg Sprengstoff und 1 Rolle Sprengschnur sowie 50 Stück sprengkräftige Zünder in verschiedenen Abteilen dieses Behälters transportiert werden.

Lagerung, Ausgabe und Aufbewahrung

Lagerungsbestimmungen

Grundsätzlich dürfen Sie Pulversprengstoffe nicht mit brisanten Sprengstoffen und Sprengschnüren gemeinsam lagern. Aber auch die Lagerung von Sprengstoffen und Zündmitteln in einem gemeinsamen Lager ist nicht zulässig.

Lagerung von brisanten Sprengstoffen und Sprengschnüren oder Pulversprengstoffen

Zünder und Sprengstoffe immer voneinander trennen!

Bis 5 kg können diese in Räumen, aber unter sicherem Verschluss gelagert werden; in ihrer Nähe dürfen sich weder Feuerstellen noch feuergefährliche Gegenstände befinden.

Über 5 bis 15 kg dürfen nur in Räumen gelagert werden, die folgende bauliche Anforderungen erfüllen:

- ebenerdige Lage,
- direkt ins Freie führende Tür mit Sicherheitsschloss,
- mit Stangen und Drahtgittern gesicherte Fenster,
- feuersichere Decke und
- keine Wohnräume unmittelbar daneben oder darüber.

In diesen Räumen dürfen sich weder Feuerstellen befinden noch feuergefährliche Gegenstände mitgelagert werden.

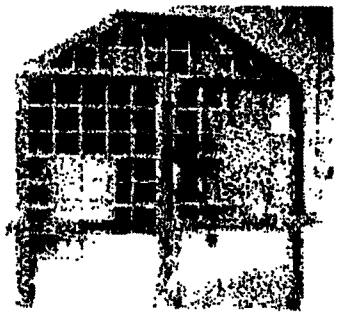
In diesen Räumen dürfen zusätzlich zu den Sprengstoffen und Sprengschnüren höchstens 100 sprengkräftige Zünder gelagert werden. Diese Zünder müssen in einem eigenen, versperrbaren Behälter untergebracht sein, der in möglichst großer Entfernung von den Sprengstoffen und Sprengschnüren steht.

Mehr als 15 kg müssen in eigenen Sprengmittellagern aufbewahrt werden.

Alle Sprengmittellager für eine Menge von mehr als 10 kg Sprengstoff müssen behördlich genehmigt sein.

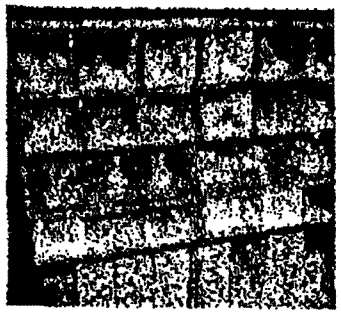
Ausgabe von Sprengmitteln

Sprengmittel müssen in der Reihenfolge ihrer Anlieferung verwendet werden. Jeder Eingang und jede Ausgabe von Sprengstoffen und Zündmitteln muss gewissenhaft in ein Lagerbuch eingetragen werden, sodass Ist- und Sollstand jederzeit übereinstimmen. Kontrollieren Sie diese Übereinstimmung in angemessenen Zeitabständen, mindestens jedoch vierzehntägig.



Zugang zum Sprengmittellager

Sprengstoffe und Zündmittel darf der Sprengbefugte erst unmittelbar vor Beginn des Ladens in der erforderlichen Menge aus dem Lager entnehmen. Beachten Sie, dass Sprengstoffe und sprengkräftige Zünder nicht zur selben Zeit ein und derselben Person ausgefolgt werden dürfen.



Sprengmittellager

Sprengkräftige Zündmittel müssen nach der Ausgabe in geeigneten Behältern aus nicht Funken ziehendem Material aufbewahrt und transportiert werden.

Besondere Lagerungsbestimmungen

Eine Ausnahme bezüglich der auszufolgenden Menge besteht dann, wenn die Sprengarbeiten an einem entlegenen oder unterirdischen Ort zu verrichten sind. In diesen besonderen Fällen darf der voraussichtliche Tagesbedarf an Sprengstoffen und Zündmitteln ausgefolgt werden.

Sprengstoffe und Zündmittel dürfen Sie niemals unbeaufsichtigt frei umherliegen lassen.
Das Abhandenkommen wie auch fehlende Bestände müssen Sie unverzüglich der nächsten Polizei oder Gendarmerie melden.

Verwahren Sie Sprengstoffe und Zündmittel bis zu ihrer Verwendung voneinander getrennt und sichern Sie sie vor Sprengstücken und unbefugtem Zugriff. Die Verwahrung hat in der Nähe der Sprengstelle in einem Tagesmagazin (einem versperrten, trockenen Raum) oder in Schießkisten (festen, dichten und versperrten Behältern) zu erfolgen.

Der Tagesbedarf ist in einem Tagesmagazin oder in Schießkisten zu verwahren.

Es ist verboten, andere Gegenstände als die Geräte und Hilfsmittel für die Sprengarbeit in Schießkisten oder Tagesmagazinen zu verwahren. Den Schlüssel zur Schießkiste oder zum Tagesmagazin hat der Sprengbefugte bei sich zu tragen.

In der Nähe der Schießkisten und Tagesmagazine dürfen sich kein Ofen, keine Feuerstellen und keine feuergefährlichen Gegenstände befinden.

Schießkisten

Sie müssen bei feuchten Bodenverhältnissen entweder einen Doppelboden haben oder auf Holzunterlagen gestellt werden.

Tagesmagazine

Sie müssen von Aufenthaltsräumen und Arbeitsstellen so weit entfernt sein, dass im Falle eines Zündschlages keine Personen gefährdet sind.

Vernichtung

Vernichten Sie verdorbene oder unbrauchbare Sprengstoffe und Zündmittel fachgemäß. Auch nicht fristgerecht verwendete Sprengstoffe oder Zündmittel dürfen Sie nicht mehr verwenden.

Woran man verdorbene Sprengstoffe erkennt.

Kennzeichen verdorbener Sprengstoffe

- Pulverförmige Sprengstoffe sind verdorben, wenn sie feucht oder so hart sind, dass die Patronen mit der Hand nicht mehr weich gedrückt werden können.
- gelatinöse Sprengstoffe sind verdorben, wenn Sprengölausschwitzung durch das Patronenpapier oder andere Zersetzungserscheinungen sichtbar werden.

Durch Kälteeinwirkung hart gewordene gelatinöse, pulverförmige Sprengstoffe und Wettersprengstoffe sind nicht verdorben! Man darf sie trotzdem nicht verwenden, schneiden, reiben, brechen oder drücken. Vor einer Verwendung sind sie schonend aufzutauen. Emulsionssprengstoffe sind bei tiefen Temperaturen sicherheitstechnisch unbedenklich (= nicht empfindlicher als bei normalen Temperaturen).

Woran man unbrauchbare Zündmittel erkennt.

Kennzeichen unbrauchbarer Zündmittel

- Sprengkapsel:
  Verformt oder oxidiert; verschobenes oder verstopftes Innenhütchen; strahlenförmige Zersetzungsstreifen um das Loch des Innenhütchens
- Sprengverzögerer:
  Verformt oder oxidiert; Boden der Schutzhülse beschädigt
- Elektrische Zünder:
  Verformt oder oxidiert; kein Stromdurchgang oder falscher Stromwiderstand
- Zeitzündschnur:
  Geknickt, brüchig oder feucht; chemisch verändert (ölig); Brenndauer liegt nicht zwischen 110 bis 130 Sekunden pro Meter
- Zündschnuranzünder:
  Feucht

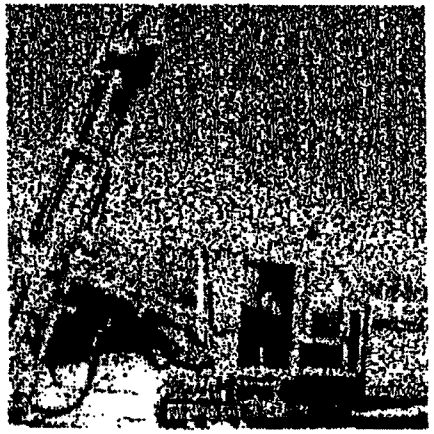
Bohren, Laden, Besetzen

Bohren

Das Führen von Bohrprotokollen ist immer erforderlich. Werden beim Bohren Sachverhalte festgestellt, die für das Laden von Bedeutung sein können, muss der Bohrist den Sprengbefugten darüber informieren. Dies gilt besonders für festgestellte Klüfte und Lassen.

Der Bohrist muss den Sprengbefugten über Auffälligkeiten informieren.

Der Durchmesser der Bohrlöcher für Patronen muss so groß sein, dass diese ohne Gewalt eingeführt werden können. Bei Pulversprengstoffen muss der Mindestdurchmesser 2 cm und die Mindesttiefe 20 cm betragen.



Bohrlefette

Untersuchen Sie Bohrlöcher und andere Laderäume vor dem Laden auf ihre Gängigkeit. Bohrlöcher und Laderäume sind zu reinigen und nötigenfalls zu trocknen. (Steht Pressluft zur Verfügung, sind sie auszublasen.)

Können Hindernisse nicht beseitigt werden, dürfen weitere Bohrlöcher nur in sicherem Abstand zu allenfalls bereits geladenen benachbarten Bohrlöchern angelegt werden.

Laden

Beim Fertigmachen der Ladung sowie beim Laden und Besetzen dürfen nur die unbedingt notwendigen Personen anwesend sein.

Auch zum Laden von Pulversprengstoffen dürfen Sie selbstverständlich nur Geräte und Hilfsmittel aus nicht Funken ziehendem Material verwenden.

Bringen Sie Patronen nicht mit Gewalt in die Laderäume! Wenn Sie dazu Ladestöcke verwenden, müssen diese aus Holz oder aus einem anderen nicht Funken ziehenden Material sein.

Verwenden Sie zum Einbringen von Patronen in Bohrlöcher in klüftigem Gestein auch Rohre oder Rinnen aus nicht Funken ziehendem Material.

Schlagpatronen dürfen nur vom Sprengbefugten und erst am Sprengort in unmittelbarer Nähe der Sprengstelle angefertigt werden. Dasselbe gilt für die Herstellung von Zündpatronen (Verbindung von Sprengstoffpatronen mit Sprengschnüren).

Schlagpatronen erst am Sprengort herstellen.

Zum Vorlochen der Patrone zur Aufnahme der Sprengkapsel oder des Sprengzünders dürfen Sie nur einen geeigneten Dom aus Holz oder aus einem anderen nicht Funken ziehenden Material verwenden. Der Sprengzünder ist vollständig in den hergestellten Hohlraum zu führen. Bei Sprengkapseln darf das mit der Zündschnur verbundene Ende jedoch nur so weit eingeführt werden, dass die Zündschnur den Sprengstoff nicht berührt.

Verhindern Sie das Herausrutschen der Sprengkapsel oder des elektrischen Zünders aus der Schlagpatrone durch Anbinden der Patrone oder durch Schlaufen der Zünderdrähte an der Patrone.

Werden verschiedene Sprengstoffe in ein und derselben Ladung/Ladesäule verwendet, muss zum Anfertigen der Schlagpatrone der brisanteste Sprengstoff eingesetzt werden.

Schlag- und Zündpatrone nicht im freiem Fall ins Bohrloch einbringen.

Schlagpatronen sind besonders vorsichtig und einzeln in das Bohrloch einzubringen. Es ist verboten, sie in Laderäume lediglich hinabfallen zu lassen. Dasselbe gilt für Zündpatronen und für Schwarzpulverpatronen.

Sonstige beim Laden stecken gebliebene Patronen muss der Sprengbefugte entweder durch eine aufgesetzte Schlagpatrone beseitigen oder vorsichtig mit der Räumkratze oder durch Ausblasen mit dem Blasrohr entfernen.

In nassen Bohrlöchern oder Lassen dürfen Sie nur hiefür geeignete Zeitzündschnüre, Sprengzünder und Sprengstoffe verwenden. Verbindungen sind so abzudichten, dass keine Feuchtigkeit eindringen kann. Kesseln und Schnüren ist nur in genügend festem Gestein erlaubt. Dabei dürfen die Bohrlöcher und Lassen erst nach einer Wartezeit von einer Stunde nach dem letzten Schuss wieder geladen werden. Steht Pressluft zur Verfügung, verkürzt sich diese Wartezeit. Sowohl beim Kesseln als auch beim Schnüren muss zunächst 15 Minuten gewartet werden. Danach sind die Bohrlöcher beim Kesseln 5 Minuten lang, beim Schnüren 15 Minuten lang auszublasen. (Die Pressluftlanze muss aus nicht Funken ziehendem Material sein.)

Ladestock

Die Warte- und Ausblasezeiten sind vom Sprengbefugten mit der Uhr zu messen. Dieselben Bestimmungen über Warte- und Ausblasezeiten gelten auch für das Einbringen der Hauptladung.

Tätigkeiten nach dem Laden

Entfernen Sie nach dem Laden übrig gebliebene Sprengstoffe und Zündmittel sofort vom Sprengort und verwahren Sie diese in sicherer Entfernung (Schießkiste).

Insbesondere dürfen sie nicht von Sprengstücken getroffen werden können. Übrig gebliebene Schlagpatronen und Zündpatronen muss der Sprengbefugte entschärfen oder abtun. Geräte und Hilfsmittel sind nach dem Laden von Sprengstoffresten zu reinigen.

Besetzen

Zum Besetzen von Sprengladungen dürfen Sie grundsätzlich nur Materialien verwenden, die keine Funken ziehen. Es eignen sich also Materialien wie Lehm, Letten, steinfreie Erde, Sand oder Split. Sprengladungen aus feuchtigkeitsunempfindlichen Sprengstoffen und Zündmitteln dürfen auch mit Wasser besetzt werden. Geben Sie einen Papierpfropfen zwischen Sprengstoff und Besatz, wenn

- loser Pulversprengstoff geladen oder
- die Schlagpatrone als letzte aufgebracht wird.

Wenden Sie beim Besetzen keine Gewalt an. Zum Besetzen dürfen nur Ladestöcke aus nicht Funken ziehendem Material oder zugelassene Gerätetypen verwendet werden.

Besonderheiten bei aufziehendem/niedergehendem Gewitter

Bei aufziehendem Gewitter darf bei Sprengung mit elektrischer Zündung ober und knapp unter Tag weder geladen noch besetzt werden. Zündfertige Ladungen sind so rasch wie möglich abzutun.

Bei schlechter Sicht darf auf keinen Fall gesprengt werden!

Bei niedergehendem Gewitter ist unabhängig von der Art der Zündung jede Sprengarbeit einzustellen. Können Sprengladungen nicht mehr zeitgerecht abgetan werden, muss der Sprengbefugte das 1. Sprengsignal und damit die Räumung des Streubereiches veranlassen. Halten Sie den Streubereich so lange abgesperrt, wie die Gefahr einer Zündung durch Bützschlag besteht.

Bei schlechter Sicht
Bei Nebel oder Nacht darf auf keinen Fall gesprengt werden.

Zünden und Sprengsignale

Zündung einer unterbrochenen Ladung
Wurden in einen Laderaum brisante Sprengstoffe in Teilladungen eingebracht und wurde der Raum zwischen den Teilladungen nicht mit Besatzmaterial ausgefüllt (unterbrochene Ladung), ist vorzugsweise mit Sprengschnur zu zünden, oder es muss jede Teilladung mit Sprengzündern gezündet werden.

Zündung bei geteilter Ladung
Wurde der Raum zwischen den Teilladungen mit Besatzmaterial ausgefüllt (geteilte Ladung) und soll mit Verzögerung gezündet werden, so muss der Zwischenbesatz ausreichend lang sein, um Zündüberschläge zu vermeiden.

Bei elektrischer Zündung ohne Sprengschnur ist jede Teilladung mit einer Schlagpatrone zu versehen. Es dürfen nur elektrische Moment- oder Millisekundenzünder verwendet werden.

Bei Zündung mit Sprengschnur muss diese an jeder Teilladung anliegen.

Werden Sprengverzögerer verwendet, sind diese im Zwischenbesatz anzuordnen. Sie müssen außerdem vor Beschädigung geschützt sein, wie durch Überschubhülsen, die mit der Sprengschnur fest verbunden sind.

Besonderheiten bei Zeitzündschnur-Zündung

Die Zündung mit Zeitzündschnur sollte auf Einzelschüsse beschränkt bleiben.

Zeitzündschnüre müssen mindestens 1 m lang sein und mindestens 20 cm aus den Bohrlöchern ragen. Werden

Zündschnuranzünder verwendet, darf eine Person höchstens 10 Zündungen vornehmen und dies nur dann, wenn die Zündstellen nahe beieinander liegen und leicht erreichbar sind.

Ist dies nicht der Fall, darf eine Person höchstens 4 Zündungen vornehmen. Wird als Zündschnuranzünder eine gekerbte Zeitzündschnur (Kerbschnur) verwendet, so darf sie höchstens halb so lang sein wie die kürzeste der anzuzündenden Zeitzündschnüre.

Beim Zünden dürfen nur die unbedingt notwendigen Personen anwesend sein.

Wenn zum Zünden mehrere Personen notwendig sind, dürfen sich ihre Wege nicht kreuzen. Achten Sie als Sprengbefugter darauf, dass alle Personen mit dem Zünden gleichzeitig beginnen. Beim Zünden dürfen nur die unbedingt notwendigen Personen anwesend sein.

Zündung mit Sprengschnur und Sprengverzögerer
Bei Zündung mit Sprengschnur dürfen sich in den Sprengladungen keine Sprengkapseln befinden. Bei Bohrloch- und Lassensprengungen muss die Sprengschnur bis zum Bohrlochtiefsten oder Lassentiefsten geführt werden.

Sprengverzögerer sind mit Sprengschnüren zu zünden. Bei Verwendung außerhalb von Laderäumen müssen sie in der Leitsprengschnur (das ist die unmittelbar zur Detonation gebrachte Sprengschnur) so angeordnet werden, dass die Wirkungsweise der Verzögerer nicht beeinträchtigt wird.

Verzögerer müssen außerdem so verlegt werden, dass sie unbeabsichtigt weder beschädigt noch zur Detonation gebracht werden können (Sicherheitsdatenblatt und mitgeliefertes Sprengstoffmerkblatt beachten!). Sie sollen diese Verzögerer zur Minimierung des auftretenden Schalles mit Sand oder Bohrmehl abdecken.

Sprengsignale
Sprengsignale müssen von allen anderen Signalen klar unterscheidbar und im notwendigen Umkreis hörbar sein. Sie dürfen nur nach Weisung des Sprengbefugten gegeben werden. Die Geräte für Sprengsignale dürfen zu keinen anderen Zwecken benützt werden.

Bei Sprengungen über Tag sind drei Sprengsignale zu geben, deren Bedeutung durch Anschlag bekannt zu geben ist:

Erstes Sprengsignal —
1 langer Ton
Deckung aufsuchen.
Streubereich räumen

Zweites Sprengsignal — —
2 kurze Töne
Zünden

Drittes Sprengsignal — — —
3 kurze Töne
Sprengung beendet

Sprengablauf
Das erste Sprengsignal ist zu geben, wenn

- das Laden und Besetzen beendet ist und alle Schüsse zum Zünden vorbereitet sind (Zünderkette geschlossen, Zündleitung geprüft und mit der Zünderkette verbunden; Sprengschnur verlegt, Sprengverzögerer eingebaut, Sprengkapsel oder elektrischer Sprengzünder befestigt);
- die vorgeschriebene Sprengzeit eingehalten wird;
- bei Gewitter die Sprengladungen nicht mehr abgetan werden können.

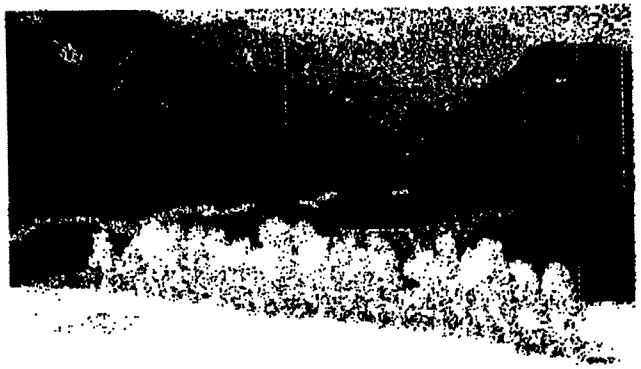
Das **zweite** Sprengsignal ist zu geben, wenn

- sich mit Ausnahme der zum Anzünden notwendigen Personen keine weiteren Personen im Streubereich oder außerhalb der Deckung befinden;
- bei elektrischer Zündung die Anlage auf ihren Gesamtwiderstand geprüft und in Ordnung befunden wurde.

Zündleitungen und Zündmaschine dürfen erst nach dem zweiten Sprengsignal vom Sprengbefugten miteinander verbunden werden. Es ist dann sofort zu zünden. Nach erfolgter Zündung hat der Sprengbefugte den Zündmaschinenschlüssel sofort wieder persönlich zu verwahren.

Widerstandsprüfung

Bei Zündung mit Zeitzündschnur haben sich nach dem Anzünden alle daran Beteiligten unverzüglich in Deckung zu begeben oder den Streubereich zu verlassen.



Einwandfreie Zündung

Das **dritte** Sprengsignal ist zu geben

- bei Sprengung mit Zeitzündschnüren, wenn alle Schüsse einwandfrei gezählt wurden;
- bei Zündung mit elektrischen Moment- oder Zeitzündern und bei Sprengung mit Sprengschnur sowie Shock-Star-Zündung, nachdem der letzte Schuss gekommen ist;
- bei allen übrigen Sprengungen 15 Minuten nach dem Kommen des letzten Schusses;
- wenn ein Schuss versagt, ausgeblasen oder ausgekocht hat oder Zweifel darüber bestehen, ob alle Schüsse ordnungsgemäß gekommen sind, sobald der Sprengbefugte auf Grund einer Besichtigung der Ansicht ist, dass keine Gefahr mehr besteht.

Ein solche Besichtigung darf frühestens 15 Minuten nach dem Zeitpunkt vorgenommen werden, an dem der letzte Schuss bei ordnungsgemäßer Zündung hätte kommen müssen. Der Ablauf der Wartezeiten ist vom Sprengbefugten mit der Uhr festzustellen.

Zwischen dem zweiten und dritten Sprengsignal darf außer dem Sprengbefugten niemand die Deckung verlassen oder den Streubereich betreten.

Versagerbeseitung

Richtiges Verhalten bei Versagern
Auch nach dem 3. Sprengsignal darf sich nur der Sprengbefugte an der Sprengstelle aufhalten. Er hat die Versager auffällig zu kennzeichen und nicht detonierte Sprengstoffe zu bergen. Alle weiteren Sicherheitsvorkehrungen sind zu treffen, wie die Warnung der im Betrieb Beschäftigten, die Absperrung des Streubereiches und die Bewachung.

Bei Schichtbetrieb obliegt die Untersuchung und Sicherung des Sprengortes der Belegschaft der abgehenden Schicht. Kann sie die damit verbundenen Arbeiten innerhalb ihrer Schicht nicht mehr oder nicht mehr ganz verrichten, so muss der Sprengbefugte der abgehenden Schicht seinen Ablöser direkt am Sprengort über den Stand der Arbeiten informieren.

Besondere Vorsicht vor Sprengstoff- oder Zündmittelresten!

Die Beseitigung von Versagern durch daneben gesetzte Hilfsschüsse ist verboten! Das Nach- oder Tieferbohren von Bohrlochpfeifen sowie stehengebliebenen Bohrlöchern und Lassen ist verboten (Lebensgefahr durch Sprengstoff- oder Zündmittelreste!)

Um Versager zu beseitigen, entfernen Sie zuerst den Besatz. Die stehengebliebene Ladung ist im Anschluss daran mit einer neuen Schlagpatrone abzutun. Dies gilt auch für Ladungen, über denen sich von vornherein kein Besatz befindet. Hier ist die neue Schlagpatrone bis auf die Ladung zu führen. Dies ist jedoch nur erlaubt, wenn keine Steinfluggefahr besteht.

Versager in Bohrlöchern oder Lassen können Sie auch dadurch beseitigen, wenn Sie die Vorgabe durch auf- oder umgelegte Sprengladungen allmählich beseitigen, bis die Ladung des Versagers mit zur Detonation kommt. In diesem Fall ist ein vergrößerter Streubereich festzulegen.

Nach dem Abtun von Versagern sind das Haufwerk und seine Umgebung nach Sprengstoff- und Zündmittelresten abzusuchen. Eventuelle Funde müssen dem Sprengbefugten übergeben werden.

Möglichkeiten der Besatzentfernung

Wichtig! Wie man den Besatz richtig entfernt.

Bei voll besetzten Laderäumen mit brisanten Sprengstoffen
Besatz mit Pressluft ausblasen oder mit Räumkratze gänzlich entfernen, bei wasserunempfindlichen Sprengstoffen auch mit Wasser ausspülen. Auf die stehen gebliebene Ladung neue Schlagpatrone aufsetzen, wieder besetzen und abtun.

Bei voll besetzten Bohrlöchern mit Pulversprengstoffen
Ganzen Besatz einschließlich Papierpfropfen mit Räumkratze aus nicht Funken ziehendem Material entfernen, neues Zündmittel mit etwas Sprengstoff einführen, wieder besetzen und abtun.

Das Ausblasen des Besatzes mit Pressluft ist erlaubt, wenn durch den Papierpfropfen das Ausblasen von Pulversprengstoff sicher verhindert wird.

Gesundheitsvorsorge

Damit Sie gesund bleiben!

1. Bei Sprengarbeiten besteht Rauchverbot und Alkoholverbot.
2. Sprengöl kann durch die Haut aufgenommen werden. Maßnahmen dagegen sind:
   - Schutzhandschuhe verwenden;
   - mit beschmutzten Händen nicht essen, rauchen oder trinken.
3. Sprengöldämpfe nicht einatmen. Auf erhöhten Standplätzen zusätzlich Absturzsicherung berücksichtigen. (Durch Sprengöldämpfe besteht die Gefahr der Bewusstlosigkeit.)
4. Gelbbraune Sprengschwaden sind schwerer als Luft und extrem gesundheitsschädlich. Sorgen Sie für ausreichende Belüftung, bevor Sie den Sprengort betreten.

Gelbbraune Sprengschwaden

Ausrüstung komplett?

Was ein Sprengbefugter alles braucht

- ☐ Schutzhelm, Schutzhandschuhe, Gehörschutz, Sicherheitsschuhe
- ☐ Tragbehälter mit Schloss (Schießkiste)
- ☐ Kugelschreiber, Notizblock
- ☐ Kreide oder Farbe
- ☐ Sprengbuch
- ☐ Meterstab
- ☐ Taschenmesser
- ☐ Holzdorn
- ☐ Isolierband (Bindfaden, Isolierdraht)
- ☐ Sprengkapselzange (Anwürgeapparat)
- ☐ Zündschnuranzünder (Streichhölzer)
- ☐ Ladestock
- ☐ Signalgeräte (Funkgerät, rote Flaggen, Horn)
- ☐ Warnkleidung
- ☐ Räumkratze
- ☐ Zündkreisprüfer
- ☐ Zündmaschinenprüfgerät
- ☐ Uhr
- ☐ Markierungsspray

Gesetzliche Grundlagen

Arbeitnehmerinnenschutzgesetz

Sprengarbeitenverordnung

Allgemeine Bergpolizei-Verordnung

Steinbruchverordnung

Bauarbeiterschutzverordnung

Verordnung über den Nachweis der besonderen Fachkenntnisse

Verordnung über die Beschäftigungsverbote und -beschränkungen für Jugendliche

Schieß- und Sprengmittelgesetz

Schieß- und Sprengmittel-Monopolsverordnung

Sprengmittelzulassungsverordnung für den Bergbau

Gefahrgutbeförderungsgesetz für Straße

Gefahrgutbeförderungsgesetz für Eisenbahn

ADR

Notizen

Information Brochure for New Hires

SICHER
GESUND
UMWELTBEWUSST
arbeiten bei der STRABAG AG

SGU-Einführungsbroschüre für
neue STRABAG-Mitarbeiter

STRABAG

STRABAG

INHALT

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Den Beauftragten für Sicherheitsfragen erreichen Sie in Wien über
Telefon 01 / 49 112 – 4413 Telefax DW - 4403
Mobil 0664 / 240 95 43
email johannes.pestal@strabag.at

1 Vorwort

Diese SGU-Broschüre ist eine Hilfestellung für unsere neuen Mitarbeiter, um bei der STRABAG AG Sicher, Gesund und Umweltbewusst zu arbeiten.

Wir nehmen Sicherheit und Gesundheit in unserem Unternehmen sehr ernst und setzen uns nachdrücklich für den Schutz der Umwelt ein. Aus diesem Grund wurden von den Geschäftsleitungen in der Erklärung zur SGU-Politik ausdrücklich die folgenden Grundsätze formuliert:

1. Verhindern aller persönlichen Schäden

Sicher arbeiten bedeutet, dass man Gefahren erkennt und man sich selbst sowie seine Kollegen davor schützt. Lassen Sie sich darüber stets von Ihren Vorgesetzten, erfahrenen Kollegen und Auftraggebern informieren.

Ein hohes Sicherheitsbewusstsein wird von allen erwartet und wird auch gefördert. Um Unfälle zu verhindern, sind bei allen Arbeiten nur die sichersten Verfahren mit der entsprechenden Sorgfalt anzuwenden.

2. Verhindern von Gesundheitsschäden

Um Gesundheitsschäden vorzubeugen, sind Ordnung, Sauberkeit und Hygiene von außerordentlicher Bedeutung. Alle Baustellen sind so eingerichtet, dass gefahrlose Bedingungen dort stets eingehalten werden. Benutzen Sie grundsätzlich nur die sanitären Einrichtungen.

3. Verhindern von Schäden an der Umwelt

Ein Anliegen unseres Unternehmens ist es, umweltbewusst zu arbeiten. Die Abfallvermeidung spielt dabei eine wichtige Rolle. Alle Abfälle gehören in die dafür bereitgestellten Behälter und nicht daneben.

Sicherheits-, Gesundheits- und Umweltbewusstsein sind Aspekte, die jeden betreffen, ständig zu beachten und in einer Gemeinschaft erforderlich sind. Die Ziele können nur dann verwirklicht werden, wenn jeder Mitarbeiter dafür eintritt und sich persönlich Verantwortlich zeigt.

SGU - Eine Sache, die jeden angeht

Wir wünschen Ihnen eine sichere, gesunde und erfolgreiche Zukunft bei der STRABAG AG

Die Unternehmensleitung

STRABAG

Hochbau

W / NÖ / Bgld	OÖ / S	T / V	K	Stmk
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Straßenbau

W / NÖ / Bgld	OÖ / S	T / V	K	Stmk
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Tunnel und Ingenieurtiefbau

Österreichweit

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

BMTI

W / NÖ / Bgld	OÖ / S	T / V	K	Stmk
alle Standorte	alle Standorte	alle Standorte	alle Standorte	alle Standorte
Saudecky	Saudecky	Saudecky	Saudecky	Saudecky

Dir. 30, A&B, KAB, OAT, Bitunova

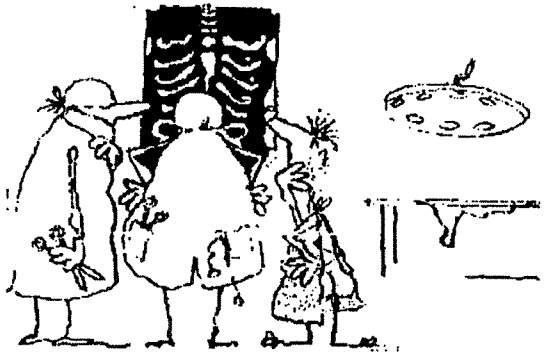
Österreichweit

W / NÖ / Bgld	OÖ / S	T / V	K	Stmk
alle Standorte die regional zuständige SGU	alle Standorte die regional zuständige SGU	alle Standorte die regional zuständige SGU	alle Standorte die regional zuständige SGU	alle Standorte die regional zuständige SGU

Bürogebäude, Labor etc.

W / NÖ / Bgld	OÖ / S	T / V	K	Stmk
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Unglücke passieren nicht von allein.
Schauen Sie nach vorn und
überlegen Sie, was Sie als nächstes tun!



Qualität heißt MITDENKEN!

2 Allgemeine Sicherheitsvorschriften

Das Tragen von **Schutzschuhen** und Schutzausrüstung ist Pflicht. Sofern ein Risiko für Kopfverletzungen besteht, etwa durch herunterfallende Geräte, Materialien oder durch Anstoßen, ist das Tragen eines **Schutzhelms** ebenfalls Pflicht.

Je nach Art der Arbeit ist der Gebrauch persönlicher Schutzausrüstung vorgeschrieben und **verpflichtend**:

- Tragen von **Schutzbrillen**, um die Augen vor umherfliegenden Gegenständen zu schützen
- Tragen von **Handschuhen**, um Verletzungen an den Händen zu vermeiden (nicht aber an Kreissägen)
- Tragen von **Ohrenschützern** bei starkem Lärm

Halten Sie **Ordnung und Sauberkeit** auf der Baustelle und in den Containern. Halten Sie Durchgänge, Verkehrswege und Zufahrten frei!

Lassen Sie NIEMALS eine Baugrube oder einen Kanalgraben zurück, ohne eine gut erkennbare Abgrenzung und Beleuchtung anzubringen. Alle Öffnungen auf der Baustelle müssen ordnungsgemäß abgedeckt werden.

Allgemeine Schutzmaßnahmen gegen den Absturz von hohen Arbeitsplätzen wie Gerüste, Leitern, Fassaden, Treppengeländer sind:

- unmittelbar dort anzubringen, wo dies erforderlich ist
- NIE ohne Erlaubnis zu entfernen.

Elektrische Defekte an Geräten, Maschinen oder Verlängerungskabeln müssen **unmittelbar** dem direkten Vorgesetzten gemeldet werden. Der weitere Gebrauch ist nicht zulässig.

Verwenden Sie nur **Leitern**, die sich in ordnungsgemäßem Zustand befinden. Es werden nur Leitern in ausreichender Länge benutzt. Diese müssen stets oben befestigt werden.

Verwenden Sie an den Kranen nur geprüfte Hebezeuge, Seile und Ketten. Prüfberichte liegen auf den Baustellen stets vor. Geben Sie dem Kranführer oder dem Fahrer von anderen Geräten NIEMALS mit 2 Personen gleichzeitig Anweisungen.

Sauerstoff- und Gasflaschen sind immer **aufrecht** zu stellen und festzubinden. Defekte an der Ausrüstung von Brennern oder Verbindungsvorrichtungen sind sofort dem Vorgesetzten zu melden.

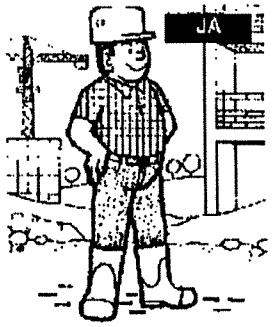
Benutzen Sie auf fahrenden Baumaschinen nur die Sitzplätze, die dafür vorgesehen sind. Halten Sie an Gabelstaplern / Ladern während der Fahrt die Hebevorrichtungen immer so dicht wie möglich am Boden. Parken sie auch in dieser Stellung.

Maschinen dürfen ausschließlich von dazu befugten, beauftragten und angeleiteten Personen bedient werden.

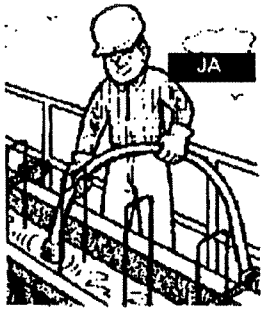
Auf den Baustellen der STRABAG gilt absolutes Alkoholverbot.

Vermeiden Sie jede Handlung, die entweder Sie
oder Ihre Kollegen einer Gefahr aussetzt.
Beseitigen Sie alle gefährlichen Situationen unverzüglich
oder melden Sie diese Ihrem Vorgesetzten !

Neben diesen allgemeinen Sicherheitsvorschriften der STRABAG kann jedes Projekt noch weitere eigene Projektvorschriften haben. Hierüber werden Sie vor Beginn Ihrer Arbeit ausführlich informiert.

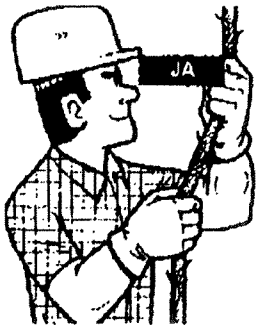


Mit persönlicher Schutzausrüstung (PSA) können Sie Verletzungen an Kopf, Händen, Füßen und Augen vorbeugen.



Gute Arbeitshandschuhe schützen vor

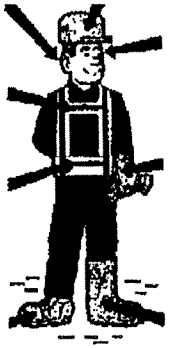
- Stich- und Schnittwunden
- Hautkrankheiten



3 Persönliche Schutzausrüstung (PSA)

STRABAG ist stets bestrebt, durch die Anwendung sicherer Arbeitsverfahren und den Einkauf von sicheren Baugeräten Risiken soweit wie möglich auszuschließen.

Falls Risiken nicht völlig ausgeschlossen werden können, werden wann immer möglich technischen Schutzmaßnahmen der Vorzug gegeben. Letztendlich liegt es in der Verantwortung jedes einzelnen, seine persönliche Schutzausrüstung zu tragen.



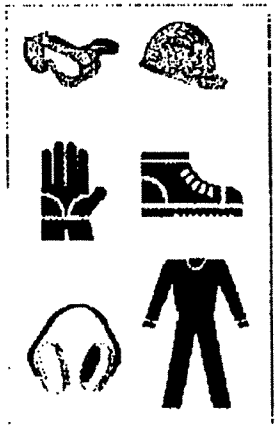
Der Betrieb stellt Ihnen folgende Ausrüstung zur Verfügung:

- Sicherheitsschuhe
- Schutzhelm
- Handschuhe

Diese Ausrüstung soll Sie vor den häufigsten Risiken auf einer Baustelle schützen. Tragen Sie diese dann auch! Sie sind dazu verpflichtet.

Daneben sollten für spezielle Arbeiten zusätzlich passende persönliche Arbeitsschutzmittel getragen werden z B. Sicherheitsbrille und Gehörschutz.

Alle erforderlichen Arbeitsschutzmittel müssen stets vollständig auf der Baustelle vorhanden sein.



4 Gebots- und Warnhinweise

Gebotsschilder können zum Beispiel angeben, welche persönliche Schutzausrüstung verpflichtend zu tragen ist.

Runde Form – weiss auf blauem Hintergrund

Verbotsschilder weisen auf Handlungen hin, die verboten sind.

Runde Form – schwarz auf weißem Hintergrund mit rotem Rand/Balken

Nicht rauchen

Zutritt verboten

Warnschilder weisen Sie auf eine mögliche Gefahr hin.

Dreieck – schwarz auf gelbem Hintergrund

Gefahr vor elektrischer Spannung

Entzündbare Stoffe

Warnung vor hängenden Lasten

5 Ordnung, Sauberkeit und Hygiene

Ordnung und Sauberkeit sind die Visitenkarte jeder Baufirma!

Zum Ende der Arbeiten, auch bei der Beendigung des Arbeitstages, sollte darauf geachtet werden, dass die Umgebung aufgeräumt ist.

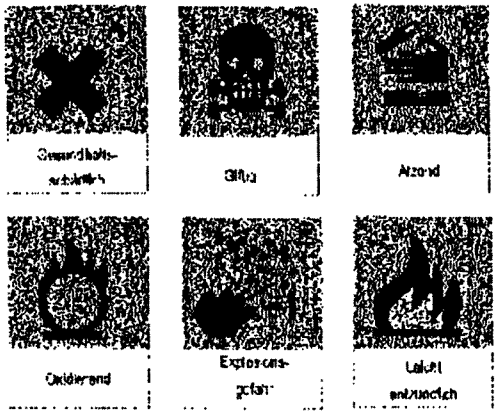
Treppen, die Umgebung von Leitern, Fluchtwegen, Zufahrten sowie der Zugang für Rettungsfahrzeuge müssen stets freigehalten werden.

Halten Sie die Unterkünfte und sanitären Anlagen stets sauber und benutzen Sie die vorgesehenen Abfallbehälter!

6 Gefahrensymbole

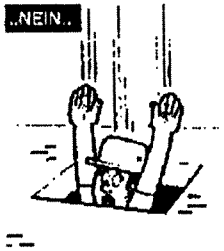
Gefahrensymbole sind notwendig, um auf mögliche Risiken gefährlicher Produkte hinzuweisen. Sie befinden sich auf den Etiketten der entsprechenden Produkte.

Schwarz auf orangem Hintergrund

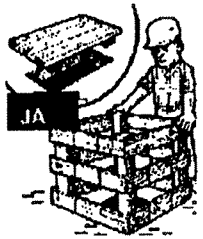


Die nötige Achtsamkeit im Umgang mit diesen Produkten wird von jedem erwartet. Lesen Sie, wenn nötig, die grundlegenden Hinweise auf dem Etikett.

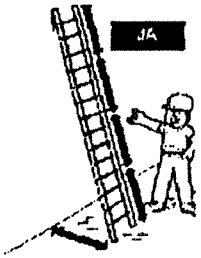
7 Maschinen und Geräte

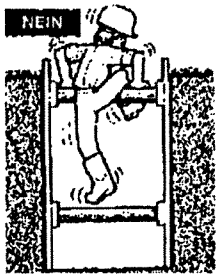


Achten Sie darauf, dass Öffnungen auf der Baustelle ordentlich gesichert sind.

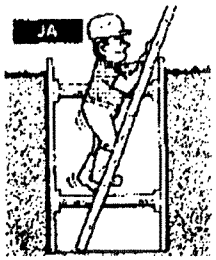


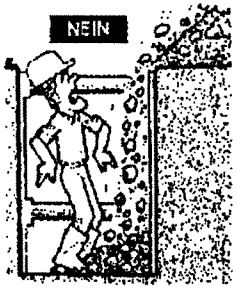
Benutzen Sie Leitern mit ausreichender Länge auf festem Boden



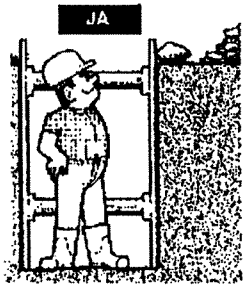


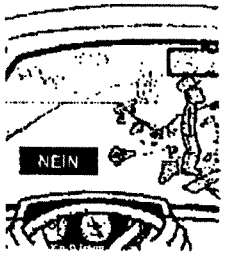
Dies gilt auch für den Ein- und Ausstieg in Gräben.



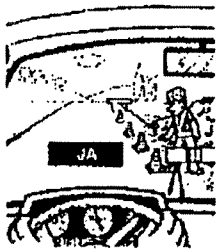


Bei Erdarbeiten besteht die Gefahr, dass Wände einstürzen, deshalb Grubenverbau bis über die Oberfläche führen.

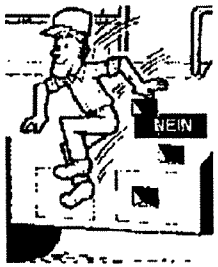




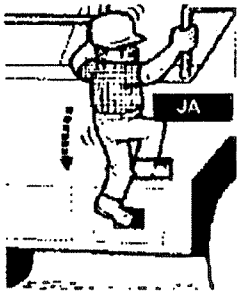
Auf Straßen immer für richtige Absperrung sorgen.

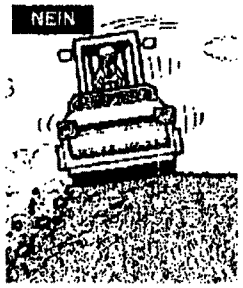


Beim Rückwärtsfahren auf toten Winkel achten, Gefahr für Mitarbeiter.

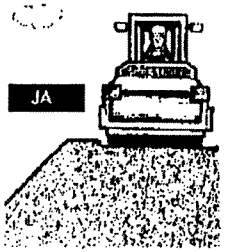


Benutzen Sie die vorgesehenen Tritte, springen Sie nicht ab.

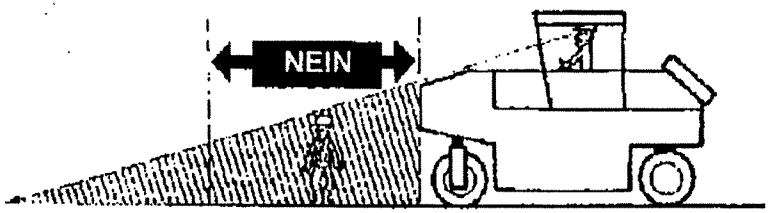


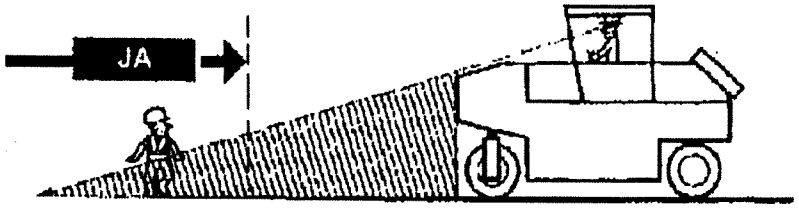


Halten Sie mit Geräten Abstand von Geländekanten.

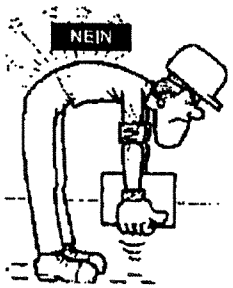


Ordnung und Sauberkeit, für IHRE und MEINE Sicherheit!





Halten Sie sich im Blickwinkel der Maschinenfahrer auf.



Tragen sie Lasten nie mit gebogenem Rücken.

Heben Sie immer aus den Beinen heraus!

Ein Handwerker arbeitet nur mit richtigem Material, das keine Mängel aufweist, und benutzt nur passende Geräte.

Reparaturen an elektrischen Geräten, Kabeln und Maschinen dürfen nur von Elektrofachkräften durchgeführt werden.

Behandeln Sie das Material mit dem nötigen Respekt und lassen Sie nichts herumliegen.

Gebrauchen Sie stets geprüftes Material! Überprüfen Sie Ihren Materialbestand vor Gebrauch:

- Sind Sicherheitsaufkleber angebracht?
- Ist das Prüfdatum noch nicht überschritten?
- Nach Gebrauch immer noch in gutem Zustand?
- Haben Sie Erfahrung mit diesem Material?

Haben Sie eine oder mehrere Fragen mit **NEIN** beantwortet, informieren Sie Ihren Vorgesetzten.

Den Vorgesetzten können Sie nach Gebrauchsanweisungen und Instruktionen fragen.

Beim Gebrauch der Materialien müssen Sie entsprechende Arbeitsschutzmittel tragen (zu erfragen bei den Vorgesetzten).

8 Erste Hilfe bei Unfällen

Ihnen ist ein kleiner Unfall passiert (Schnitt-, Stechwunde,...):

- benachrichtigen Sie Ihren Vorgesetzten
- lassen Sie sich unverzüglich versorgen, auch wenn Ihnen die Wunde unbedenklich erscheint. Sie beugen so möglichen Infektionen vor.

Auf jeder Baustelle ist ein Verbandkasten für Erste Hilfe vorhanden.

Sollten Sie Zeuge eines Unfalls werden

1. Behalten Sie die Ruhe!
2. Rufen Sie selbst bzw. lassen Sie unverzüglich den Vorgesetzten (Sicherheitsbeauftragten) sowie den Ersthelfer rufen.
3. Beheben Sie möglichst rasch die eventuell gefährliche Situation.
4. Lassen Sie das Unfallopfer liegen.
5. Halten Sie Umstehende auf Abstand.
6. Bedecken Sie das Unfallopfer mit einer Decke oder Jacke.

Telefonnummern von hilfeleistenden Ärzten etc. finden Sie am Schwarzen Brett.

9 Brand

Vorbeugen ist besser als löschen!

Was ist im Brandfall zu tun?

Bewahren Sie unter allen Umständen die Ruhe - keine Panik!

ALARM GEBEN

- benachrichtigen Sie unverzüglich den Vorgesetzten, die Feuerwehr und Ihre Kollegen

LÖSCHEN

- nehmen Sie den nächsten Feuerlöscher und versuchen Sie den Brand zu löschen
- gehen Sie kein Risiko ein

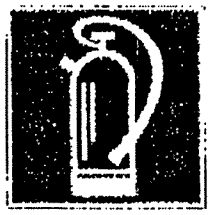
Verlassen Sie das Gebäude / die Baustelle, sobald Sie die Alarmsirenen hören

- begeben Sie sich sofort zum Sammelplatz, wo die Verantwortlichen kontrollieren, ob alle anwesend sind

Feuerlöscher

Das meist gebrauchte Brandlöschgerät auf STRABAG-Projekten ist der Feuerlöscher Typ ABC 6 kg. Wie Sie ihn zu bedienen haben, steht auf dem Etikett am Löscher:

1. Sicherheitsstift herausziehen
2. Hebel vollständig hinein drücken
3. in Flammenfuß richten und den Spritzhebel (Sprühventil) eindrücken



Der ideale Abstand vom Feuerlöscher zum Brand beträgt 3 bis 4 m.

Gebrauchte und beschädigte Geräte müssen direkt ausgetauscht werden.

10 Schlusswort

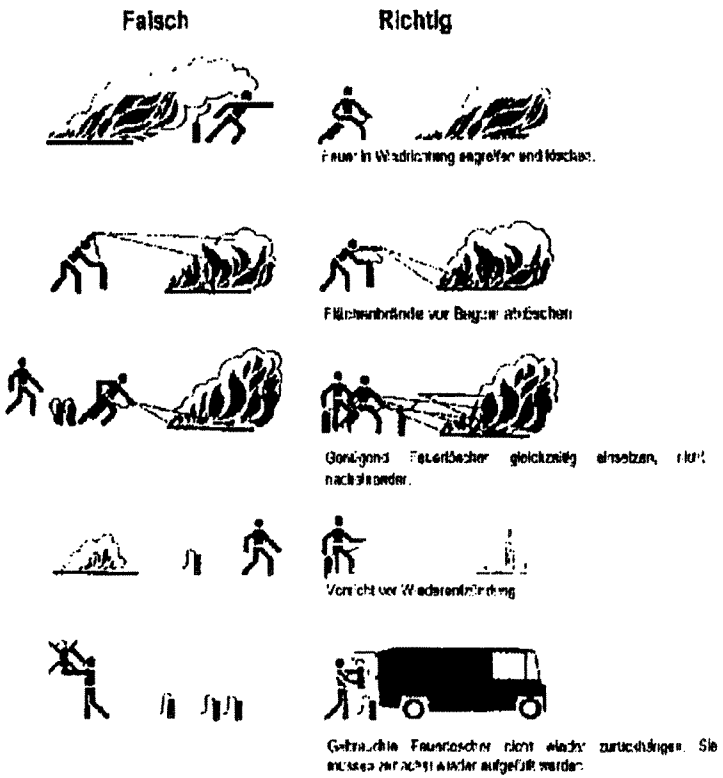
Dies war die erste Information über sicheres, gesundes und umweltbewusstes Arbeiten bei der STRABAG.

Nun liegt es an Ihnen, diese Richtlinien tatkräftig zu befolgen.

Haben Sie noch Fragen? Sie können sich stets an Ihren Vorgesetzten oder die Sicherheitsfachkraft wenden!

Viel Erfolg!

Der Gebrauch von Feuerlöschern:



Strabag Betriebsanweisungen

1. **Geräte zur Herstellung, Transport und Verteilung von Beton**
   1.1. Autobetonpumpen mit Verteilermast

2. **Hebezeuge**
   2.1. Krane
   2.2. Mobilkran / Autokran
   2.3. LKW-Ladekran
   2.4. Arbeitskorb / sonst. Personenaufnahmemittel (PAM)
   2.5. Hubstapler

3. **Geräte zur Erdbewegung und Bodenverdichtung**
   3.1. Seilbagger
   3.2. Hydraulikbagger
      3.2.1. Schnellwechseleinrichtungen
      3.2.2. Heben von Einzellasten mit Bagger und Baggerlader
   3.3. Baggerlader
   3.4. Kleinlader
   3.5. Lade – Planiergeräte
   3.6. Grader
   3.7. Muldenkipper
   3.8. Kleindumper
   3.9. Walzen
   3.10. Radlader

4. **Bohrgeräte**
   4.1. Raupenbohrgerät

5. **Straßenbaugeräte**
   5.1. Straßenfertiger

6. **Geräte für Tunnel – und Stollenbau**
   6.1. Bohrwagen

7. **Sonstige Geräte und Einrichtungen**
   7.1. Bolzensetzgeräte: ÖNORM Z 1541
   7.2. Geräte für autogenes Schweißen und Schneiden: Plakat AUVA
   7.3. Lagerung und Verwendung von Flüssiggasflaschen
   7.4. Sonstige selbstfahrende Arbeitsmittel mit Fahrersitz
   7.5. Handgeführte selbstfahrende Arbeitsmittel
   7.6. Elektrisches Handwerkzeug

Die Betriebsanweisungen sind Bestandteil der Sicherheitsdatenbank im Lotus Notes!

BAGGERLADER

HINWEIS FÜR DEN AUFSICHTSPFLICHTIGEN BAULEITER / POLIER

Für die Bedienung des übernommenen Gerätes sind nur unterwiesene und bereits mit dem Geräte vertraute Arbeitnehmer heranzuziehen. Weiters ist eine gerätebezogene Fahrbewilligung zu erteilen.
Vor der Verwendung eines für den Benützer neuen Gerätes hat dieser die Betriebsanleitung des Herstellers zu lesen oder es ist zumindest eine Unterweisung durch einen bereits mit dem Gerät vertrauten Mitarbeiter zu veranlassen. Besonderes Augenmerk auf fremdsprachige Arbeitnehmer.
Achtung: Kennzeichen und Führerscheinpflicht auf öffentlichen Straßen oder Plätzen!
Bei Einsatz eines Gerätes mit Schnellwechseleinrichtung sowie einer Ausrüstung für das Heben von Einzellasten (abnahmepflichtig mit Prüfbuch und jährlich wiederkehrender Prüfung) sind dem Fahrer die diesbezüglichen Unterweisungen zur Kenntnis zu bringen und unterschreiben zu lassen. (siehe eigene Betriebsanweisung). Baustellenbezogene Besonderheiten sind im Zuge der Evaluierung zu erfassen und zu dokumentieren. Diese Betriebsanweisung ist Bestandteil der Evaluierung und ist dem Fahrer im Zuge der Unterweisung zur Kenntnis zu bringen.

SCHUTZMASSNAHMEN UND VERHALTENSREGELN

Kein Gerät ohne Fahrbewilligung durch den Arbeitgeber in Betrieb nehmen. Machen Sie sich vor der Aufnahme der Arbeiten mit den Besonderheiten der Baustelle und der Arbeitsumgebung vertraut. Nehmen Sie nie ein Gerät ohne vorherigen Inspektionsrundgang in Betrieb. Beim Befahren öffentlicher Straßen und Plätze Gerät in den verkehrsrechtlich zulässigen Zustand bringen. Kennzeichen- und Führerscheinpflicht beachten. Vergewissern Sie sich, dass alle Hauben u. Deckel geschlossen u. alle Warnschilder montiert sind und kontrollieren Sie das Gerät auf augenscheinliche Mängel. Keine Inbetriebnahme eines defekten Gerätes. **Vor dem Starten:** Fahrersitz, Lenksäule und Rückblickspiegel einstellen. Sicherheitsgurt anlegen. (Gerät nie von außen bedienen)
Im Leerlauf Funktionsprobe der Betriebs- und Feststellbremse sowie Warneinrichtung durchführen. Vor jeder Arbeitsaufnahme, auch nach Arbeitsunterbrechungen prüfen, ob sich Personen oder Hindernisse im Gefahrenbereich befinden. Im Bedarfsfall Warnzeichen geben. (Toter Sichtwinkel!). Im Fahrbetrieb Laderschaufel immer in Bodennähe halten.(Bessere Sicht und Gerätestabilität.). Mit voller Schaufel eine Höchstgeschwindigkeit von max. 10 km/h nicht überschreiten. Nur auf ebenem Boden beladen, entladen und wenden. Stets Tragfähigkeit des Bodens berücksichtigen und ausreichend Abstand zu Baugruben halten. Beim Befahren von Steigungen empfohlene max. Werte nicht übersteigen, querfahren und drehen möglichst vermeiden, volle Schaufel möglichst bergseitig halten. Im Baggerbetrieb immer Abstützungen verwenden. Erkundigen Sie sich vor der Arbeit über erdverlegte Wasser-, Gasleitungen oder Stromkabel im Arbeitsbereich. Für Arbeiten unter Freileitungen vorgeschriebenen Sicherheitsabstand einhalten. Gerät nur auf ebenem und festem Boden abstellen. Ladeschaufel absenken, Heckbagger in die vom Hersteller vorgesehene fixierbare Transportstellung bringen oder ausstrecken und absenken. Feststellbremse anziehen. Fahrhebel in Neutralstellung bringen.
Motor abstellen und Zündschlüssel abziehen. Evtl. vorhandene Sperre der Bedienungshebel einlegen. Beim Absteigen vorgesehene Tritte und Haltegriffe verwenden, nicht am Lenkrad oder den Bedienungshebeln anhalten. Bagger gegen unbefugte Inbetriebnahme sichern. Gerät nur bei abgestelltem Motor tanken.
Kein offenes Feuer, nicht rauchen, sich vom Standort des nächsten Feuerlöschers überzeugen.
Maschine verladen: Nur trockene und fettfreie Auffahrtsrampen und Transportflächen befahren. Mindestbodenfreiheit des Gerätes beachten, Einweiser beiziehen.

WARTUNG UND INSTANDHALTUNG

Wartungs- u. Reparaturarbeiten dürfen nur von fachkundigen u. dazu beauftragten Personen durchgeführt werden. Wartungsarbeiten nie an fahrender Maschine oder laufendem Motor vornehmen. Ausrüstung immer absenken oder Hubarmsperren verwenden! Vor jeder Arbeit an Hydraulikleitungen sind diese drucklos zu machen.

ACHTUNG

Diese Anweisung ist nur ein Auszug der wesentlichsten Schutzmaßnahmen und Betriebsauflagen.
Die lückenlose Einhaltung der Betriebsanleitung des Geräteherstellers ist Voraussetzung für jeden sicheren und wirtschaftlichen Geräteeinsatz.

GERMAN

Annex D
Supervisors Qualification Program

INHALTSVERZEICHNIS

		zuständig: Bauleiter	Polier	Nicht erforderlich
1. Adress- und Telefonliste, Firmenliste, Baustellenorganigramm		☐	☐	☐
2. Evaluierung	ÖBEV, Sicherheitsdatenblätter, Betriebsanweisungen, etc.	☐	☐	☐
3. Gesetze, Unterlagen	Merkblätter der AUVA Aushangpflichtige Gesetze Mappe „Sicherheit am Bau", etc.	☐	☐	☐
4. QM-Dokumente – Ablage		☐	☐	☐
Unterweisung von Arbeitnehmern	FB 3.5-STO-02			
Bestellung von Arbeitnehmern	FB 3.5-STO-03			
Baustellendokumente und Aushänge	FB 3.5-STO-04			
Information von Besuchern	FB 3.5-STO-06			
Meldeschema bei Arbeitsunfällen	FB 3.5-STO-09			
Checkliste für UBL/DRL/BRL/GRL	CH 3.5-STO-02			
5. QM-Dokumente – Aushang		☐	☐	☐
Notrufnummern	FB 3.5-STO-07			
Alarmplan Unfall / Feuer	FB 3.5-STO-08			
Alarmplan Umwelt	auf Bedarf, in der jeweils gültigen Fassung			
6. Unterweisungen		☐	☐	☐
7. Prüfungen der Arbeitsmittel		☐	☐	☐
BMTI Gerät, Fremdgerät, GWG, Krane, Anschlagmittel	Prüfplan, Abnahmeprüfung, Prüfung nach Aufstellung, wiederkehr. Prüfung			
Gerüstüberprüfung durch Aufsteller	CH 3.5-STO-04			
Gerüstüberprüfung vor Ersteinsatz	CH 3.5-STO-05			
Gerüstüberprüfung wiederkehrend	CH 3.5-STO-06			
8. Fahrbewilligungen		☐	☐	☐
Innerbetriebliche Fahrbewilligung	AUVA-Ausweis			
Fahrbewilligung lt. AM-VO	FB 3.5-STO-05			
9. Bescheide	Baubewilligung, Gehsteig- u. Straßenbenützung, Sonderarbeitszeit Baustellensicherung, etc.	☐	☐	☐
10. Unfallmeldungen		☐	☐	☐
Unfallmeldungen der AUVA	Leerformular			
Meldung eines Beinahe-Unfalles	FB 3.5-STO-12			
11. ADR-Gefahrgutbeförderung	Merkblätter, Unterweisung Ablage Unterlagen in Kopie Beförderungspapier, etc.	☐	☐	☐
12. Ausländerbeschäftigung	Merkblätter, Ablage Unterlagen, ID-Karte, Reisepass, etc.	☐	☐	☐
13. Bauarbeitenkoordination	Baustellenordnung, SiGe-Plan Vorankündigung, Unterlage etc.	☐	☐	☐

STRABAG	UNTERWEISUNG VON ARBEITNEHMERN	FB 3.5-STO-02 Ausgabe: 01

Erstellt/geändert: Pestal / Berger, 07.01.2004

Baustelle / Bereich:	Bauleiter:	Polier:

1. Es wird bestätigt, daß die nachstehend angeführten Personen durch Herrn ..... über die Durchführung ihrer Arbeiten im oben angeführten Bereich gemäß BauV §154 und ASchG §14, nach den Merkblättern M ....., der Mappe „Sicherheit am Bau" und den der Evaluierung beiliegenden Betriebsanweisungen und Sicherheitsdatenblättern etc. fachkundig informiert und unterwiesen wurden und diese Unterweisung auch verstanden haben.
2. Die unten angeführten Arbeitnehmer wurden davon unterrichtet, daß sie verpflichtet sind, die vom Arbeitgeber zur Verfügung gestellten persönlichen Schutzausrüstungen zu benutzen (§69, Abs. 3, ASchG). Dies gilt insbesondere für das Tragen von Schutzhelmen, Sicherheitsschuhen und -stiefeln, Schutzbrillen, Gehörschutz, sowie für das Anlegen von Sicherheitsgeschirren.
3. Es wird bestätigt, daß die u.a. Personen durch Herrn ..... über die Aufstellung, Umstellung und Überprüfung von Gerüsten nach der BauV §§55-73 sowie nach dem Merkblatt M262 und der Mappe Sicherheit am Bau (E6-E8.2) fachkundig unterwiesen wurden, diese Unterweisung auch verstanden haben und für den angeführten Bereich verantwortlich sind.
4. .....
   .....
5. .....
   .....

Zur Kenntnis genommen durch Unterschrift:

unterwiesene Person	unterwiesen lt. Punkt*)					Datum	Unterschrift
	1.	2.	3.	4.	5.		

*) Zutreffendes ankreuzen

Ort/Datum: ..... Unterschrift Bauleiter / Polier: .....

unterwiesene Person	unterwiesen lt. Punkt*)					Datum	Unterschrift
	1.	2.	3.	4.	5.		

*) Zutreffendes ankreuzen

Ort/Datum: ..... Unterschrift Bauleiter / Polier: .....

STRABAG	BESTELLUNG VON ARBEITNEHMERN IN ABWESENHEIT DER AUFSICHTSPERSON	FB 3.5-STO-03 Ausgabe: 01

Erstellt/geändert: Pestal / Berger, 07.01.2004

Baustelle:	Bauleiter:
	Polier:
	Vorarbeiter:

Für die Zeit der Abwesenheit des Baustellenführungspersonals von der Baustelle wird

Herr .....

als geeigneter Arbeitnehmer gemäß §4 BauV bestellt.

Er besitzt die für die gewissenhafte Durchführung der auszuführenden Arbeiten erforderlichen praktischen Kenntnisse. Gemäß BauV §4 bestätigt er, von der obengenannten Aufsichtsperson über die bei den auszuführenden Arbeiten zum Schutz der Arbeitnehmer notwendigen Maßnahmen unterwiesen worden zu sein, sowie dieser Bestellung auch zuzustimmen.

Ort: Unterschrift Bauleiter / Polier / VA:

Datum: Unterschrift geeigneter Arbeitnehmer:

Erläuterung:

BauV §4 (Bauarbeiterschutzverordnung):
Wenn die Aufsichtsperson auf der Baustelle nicht ständig anwesend ist, ist ein auf der Baustelle beschäftigter geeigneter Arbeitnehmer zu bestellen, der in Abwesenheit der Aufsichtsperson auf die Durchführung und Einhaltung der zum Schutz der Arbeitnehmer notwendigen Maßnahmen zu achten hat. Es darf nur ein Arbeitnehmer bestellt werden, der

1. die Gewähr für eine gewissenhafte Durchführung der übertragenen Aufgaben bietet,
2. die für die auszuführenden Arbeiten erforderlichen praktischen Kenntnisse besitzt,
3. von der Aufsichtsperson über die bei den auszuführenden Arbeiten zum Schutz der Arbeitnehmer notwendigen Maßnahmen nachweislich besonders unterwiesen worden ist und
4. seiner Bestellung nachweislich zugestimmt hat.

STRABAG	BAUSTELLENDOKUMENTE und AUSHÄNGE	FB 3.5-STO-04 Ausgabe: 01

Erstellt/geändert: Pestal / Berger, 07.01.2004

Art	Dokument	Bemerkungen	Ort des Aushanges
Baubewilligung	Bescheid		von aussen gut sichtbar, „schwarze Tafel" oder Containerscheibe
Gehsteigbenützung	Bescheid		von aussen gut sichtbar, „schwarze Tafel" oder Containerscheibe
Straßenbenützung	Bescheid		von aussen gut sichtbar, „schwarze Tafel" oder Containerscheibe
Vorankündigung lt. BauKG	Vorankündigung		von aussen gut sichtbar, „schwarze Tafel" oder Containerscheibe
Liste der Arbeitgeber	Sub-Liste	Zusammenstellung ALLER auf der Baustelle beschäftigten Unternehmen	Baubüro
SiGe-Plan	SiGe-Unterlagen	Bestehend aus - SiGe- Beschreibung - SiGe- Bauzeitplan - Unterlage f. spätere Arbeiten	Baubüro
sicherheitsrelevanter Baustelleneinrichtungs-plan (bei Bedarf)	Plandarstellung	Darstellung der - Fluchtwege, Sammelplätze - Container, Sanitärräume, Unterkunft, Magazin, Lager, - Kran samt Schwenkbereich, - Feuerlöscher, Erste Hilfe, Tragbahre, Notruf-Telefon	von aussen gut sichtbar, „schwarze Tafel" oder Containerscheibe
Baustellenordnung	Vordruck	Interner Vordruck oder Beilage des SiGe-Plans	Baubüro
Aushangpflichtige Gesetze	Vordruck		Arbeiter-Aufenthaltsraum, evtl. auch Baubüro
Normalarbeitszeit	Arbeitszeitregelung	Interne Regelung lt. Betriebs-vereinbarung (Bundesland beachten) oder Baustellen-spezifische Regelung erstellen	Arbeiter-Aufenthaltsraum, evtl. auch Baubüro
Arbeitszeit für Jugendliche	Interner Vordruck		Arbeiter-Aufenthaltsraum, evtl. auch Baubüro
Sonderarbeitszeit	Bescheid/Genehmigung	Nachtarbeit, Wochenendarbeit	von aussen gut sichtbar, „schwarze Tafel" oder Containerscheibe
Sicherheit am Bau	„Blaue Mappe"		Baubüro
Notrufnummern	FB 3.5-STO-07	Inkl. Zusammenstellung der sicherheitstechnisch verantw. Personen wie, - Sicherheitsfachkraft, - Sicherheitsvertrauenspersonen - Ersthelfer, - Baustellenkoordinator, etc	von aussen gut sichtbar, „schwarze Tafel" oder Containerscheibe
Alarmplan Unfall / Feuer	FB 3.5-STO-08		von aussen gut sichtbar, „schwarze Tafel" oder Containerscheibe
Alarmplan Umwelt	auf Bedarf, in der jeweils gültigen Fassung		von aussen gut sichtbar, „schwarze Tafel" oder Containerscheibe
Bestellung von Aufsichtspersonen	FB 3.5-STO-03	Bestellung von Arbeitnehmern in Abwesenheit der Aufsichtsperson	Baubüro
Meldeschema bei Arbeitsunfällen	FB 3.5-STO-09		Baubüro

STRABAG	FAHRBEWILLIGUNG LAUT §33 AM-VO NACHWEIS DER FACHKENNTNISSE UND UNTERWEISUNGEN	FB 3.5-STO-05 Ausgabe: 01

Erstellt/geändert: Pestal / Berger, 07.01.2004

BAUSTELLE:	Bauleiter:	Datum:	NR.:
	Poller / Vorarbeiter:	Kostenstelle:	

Nr.	Gerät	Name Vorname Geburtsdatum	Nachweis der Fachkenntnisse	Unterweisung		
				Datum	Art der Unterweisung	Name/Betrieb des Unterweiser Unterschrift des Geräteführers
		Name: Vorname: Geburtsdatum:			Ersunterweisung	
					Wiederkehrende Unterweisung	
		Name: Vorname: Geburtsdatum:			Ersunterweisung	
					Wiederkehrende Unterweisung	
		Name: Vorname: Geburtsdatum:			Ersunterweisung	
					Wiederkehrende Unterweisung	
		Name: Vorname: Geburtsdatum:			Ersunterweisung	
					Wiederkehrende Unterweisung	
		Name: Vorname: Geburtsdatum:			Ersunterweisung	
					Wiederkehrende Unterweisung	
		Name: Vorname: Geburtsdatum:			Ersunterweisung	
					Wiederkehrende Unterweisung	
		Name: Vorname: Geburtsdatum:			Ersunterweisung	
					Wiederkehrende Unterweisung	

Erstellt durch: .....

STRABAG	INFORMATION VON BESUCHERN	FB 3.5-STO-06 Ausgabe: 01

Erstellt/geändert: Pestal / Berger, 07.01.2004

Baustelle / Bereich:	Bauleiter:	Polier:

1. Die nachstehend angeführten Personen (Besucher) wurden durch den Vertreter (Führer) der Besuchergruppe über die Gefährdungen im angeführten Bereich/Baustelle fachkundig informiert und haben diese Information auch verstanden. Der Vertreter der Besuchergruppe übernimmt die Verantwortung für die sichere Führung der Besuchergruppe auf der Baustelle/Bereich.
2. Die Besucher wurden davon unterrichtet, dass sie verpflichtet sind, die erforderlichen persönlichen Schutzausrüstungen zu benützen. Dies gilt insbesondere für das Tragen von Schutzhelmen, Sicherheitsschuhen und –stiefeln, Schutzbrillen und Gehörschutz.
3. Das Betreten der Baustelle/Bereiche durch die Besuchergruppe erfolgt auf deren eigene Gefahr. Die STRABAG AG, ihre Mitarbeiter und Subunternehmer haften für Schäden der Besuchergruppe nur bei Vorsatz oder grober Fahrlässigkeit.
4. Die Mitglieder der Besuchergruppe haften für von ihnen allenfalls verursachte Schäden.
5. Den Anweisungen des Baustellenpersonals ist Folge zu leisten.
6. Der Vertreter der Besuchergruppe bestätigt mit Wirkung für sich und die übrigen Besucher die Einhaltung der obigen Bedingungen.

	Besucher		Besucher
01		16	
02		17	
03		18	
04		19	
05		20	
06		21	
07		22	
08		23	
09		24	
10		25	
11		26	
12		27	
13		28	
14		29	
15		30	

Ort/Datum: ..... Unterschrift Bauleiter / Polier: .....

Unterschrift des Vertreters der Besuchergruppe: .....

STRABAG	NOTRUFNUMMERN	FB 3.5-STO-07 Ausgabe: 01

Erstellt/geändert: Pastal / Berger, 07.01.2004

Bauvorhaben / Baustellenadresse	Baustellen-Telefon:

NOTRUF

FEUERWEHR	**122**	TELEFON	
POLIZEI	**133**	STROM	
RETTUNG	**144**	KANAL	
NOTARZT		WASSER	
KRANKENHAUS		GAS	

BAULEITUNG

BAULEITER	Name: Tel.:	**FIRMA**	STRABAG AG DIREKTION Tel.:
TECHNIKER	Name: Tel.:	**BRL / GRL**	Name: Tel.:
POLIER	Name: Tel.:		Name: Tel.:
VORARBEITER	Name: Tel.:		

ARBEITSSICHERHEIT

BAUSTELLEN-KOORDINATOR	Name: Tel.:	**ERSTHELFER**	
SICHERHEITS-FACHKRAFT	Name: Tel.:	Name:	Tel.:
SICHERHEITS-VERTRAUENSPERSONEN	Name: Tel.:	Name:	Tel.:
	Name: Tel.:	Name:	Tel.:
ARBEITSINSPEKTORAT	Name: Tel.:	Name:	Tel.:
		Name:	Tel.:
		GEFAHRGUTLENKER	
		Name:	Tel.:
		Name:	Tel.:

STRABAG	ALARMPLAN UNFALL / FEUER	FB 3.5-STO-08 Ausgabe: 01

Erstellt/geändert: Pestal / Berger, 07.01 2004

FEUERWEHR - 122 / POLIZEI - 133 / RETTUNG - 144

FEUER

1. MELDEN

1.1 Ruhe bewahren!

1.2 Meldekette in Gang setzen

a) **Feuerwehr.....122**

b) **Polizei 133**

c) **Bauleitung**

1.3 Informationen weitergeben

- **WER** meldet – Namen angeben!
- **WAS** ist passiert?
- **WAS brennt?**
- sind Menschen in **GEFAHR?**
- sind Menschen **VERLETZT?**
- Baustellen-**ADRESSE** bekannt geben!
- **ANFAHRTSWEG** für Feuerwehr!

1.4 **Der Anrufer legt zuletzt auf!**

2. ERSTMASSNAHMEN

2.1 Gefährdete / verletzte Personen aus dem Gefahrenbereich bringen!

2.2 Brandgefährdete Geräte / Materialien / Gegenstände aus dem Gefahrenbereich bringen!

2.3 Gefahrenbereich absperren!

2.4 Zufahrswege für Feuerwehr freimachen!

2.5 Löschversuch mit Handfeuerlöscher unternehmen!

3. WEITERE MASSNAHMEN

3.1 Einsatzfahrzeuge einweisen
Posten bei Baustelleneinfahrt

3.2 Schaulustige vom Unfallort und von der Zufahrt fernhalten

UNFALL

1. ERSTE HILFE

1.1 Ruhe bewahren!

1.2 Verletzte aus dem Gefahrenbereich bringen / Unfallstelle absichern!

1.3 Ersthelfer kontaktieren!

1.4 Versorgen der Verletzten durch Ersthelfer

2. UNFALL MELDEN

2.1 Notrufnummern anrufen

- **Notarzt**
- **Rettung 144**
- **Polizei.....133**
- **Feuerwehr.....122**
- **Bauleitung**

2.2 Informationen weitergeben

- **WER** meldet – Namen angeben!
- **WAS** ist passiert?
- **ANZAHL** der Verletzten?
- **GRAD** (Schwere) der Verletzungen?
- Sind weitere Menschen in **GEFAHR?**
- Baustellen-**ADRESSE** bekanntgeben
- **ANFAHRTSWEG** für Rettung

2.3 **Der Anrufer legt zuletzt auf!**

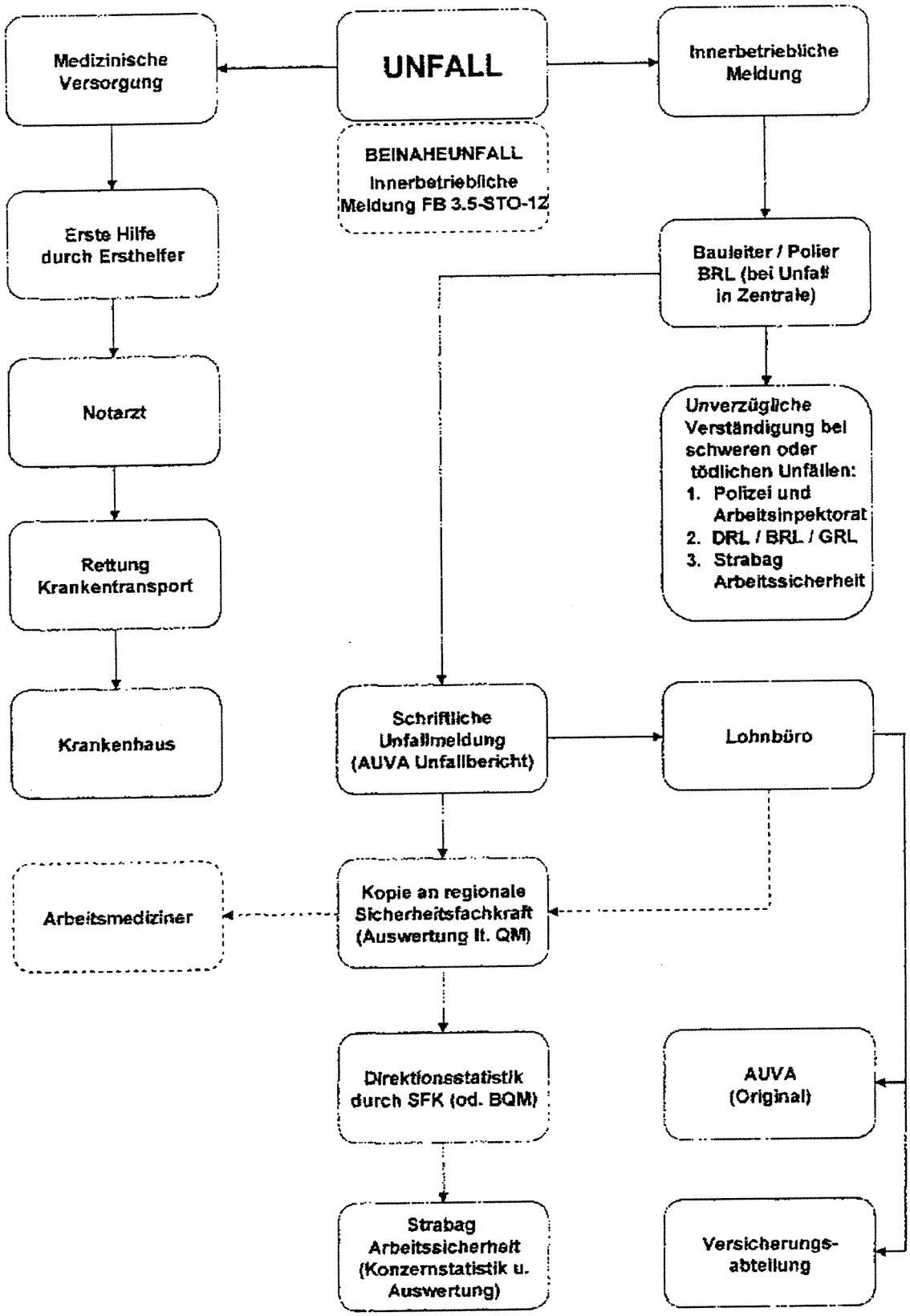
3. WEITERE MASSNAHMEN

3.1 Einsatzfahrzeuge einweisen
Posten bei Baustelleneinfahrt

3.2 Schaulustige vom Unfallort und von der Zufahrt fernhalten

STRABAG	MELDESCHEMA BEI ARBEITSUNFÄLLEN	FB 3.5-STO-09 Ausgabe: 01

Erstellt/geändert: Pestal / Berger, 07.01.2004



STRABAG	UNFALLURSACHE - SCHLÜSSELNUMMERN	FB 3.5-STO-10 Ausgabe: 01

Erstellt/geändert: Pesta / Berger, 07.01.2004

A	BAUSTELLEN - EINSATZART
1	Erdbau
2	Leitungsbau (Kanal, Wasser, Gas,...)
3	Hochbau
4	Tiefbau / Brückenbau
5	Spezialtiefbau
6	Straßenbau / Außenanlagen
7	Gleisbau
8	Tunnelbau
9	Betriebsstätten, Anlagen
10	Reparatur / Wartung
11	Büro, Weg, Sonstiges
12	
13	
15	

B	ART DER TÄTIGKEIT
20	Ladetätigkeit, Manipulation (Händisch)
21	Heben von Lasten (Maschinell)
22	Erd-Aushub-Verfüllarbeiten
23	Erd-Sicherungsarbeiten, Pölzen
24	Transportarbeiten
25	Abbrucharbeiten
26	Rohrlegearbeiten
27	Schalungsarbeiten
28	Betonierarbeiten
29	Bewehrungsarbeiten
30	Gerüstarbeiten
31	Stahl-Eisen-Arbeiten
32	Maurer-, Trockenbauarbeiten
33	Versetzarbeiten
34	Montagearbeiten, Fertigteile
35	Bohr-Vortriebsarbeiten
36	Asphaltierungsarbeiten, Vorspritzen
37	Pflastern, Steine setzen
38	Vor-, Nach- und Reinigungsarbeiten
39	Arbeitswege, Verkehrswege
40	Manipulation/Verarbeitung Arbeitsstoffe
41	Büroarbeiten
42	Sonstige Baustellenarbeiten

C	BETEILIGTES ARBEITSMITTEL
50	Fahrzeug / Transportmittel
51	Kran / Hebezeug
52	Bagger / Lader / Raupe
53	Straßenbaugerät (Walze, Fertiger, etc)
54	Sonstiges Gerät - schwer
55	Kleingeräte / handgeführte Arbeitsmittel
56	Handwerkzeug
57	Gerüst / Leiter / Schalung
58	Anlagen / Fördereinrichtungen
59	kein Arbeitsmittel

D	VERLETZTER KÖRPERTEIL
60	Augen
61	Kopf / Hals / Zähne
62	Rumpf / innere Organe
63	Arm / Hand
64	Bein / Fuß
65	mehrere Körperteile
67	
68	

E	SCHWERE DES UNFALLES
70	0 Ausfalltage
71	1 - 3 Ausfalltage
72	4 - 19 Ausfalltage
73	20 - 45 Ausfalltage
74	> 46 Ausfalltage
75	tödlicher Unfall
76	

F	ART DES UNFALLES
80	Stolpern, Aus-/Abrutschen
81	Absturz, Sturz und Fall
82	durch fallenden Gegenstand
83	durch Arbeitsmittel
84	durch Arbeitsstoff
85	persönliches Fehlverhalten
86	Wegunfall
87	

STRABAG	UNFALLURSACHE - AUSWERTUNG	FB 3.5-STO-11 Ausgabe: 01

Erstellt/geändert: Pestal / Berger, 07.01.2004

Die detaillierte Auswertung von Arbeitsunfällen erfolgt durch die jeweils für den Bereich zuständige Sicherheitsfachkraft, die eine Kopie der Unfallmeldung und diese Zusammenfassung zur statistischen Auswertung der Arbeitsunfälle an den für die Erstellung der Direktionsunfallstatistik Beauftragten[1] weiterleitet. Der für die Erstellung der Direktionsunfallstatistik verantwortlich Beauftragte[1] leitet diese nach Erfassung aller Arbeitsunfälle eines Wirtschaftsjahres am Beginn des Folgejahres bzw. auf Aufforderung an den Konzernbeauftragten für Arbeitnehmerschutz weiter (⇒ Konzernstatistik).

Die hier einzutragenden Kennziffern sind dem Formular „FB 3.5-STO-10 - Unfallursache – Schlüsselnummern" zu entnehmen! Nur eine Schlüsselnummer je Kategorie eintragen !!!

ZUSAMMENFASSUNG

Schlüssel Nr. 1 – 15	BAUSTELLEN - EINSATZART A	Schlüssel Nr. 20 – 42	ART DER TÄTIGKEIT B
Schlüssel Nr. 50 – 59	BETEILIGTES ARBEITSMITTEL C	Schlüssel Nr. 60 – 68	VERLETZTER KÖRPERTEIL D
Schlüssel Nr. 70 – 78	SCHWERE DES UNFALLES E	Schlüssel Nr. 80 – 87	ART DES UNFALLES F

<u>Baustellenangaben:</u> Baustelle: KSt.: Bereich: Gruppe:	<u>Vorgesetzte:</u> Bereichsleiter: Gruppenleiter: Bauleiter: Polier/VA:
Verletzter: Funktion: Ausfalldauer (in Kalendertagen): ..... KT Sonstiges:	Ausgewertet von: Funktion: Datum: Unterschrift:

[1] Vom Konzernbeauftragten für Arbeitnehmerschutz wird je Direktion eine SFK (bzw. BQM) gesondert (siehe auch Sicherheitsdatenbank) mit der Erstellung der Direktionsunfallstatistik beauftragt.

STRABAG	MELDUNG EINES BEINAHE-UNFALLES	FB 3.5-STO-12 Ausgabe: 01

Erstellt/geändert: Berger, 07.01.2004

ALLGEMEINE BAUSTELLENDATEN

Bauvorhaben:		KSt.:
Anschrift d. Baustelle:		
Dir. / Bereich / Gruppe		
Bauleiter:		
Polier:		

ANGABEN ZUM BEINAHE-UNFALL

Datum / Uhrzeit:	
Beschreibung des Herganges:	
Mögliche Folgen:	leicht Verletzte schwer Verletzte Tote € Sachschaden: Sonstiges:
Was hat den Eintritt der Schadensfolgen konkret verhindert?	
Welche Maßnahmen wurden gesetzt um ähnliche Ereignisse zu verhindern?	
Welche allgemeinen Empfehlungen und Ratschläge können aus diesem Vorfall abgeleitet werden?	

Verteiler *): ☐ Verfasser
☐ BL
☒ SFK (quartalsweise an Strabag Arbeitssicherheit)

*) vom BQM festzulegen

Verfasser:	
Unterschrift:	

STRABAG	BAUKG – DECKBLATT FÜR UNTERLAGE	FB 3.5-STO-14 Ausgabe: 01

Erstellt/geändert: Pestal / Berger, 07.01.2004

Wien, am

Unterlage für spätere Arbeiten gemäß §8, BauKG

Bauvorhaben

.....

Inhaltsverzeichnis:

- Unterlage detailliert (Seiten)
- Beilagen (Fotodokumentation) (Seiten)
- Statik ⇒
- Einbautenpläne ⇒
- Installationspläne – Wasser, Gas, Elektro, Fernwärme etc.

  ⇒

Die Unterlage für spätere Arbeiten in der vorliegenden Version beruht auf dem Wissensstand vom und gibt keine Gewähr auf Vollständigkeit während der Nutzung des Gebäudes. Sie ist durch den Nutzer immer am aktuellen Stand zu halten und entbindet die nachfolgend tätigen Professionisten sowie den Nutzer nicht von der gesetzlich vorgeschriebenen Gefahrenermittlung und Festlegung geeigneter Maßnahmen zum Schutz der Mitarbeiter.

Zur Kenntnis genommen:

.....	.....	.....
Bauherr	Baustelle	Baustellenkoordinator

STRABAG	BAUKG - HINWEISBRIEF	FB 3.5-STO-13 Ausgabe: 01

Erstellt/geändert: Pestal / Berger, 07.01.2004

An

Wien, am

Betreff: **Bauvorhaben XXXXX**

Thema: **Bauarbeitenkoordinationsgesetz (BauKG)**

Sehr geehrte Damen und Herren!

Aus Auftragnehmer im Zuge der Erstellung des o.a. Bauvorhabens verweisen wir auf die Anwendbarkeit des BauKG, aufgrund

- ☐ Überschreiten der Schwellenwerte (Personentage) lt. §6(1)
- ☐ Beschäftigung mehrerer Auftragnehmer lt. §3(1)
- ☐ Arbeiten mit besonderen Gefahren lt. §7(2).

Im Sinne des BauKG hat der Bauherr dafür zu sorgen, dass die beauftragten Arbeitgeber die gemäß BauKG geltenden Bestimmungen zur Verbesserung der Sicherheit und des Gesundheitsschutzes einhalten.

Als betroffener Arbeitgeber ersuchen wir daher um Übermittlung nachfolgender Unterlagen:

- ☐ Vorankündigung gemäß § 6
- ☐ Sicherheits- und Gesundheitsschutzplan gemäß § 7
- ☐ Unterlage für spätere Arbeiten gemäß § 8

Weiters ersuchen wir um Bekanntgabe des

- ☐ Namen und Adresse des Planungskoordinators
- ☐ Namen und Adresse des Baustellenkoordinators.

Mit freundlichen Grüßen

Verteiler: Anschrift
Baustelle
BRL/GRL
Ablage

STRABAG	SICHERHEITSTECHNISCHE CHECKLISTE SFK	CH 3.5-STO-01 Ausgabe: 01

Erstellt/geändert: Pestal / Berger, 07.01.2004

BAUSTELLE: ORT:	SFK:	Datum: Kostenstelle:	Nr.:
Bauleiter: Polier/VA:	stellvertretende Aufsichtsperson:	Anzahl der AN:	Baubeginn: ca. Ende:	Bauphase:

NR.	PRÜFUNG	BEURTEILUNG	NR.	KONTROLLBEREICH
1	Äußeres Bild der Baustelle		1.1	Ordnung, Sauberkeit, Gesamteindruck auf der Baustelle
			1.2	Firmentafeln ordentlich angebracht?
			1.3	Baustellensicherung, Absperrung, gesetzl. vorgeschr. Tafeln
2	Organisation		2.1	Prüfliste Polier / Vorarbeiter korrekt geführt?
			2.2	Evaluierung nach OBEV durchgeführt? Fragebogen korrekt?
3	Verkehrssicherheit		3.1	Genehmigung nach §90 StVo vorhanden? eingehalten?
			3.2	Verkehrszeichen, Beleuchtung, Absperrungen
4	Arbeitsmittel (Eigengerät)		4.1	Prüfpflichten lt. AM-VO, BauV, Prüfbücher
			4.2	Wartung, Zustand, Betriebsanweisung, Plaketten BMTI, §11 AM-VO, §57 KFG
			4.3	innerbetriebliche Fahrbewilligung / Unterweisung
	Sub-Arbeitsmittel / Leihgeräte fremd		4.4	Überprüfungen, Plaketten, Fahrbewilligung – ok?
	Kraftfahrzeuge		4.5	wiederkehrende Überprüfung, Kranbuch, etc.
			4.6	Wartung, Zustand, Betriebsanweisung, Prüfplakette §57 KFG
			4.7	innerbetriebliche Fahrbewilligung, Führerschein
	Baustellenausstattung		4.8	Wartung, Zustand, Prüfplakette ÖVE
	Werkzeuge		4.9	Zustand, Eignung (Leitern)
	Kleingeräte		4.10	elektrische Sicherheit, Verteiler, Schalter, Stecker, Dosen, Kabel
5	Persönliche Schutzausrüstung		5.1	Helme, Schutzbrille, Gehörschutz, Atemschutz, Handschuhe ok?
			5.2	Sicherheitsschuhe
			5.3	Warnkleidung gemäß ÖN EN 471 – vorhanden? ok?
6	Arbeitssicherheit		6.1	Erste Hilfe Koffer – Größe? Inhalt noch in Ordnung?
			6.2	Notfallanweisungen – Alarmpläne, Notrufnummern vorhanden?
			6.3	Ersthelfer bekannt – ausreichende Anzahl?
			6.4	Geländer, sonstige Absturzsicherungen
			6.5	Gerüste – Überprüfung Aufsteller / Ersteinsatz / wiederkehrend?
			6.6	Pölzungen, Künettenverbau, Baugrubensicherung
			6.7	Sichere Lagerung von Baumaterial, Gas, Treibstoffe
			6.8	Handfeuerlöscher, Brandschutz etc.
7	Baustellenpersonal / Fremdpersonal		7.1	Unterweisung / Information der Arbeitnehmer / Subunternehmer
8	Arbeitsstoffe		8.1	Sicherheitsdatenblätter vorhanden? Vorgaben eingehalten?
9	Hygiene		9.1	sauberes Wasser, Reinigungsmittel, Putzpapier
			9.2	Hautschutzmittel, Handcreme, Sonnenschutzmittel
10	Toiletten		10.1	vorhanden oder erreichbar, Sauberkeit, Papier
11	Container		11.1	Vorhandensein, Größe, Einrichtung, etc.
12	Ausländerbeschäftigung		12.1	Sind SUB-Personalunterlagen auf der Baustelle vorhanden?
13	ADR - Gefahrgutbeförderung		13.1	ADR bzw. Ausnahme „Baustellenbeförderung" eingehalten?

NR.	BEMERKUNGEN	VERWEIS AUF

Verteiler *): ☐ BL ☐ SVP ☐ CRL ☐ BRL *) vom BOM festzulegen

☐ Bestätigung der durchgeführten Mängelbehebung erforderlich!

Meldung an: .....*)

Name/Funktion:	
Unterschrift:	

STRABAG	SICHERHEITSTECHNISCHE CHECKLISTE FÜR UBL / DRL / BRL / GRL	CH 3.5-STO-02 Ausgabe: 01

Erstellt/geändert: Pestal / Berger, 07.01.2004

Bauvorhaben:		KSt.:
Anschrift der Baustelle:		
Bauleiter / Polier:		

Überprüfungsinhalte	JA	NEIN	Bemerkungen / Maßnahmen
Sauberkeit und Ordnung ok, Verkehrswege frei	☐	☐	
Persönliche Schutzausrüstungen sind vorhanden und werden verwendet	☐	☐	
Dokumentierte SFK-Begehungen werden durchgeführt	☐	☐	
Erste-Hilfe – Einrichtungen sind vorhanden und zugänglich	☐	☐	
Unterweisungen der Mitarbeiter und Subunternehmern sind vorhanden	☐	☐	
Es sind keine technischen / organisatorischen Mängel erkennbar	☐	☐	

Sonstige Bemerkungen:

Sofortmaßnahmen erforderlich: JA ☐ NEIN ☐

wenn ja, welche:

Ort, Datum	Name, Vorname	Unterschrift

Bestätigung über die ordnungsgemäße Durchführung der Mängelbehebung:

Verantwortlich	Termin	erledigt durch	Unterschrift

Verteiler: Berichtersteller, SFK, Konzernbeauftragter für Arbeitnehmerschutz

STRABAG	UNTERWEISUNG VON ARBEITNEHMERN	FB 3.5-STO-02 Ausgabe: 01

Erstellt/geändert: Pestal / Berger, 07.01.2004

Baustelle / Bereich:	Bauleiter:	Polier:

1. Es wird bestätigt, daß die nachstehend angeführten Personen durch Herrn ..... über die Durchführung ihrer Arbeiten im oben angeführten Bereich gemäß BauV §154 und ASchG §14, nach den Merkblättern M ....., der Mappe „Sicherheit am Bau" und den der Evaluierung beiliegenden Betriebsanweisungen und Sicherheitsdatenblättern etc. fachkundig informiert und unterwiesen wurden und diese Unterweisung auch verstanden haben.
2. Die unten angeführten Arbeitnehmer wurden davon unterrichtet, daß sie verpflichtet sind, die vom Arbeitgeber zur Verfügung gestellten persönlichen Schutzausrüstungen zu benutzen (§69, Abs. 3. ASchG). Dies gilt insbesondere für das Tragen von Schutzhelmen, Sicherheitsschuhen und -stiefeln, Schutzbrillen, Gehörschutz, sowie für das Anlegen von Sicherheitsgeschirren.
3. Es wird bestätigt, daß die u.a. Personen durch Herrn ..... über die Aufstellung, Umstellung und Überprüfung von Gerüsten nach der BauV §§55-73 sowie nach dem Merkblatt M262 und der Mappe Sicherheit am Bau (E6-E8.2) fachkundig unterwiesen wurden, diese Unterweisung auch verstanden haben und für den angeführten Bereich verantwortlich sind.
4. .....
   .....
5. .....
   .....

Zur Kenntnis genommen durch Unterschrift:

unterwiesene Person	unterwiesen lt. Punkt*)					Datum	Unterschrift
	1.	2.	3.	4.	5.		

*) Zutreffendes ankreuzen

Ort/Datum: ..... Unterschrift Bauleiter / Polier: .....

unterwiesene Person	unterwiesen lt. Punkt*)					Datum	Unterschrift
	1.	2.	3.	4.	5.		

*) Zutreffendes ankreuzen

Ort/Datum: ..... Unterschrift Bauleiter / Polier: .....

STRABAG	BEGEHUNGSPROTOKOLL BAUSTELLENKOORDINATOR	CH 3.5-STO 03 Ausgabe: 01

Erstellt/geändert: Pastal / Berger, 07.01.2004

Baustelle: KSt.: Ort:	Baustellenkoordinator:	Datum: Uhrzeit:	Nr.:

	PRÜFUNG	BEURTEILUNG	Nr.	KONTROLLBEREICH
1	Aushänge und Unterlagen		1.1	Unterlagen lt. BauKG (SiGe-Plan, Vorankündigung, Baustellenordnung, Firmenliste etc.) – ok?
			1.2	Sicherheitsvorschriften, BauKG und Baustellenordnung eingehalten?
			1.3	Baubewilligung, Straßen-/Gehsteigbenützungsbescheid, sonstige behördliche Bewilligungen vorhanden? eingehalten?
			1.4	Arbeitszeitregelung (Normalarbeitszeit, Jugendarbeitszeit, etc.)
			1.5	Notfallanweisungen, Notrufnummern, Alarmpläne, Rettungsplan
			1.6	Unterweisungen durchgeführt? Spezielle Unterweisungen?
			1.7	Evaluierung vorhanden?
			1.8	
			1.9	
2	Organisation der Baustelle		2.1	Ordnung, Sauberkeit, Gesamteindruck auf der Baustelle
			2.2	Baustellensicherung, Absperrung, gesetzl. vorgeschr. Tafeln
			2.3	Lagerbereiche ok? Sichere Lagerung von Baumaterial, Treibstoffe?
			2.4	Baustrom, Gas, Wasser etc. abgesichert und ok?
			2.5	Verkehrswege, Beleuchtung, Absperrungen, Kennzeichnungen
			2.6	Gefahrenbereiche gekennzeichnet? Zutrittsverbote?
			2.7	Passanten, Fußgänger, Kinder sicher?
			2.8	Toiletten - vorhanden oder erreichbar, Sauberkeit, Papier ?
			2.9	Container, Aufenthaltsräume, Sozialräume etc. ok?
			2.10	
			2.11	
3	Allg. Baustellenausrüstung		3.1	Erste Hilfe Koffer, Feuerlöscher, Brandschutz etc.
			3.2	Ersthelfer vorhanden? Ausreichende Anzahl?
			3.3	
			3.4	
4	Persönliche Schutzausrüstung		4.1	Persönliche Schutzausrüstung vorhanden und verwendet?
			4.2	Kollektive Schutzeinrichtungen vorhanden? ok?
			4.3	
			4.4	
5	Technische Schutzausrüstung		5.1	Absturzsicherungen vorhanden? Anschlagpunkte? ok?
			5.2	Baugruben- und Künettensicherung ok?
			5.3	Gerüste und Leitern ok? Überprüfung durchgeführt?
			5.4	Arbeitsmittel ok? Überprüft? Abgenommen? Fahrbewilligungen?
			5.5	Arbeitsstoffe ok? Sicherheitsdatenblätter eingehalten?
			5.6	Elektrische Sicherheit - Verteiler, Schalter, Stecker, Kabel – ok?
			5.7	
			5.8	

Nr.	BEMERKUNGEN:	Verweis auf:

Verteiler *):
- ☐ Baustelle
- ☐ Bauher
- ☐ Bauaufsicht/Projektant
- ☐
- ☐

Name:	
Unterschrift:	

STRABAG	GERÜSTÜBERPRÜFUNG DURCH DEN AUFSTELLER	CH 3.5-STO-04 Ausgabe: 01

Erstellt/geändert: Pestal / Berger, 07.01.2004

Bauvorhaben:		KSt.:
Anschrift d. Baustelle:		
Bauleiter / Polier:		
Aufstellungsfirma:		
Beschreibung des Aufstellungsortes:		
Bauart des Gerüstes:		
Umfang:		

Verwendung als: ☐ Arbeitsgerüst ☐ Schutzgerüst

Art des Gerüstes: ☐ Leitergerüst ☐ Metallgerüst ☐ Verfahrbares Standgerüst

☐ Bockgerüst ☐ Konsolgerüst ☐ Ausschuss-gerüst

☐ Gerüst für Arbeiten an Schornsteinen ☐ Hängegerüst ☐ Behelfsgerüst

Überprüfung anlässlich: ☐ Neuaufstellung ☐ Umstellung ☐ Änderung

☐ nach besonderen Vorkommnissen

Grund: _____

Überprüfung durchgeführt:

von: _____

am: _____

Die Aufstellungsfirma bestätigt hiermit, dass o.a. Gerüst durch geeignete, fachkundige und hierzu berechtigte Personen bzw. unter fachkundiger Aufsicht aufgestellt wurde und den Gerüstbauvorschriften des 7. Abschnittes der Bauarbeiterschutzverordnung BGBl Nr 340/1994 in der jeweils gültigen Fassung, sowie der ÖNORM B 4007 Ausgabe 01.07.2002 (ersetzt Ausgabe 01.01.1994), entspricht.

Bei der Überprüfung durch die oben stehende geeignete, fachkundige und berechtigte Person der Aufstellungsfirma wurden alle verwendeten Gerüstbauteile auf offensichtliche Mängel überprüft sowie der Unterbau des Gerüstes, seine Verbindungen und Verankerungen, ferner die Standsicherheit, Tragfähigkeit und Begehbarkeit untersucht und der einwandfreie Zustand festgestellt.

_____ Datum

_____ Für die Baustelle

Anmerkung: Diese Bestätigung muss am Aufstellungsort des Gerüstes jederzeit zur Einsichtnahme durch behördliche Organe aufliegen.

STRABAG	GERÜSTÜBERPRÜFUNG DURCH DEN BENUTZER VOR DEM ERSTEINSATZ	CH 3.5-STO-05 Ausgabe: 01

Erstellt/geändert: Pestal / Berger, 07.01.2004

Bauvorhaben:		KSt.:

Ausführung: (in Sonderfällen muss ein statischer Nachweis aufliegen!)

- ☐ Laut Anleitung der Aufstellungsfirma!
- ☐ Gemäß Angaben der Benützungsfirma! ☐ Plangemäß!

Standsicherheit:

- ☐ Verwendetes Material durch Augenschein geprüft!
- ☐ Verbindungs- und Verankerungsmittel augenscheinlich geprüft!
- ☐ Aufstandsflächen geprüft!
- ☐ Ausreichende Aussteifungen (Diagonalen) vorhanden!
- ☐ Leitern, Stiegen, Übergänge (sicherer Zugang zu Arbeitsplätzen), Verbindungen mit dem Gerüst geprüft!
- ☐ Feststellvorrichtungen gegen unbeabsichtigtes Bewegen geprüft! (nur bei fahrbaren Gerüsten)

Absturzsicherungen: (bei Brettern aus Holz muss die Mindeststärke 12 x 2,4 cm betragen)

- ☐ Brustwehr durchgehend vorhanden und in Ordnung (ca. in 1 m Höhe)
- ☐ Mittelwehr durchgehend vorhanden und in Ordnung (lichter Abstand max. 47 cm – jeweils zur Brust- und Fußwehr)
- ☐ Fußwehr durchgehend vorhanden und in Ordnung (mind. 12 x 2,4 cm)
- ☐ Endabsicherung vorhanden und in Ordnung!
- ☐ Wehren gegen unbeabsichtigtes Lösen gesichert!
- ☐ Blende 50 cm (für Fanggerüst) vorhanden und in Ordnung! falls begangen wird: Brustwehr vorhanden und in Ordnung!
- ☐ Abstand zwischen Mauergrund und mauerseitiger Belagskante max. 30 cm!
- ☐ Ausnahmefall: Abstand ..... cm, weil .....

Gerüstbelag: bei Pfostenbelag unbedingt Gerüstpfosten verwenden; Pfosten mind. 5 cm dick u. 20 cm breit, dicht liegend, bei Auflagen mind. 20 cm überstehend, bei Endlauflagen max. 30 cm; doppelte Lage, wenn das Fanggerüst 4 m unter der Absturzkante angebracht ist:

- ☐ Durchgehend vorhanden und in Ordnung!

Aufstiege: ☐ Vorhanden und in Ordnung!

Kennzeichnung für Verkehrsteilnehmer:

- ☐ Nicht vorhanden, weil nicht erforderlich! ☐ Vorhanden und in Ordnung!

Nicht isolierte elektrische Anlagen (Leitungen) in der Nähe:

- ☐ Nicht vorhanden! ☐ Vorhanden u. durch EVU gesichert!

Seilumlenkrollen von Materialaufzügen oder Winden

- ☐ Nicht vorhanden! ☐ Entfernung größer als 2,5 m!
- ☐ Entfernung geringer als 2,5 m und gegen Handeinzug gesichert!

Eventuelle Anmerkungen:

☒ Zutreffendes bitte ankreuzen!

Eventuelle Mängel sind vor der Benützung unbedingt zu beseitigen!

Datum _____ Für die Baustelle _____

Anmerkung: Die oben angeführten Punkte stellen nur die wichtigsten Prüfkriterien dar. Die BauV. Abschnitt 7, §§ 55-73, ist unbedingt einzuhalten.

STRABAG	WIEDERKEHRENDE GERÜSTÜBERPRÜFUNG DURCH DEN BENUTZER	CH 3.5-STO-06 Ausgabe: 01

Erstellt/geändert: Postal / Berger, 07.01.2004

Bauvorhaben:		KSt.:

Grund der Überprüfung:

- ☐ wöchentliche Prüfung / monatlich bei Systemgerüsten
- ☐ nach längerer Arbeitsunterbrechung
- ☐ nach Sturm, Frost oder sonstigen Schlechtwetterperioden

PRÜFUNGSINHALTE

⇨ **Ausführung:**
☐ OK
☐ Mängel:

beseitigt durch:
Datum:

⇨ **Standsicherheit:**
☐ OK
☐ Mängel:

beseitigt durch:
Datum:

⇨ **Absturzsicherung:**
☐ OK
☐ Mängel:

beseitigt durch:
Datum:

⇨ **Gerüstbelag:**
☐ OK
☐ Mängel:

beseitigt durch:
Datum:

⇨ **Aufstiege:**
☐ OK
☐ Mängel:

beseitigt durch:
Datum:

☒ Zutreffendes bitte ankreuzen!

Eventuelle Mängel sind vor der Benützung unbedingt zu beseitigen!

Datum _____ Für die Baustelle _____

Anmerkung: Die oben angeführten Punkte stellen nur die wichtigsten Prüfkriterien dar. Die BauV, Abschnitt 7, §§ 55-73, ist unbedingt einzuhalten.

Einleitung

SCC (Sicherheits Certifikat Contraktoren) ist ein Managementsystem auf dem Gebiet von Sicherheit, Gesundheits- und Umweltschutz.

Um das SCC-Zertifikat zu erlangen, sind mehrere vorgegebene Kriterien zu erfüllen.
Eines davon verlangt, dass ein Unternehmen, welches als Subunternehmer auf den unter SCC-Auflagen laufenden Baustellen tätig ist, ebenfalls die entsprechenden Erfordernisse erfüllt.

Als Nachweis hiefür bieten sich zwei Möglichkeiten:

Variante 1: Das Unternehmen weist nach, dass es das SCC-Zertifikat (oder gleichwertiges) erhalten hat.

Variante 2: Das Unternehmen wird durch den Auftraggeber auf Basis der SCC-Checkliste (Dokument CH 3.5-STO-07) beurteilt.
Grundlage hiefür ist die Beantwortung des vorliegenden Fragebogens.

In jedem Fall kann sich der Auftraggeber des Subunternehmers durch Einblicknahme in Nachweise, durch Vorlegenlassen von Unterlagen und/oder durch Kontrolle auf der Baustelle von der Erfüllung der geforderten Kriterien überzeugen.

Im Falle einer Beauftragung des Unternehmens sind die im Anhang zum Fragebogen geforderten Unterlagen vor Beginn der Arbeiten dem Bauleiter des Auftraggebers schriftlich zu übergeben.

Erläuterung zum Ausfüllen des Fragebogens:

Wenn das Unternehmen seinerseits ein SCC-Zertifikat erhalten hat, ist eine Kopie desselben zu übermitteln (vgl. Variante 1 der Einleitung). Der unausgefüllte Fragebogen ist beizulegen.

Erfolgt die Beurteilung des Unternehmens durch den Auftraggeber (vgl. Variante 2 der Einleitung), ist die Erfüllung sämtlicher Fragen dieses Fragebogens mit „Ja" Voraussetzung für eine Beauftragung als Subunternehmer.
Sind zum Zeitpunkt der Beantwortung der Fragen noch nicht alle Forderungen erfüllt, hat das Unternehmen unverzüglich nachweisbare Maßnahmen zu ergreifen, welche die Erfüllung in Zukunft sicherstellen und darf die betreffenden Fragen positiv beantworten.

Außer: das Unternehmen unterliegt nicht dem Geltungsbereich des ArbeitnehmerInnenschutzgesetzes ASchG (Frage 1.1)!
In diesem Fall nur Punkte 1.1, 8. und 9. ausfüllen!

Zutreffende Kästchen sind anzukreuzen: im Abschnitt 1 sind zusätzliche Angaben gefordert.

Unternehmen: .....

(Name, Anschrift, Tel., e-mail, etc.) .....

Branche: .....

Name des Firmenleiters/
der Firmenleiterin: .....

Abschnitt	Ja	Nein	Anmerkung
1. Politik und Organisation von Sicherheit-, Gesundheits- und Umweltschutz	—	—	—
1.1 Wurde geprüft, ob das Unternehmen dem Geltungsbereich des ArbeitnehmerInnenschutz-gesetzes-ASchG unterliegt?	☐	☐	

☐ Das Unternehmen unterliegt dem Geltungsbereich des ASchG.

Daher sind nachstehende Angaben betreffend Präventivdienste zu machen:

Durch wen erfolgt sicherheitstechnische Betreuung?

- ☐ eigene Sicherheitsfachkraft (SFK)
- ☐ externe SFK
- ☐ sicherheitstechnisches Zentrum
- ☐ Präventionszentrum
- ☐ Unternehmermodell

Zugehörenden Namen und tel. Erreichbarkeit angeben:

.....

Durch wen erfolgt arbeitsmedizinische Betreuung?

- ☐ eigener Arbeitsmediziner (AMed)
- ☐ externer AMed
- ☐ arbeitsmedizinisches Zentrum
- ☐ Präventionszentrum

Zugehörenden Namen und tel. Erreichbarkeit angeben:

.....

☐ Das Unternehmen unterliegt nicht dem Geltungsbereich des ASchG.

Abschnitt	Ja	Nein	Anmerkung
1.2 Wurde geprüft, ob eine statistische Auswertung von Arbeitsunfällen erforderlich ist?	☐	☐	

Bei Beschäftigung von Arbeitnehmern durch das Unternehmen sind jedenfalls nachstehende Angaben für die letzten 3 Jahre zu machen:

	20..	20..	20..
Zahl der Arbeitnehmer	.....	.....	.....
Zahl der meldepflichtigen Arbeitsunfälle (AU),	.....	.....	.....
davon tödlich	.....	.....	.....
Zahl der summierten Ausfallkalendertage aufgrund von Aus	.....	.....	.....

1.3 Wurde geprüft, ob für das Unternehmen ein Abfallbeauftragter erforderlich ist?	☐	☐	

☐ Es gibt einen Abfallbeauftragten.
Name und tel. Erreichbarkeit:
.....

☐ Es gibt keinen Abfallbeauftragten, weil nicht erforderlich

.4 Wurde geprüft, ob für das Unternehmen Sicherheitsvertrauenspersonen (SVP) nach ASchG erforderlich sind?	☐	☐	

☐ Es gibt SVPs.
Anzahl: .....

☐ Es gibt keine SVPs, weil nicht erforderlich

1.5 Wurde geprüft, ob für das Unternehmen ein Arbeitsschutzausschuß (ASA) nach ASchG erforderlich ist?	☐	☐	

☐ Es gibt einen ASA mit mind. 2 Sitzungen im Jahr

☐ Es gibt keinen ASA, weil nicht erforderlich

Abschnitt	Ja	Nein	Anmerkung
.6 Wurde geprüft, ob für das Unternehmen ausgebildete Ersthelfer nach ASchG erforderlich sind? ☐ Es gibt Ersthelfer. Anzahl: ..... ☐ Es gibt keine Ersthelfer, weil nicht erforderlich	☐	☐	
2. Evaluierung, Persönl. Schutzausrüstung	—	—	—
2.1 Werden für jede Baustelle die Gefährdungen ermittelt und dokumentiert?	☐	☐	
2.2 Werden aufgrund der Gefährdungsbeurteilung Schutzmaßnahmen festgelegt und dokumentiert?	☐	☐	
2.3 Erfolgt bei veränderten Gegebenheiten eine Aktualisierung der zuvor genannten Punkte?	☐	☐	
2.4 Wird Persönliche Schutzausrüstung (PSA) auf Basis der Evaluierung zur Verfügung gestellt, instandgehalten und ersetzt?	☐	☐	
3. Personalauswahl	—	—	—
3.1 Findet vor dem Einsatz der Arbeitnehmer eine Überprüfung der fachlichen Qualifikation statt?	☐	☐	
3.2. Findet vor dem Einsatz der Arbeitnehmer eine Überprüfung besonderer Qualifikationen im Bezug auf Arbeitssicherheit (z.B. Staplerfahrer, Ersthelfer, SVP, sonstige Berechtigungen) statt?	☐	☐	
3.3 Werden auf jeder Baustelle Arbeitnehmer eingesetzt, welche die deutsche Sprache verstehen?	☐	☐	
4. Unterweisung, Schulung	—	—	—
4.1. Werden die Mitarbeiter durch das eigene Unternehmen über die allgemeinen Gefährdungen am Arbeitsplatz unterwiesen?	☐	☐	
4.2. Erfolgen Schulungen von Führungskräften zum Thema „Sicherheit, Gesundheits- und Umweltschutz"?	☐	☐	
4.3 Erfolgen Schulungen von operativen Arbeitnehmern zum Thema „Sicherheit, Gesundheits- und Umweltschutz"?	☐	☐	

	Abschnitt	Ja	Nein	Anmerkung
5.	**Kommunikation in Sicherheit, Gesundheits- und Umweltschutz (SGU)**	—	—	—
5.1	Steht bei firmeninternen Sitzungen das Thema SGU auf der Tagesordnung?	☐	☐	
5.2	Werden besondere Aktionen betreffend Arbeitssicherheit durchgeführt?	☐	☐	
6.	**Regeln, Vorschriften**	—	—	—
6.1	Gibt es Vorschriften und Betriebsanweisungen für allgemeine und besondere Tätigkeiten?	☐	☐	
6.2	Werden für das Unternehmen tätige Subunternehmer vor Aufnahme der Tätigkeit über derartige Vorschriften und Betriebsanweisungen unterwiesen?	☐	☐	
6.3	Gibt es darüber Nachweise?	☐	☐	
7.	**Begehungen**	—	—	—
7.1	Gibt es von den verantwortlichen Führungskräften Arbeitssicherheits-Begehungen von Baustellen?	☐	☐	
7.2	Gibt es ein Verfahren zur Verfolgung von Verbesserungsmaßnahmen, die bei derartigen Begehungen festgelegt werden?	☐	☐	
7.3	Werden die zuvor genannten Punkte dokumentiert?	☐	☐	
8.	**Arbeitsmittel**	—	—	—
8.1	Weisen alle Geräte und Maschinen ab Baujahr 1996 ein CE-Prüfzeichen auf?	☐	☐	
8.2	Gibt es für alle Geräte und Maschinen Bedienungsanleitungen und/oder Betriebsanweisungen?	☐	☐	
8.3	Werden Geräte und Maschinen nach Arbeitsmittelverordnung - AM-VO regelmäßig überprüft?	☐	☐	
8.4	Werden elektrische Arbeitsmittel und prüfpflichtige Persönliche Schutzausrüstung jährlich überprüft?	☐	☐	
8.5	Erfolgt eine Dokumentation der zuvor genannten Überprüfungen?	☐	☐	

	Abschnitt	Ja	Nein	Anmerkung
9.	**Arbeitsstoffe**	—	—	—
9.1	Werden bei geplanter Verwendung gefährlicher Arbeitsstoffe die Grundsätze der Unfallverhütung (Organisatorische und technische Schutzmaßnahmen haben Vorrang vor persönlicher Schutzausrüstung) angewendet?	☐	☐	
9.2	Stehen bei Verwendung gefährlicher Arbeitsstoffe die Sicherheitsdatenblätter zur Verfügung?	☐	☐	
10.	**Unfälle, Notfälle**	—	—	—
10.1	Werden schwere Unfälle, besondere Sach- oder Umweltschäden detailliert untersucht?	☐	☐	
10.2	Gibt es hierüber Aufzeichnungen?	☐	☐	

Anhang zum Fragebogen

Im Falle einer Beauftragung ist auf Anfrage vorzulegen:

- Name der Aufsichtsperson
- Name des Stellvertreters der Aufsichtsperson
- Nachweise betreffend Abschnitt 1 des vorliegenden Fragebogens
- Auflistung der Namen der auf der Baustelle eingesetzten Führungskräfte und operativen Mitarbeiter.

  Auf dieser Auflistung sind zusätzliche Angaben erforderlich betreffend
  – fachliche Qualifikation
  – besondere Qualifikationen, falls zutreffend (z. B. Staplerfahrer, Ersthelfer, etc.)
  – Hinweis auf Deutsch-Kenntnis, falls erforderlich (zumindest 1 AN je Partie)
- Formblatt mit Inhalt und Datum der letzten Unterweisung durch das Unternehmen, sowie Namen und Unterschriften der unterwiesenen Mitarbeiter
- Evaluierung

Bei Veränderungen sind die Angaben zu aktualisieren.

..... Ort, Datum

..... Für das Unternehmen

Einleitung

SCC (Sicherheits Certifikat Contraktoren) ist ein Managementsystem auf dem Gebiet von Sicherheit, Gesundheits- und Umweltschutz.

Um das SCC-Zertifikat zu erlangen, sind mehrere vorgegebene Kriterien zu erfüllen.
Eines davon verlangt, dass ein Unternehmen, welches als Personaldienstleister für unter SCC-Auflagen laufende Baustellen tätig ist, Erfordernisse, die der SCP-Checkliste entsprechen, erfüllt.
(SCP bedeutet „Sicherheits Certifikat Personaldienstleistungen", ist Teil der Unterlagen des Sektorkomitees SCC Austria.

Als Nachweis hiefür bieten sich zwei Möglichkeiten:

Variante 1: Das Unternehmen weist nach, dass es das SCP-Zertifikat erhalten hat.

Variante 2: Das Unternehmen wird durch den Auftraggeber auf Basis der SCP-Checkliste (Dokument CH 3.5-STO-08) beurteilt.
Grundlage hiefür ist die Beantwortung des vorliegenden Fragebogens.

In jedem Fall kann sich der Auftraggeber des Personaldienstleisters durch Einblicknahme in Nachweise, durch Vorlegenlassen von Unterlagen und/oder durch Kontrolle auf der Baustelle von der Erfüllung der geforderten Kriterien überzeugen.

Im Falle einer Beauftragung des Unternehmens sind die im Anhang zum Fragebogen geforderten Unterlagen vor Beginn der Arbeiten dem Bauleiter des Auftraggebers schriftlich zu übergeben.

Erläuterung zum Ausfüllen des Fragebogens

Wenn das Unternehmen ein SCP-Zertifikat erhalten hat, ist eine Kopie desselben zu übermitteln (vgl. Variante 1 der Einleitung). Der unausgefüllte Fragebogen ist beizulegen.

Erfolgt die Beurteilung des Unternehmens durch den Auftraggeber (vgl. Variante 2 der Einleitung), ist die Erfüllung sämtlicher Fragen dieses Fragebogens mit „Ja" Voraussetzung für eine Beauftragung als Personaldienstleister.
Sind zum Zeitpunkt der Beantwortung der Fragen noch nicht alle Forderungen erfüllt, hat das Unternehmen unverzüglich nachweisbare Maßnahmen zu ergreifen, welche die Erfüllung in Zukunft sicherstellen und darf die betreffenden Fragen positiv beantworten.

Außer: das Unternehmen unterliegt nicht dem Geltungsbereich des ArbeitnehmerInnenschutzgesetzes ASchG (Frage 1.1)!
In diesem Fall nur Punkte 1.1 ausfüllen!

Zutreffende Kästchen sind anzukreuzen; im Abschnitt 1 sind zusätzliche Angaben gefordert.

Unternehmen: .....

(Name, Anschrift, Tel., e-mail, etc.) .....

Branche: .....

Name des Firmenleiters/
der Firmenleiterin: .....

Abschnitt	Ja	Nein	Anmerkung
1. Politik und Organisation von Sicherheit-, Gesundheits- und Umweltschutz	—	—	—
1.1 Wurde geprüft, ob das Unternehmen dem Geltungsbereich des ArbeitnehmerInnenschutzgesetzes ASchG unterliegt?	☐	☐	

☐ Das Unternehmen unterliegt dem Geltungsbereich des ASchG.

Daher sind nachstehende Angaben betreffend Präventivdienste zu machen:

Durch wen erfolgt sicherheitstechnische Betreuung?

- ☐ eigene Sicherheitsfachkraft (SFK)
- ☐ externe SFK
- ☐ sicherheitstechnisches Zentrum
- ☐ Präventionszentrum
- ☐ Unternehmermodell

Zugehörenden Namen und tel. Erreichbarkeit angeben:

.....

Durch wen erfolgt arbeitsmedizinische Betreuung?

- ☐ eigener Arbeitsmediziner (AMed)
- ☐ externer AMed
- ☐ arbeitsmedizinisches Zentrum
- ☐ Präventionszentrum

Zugehörenden Namen und tel. Erreichbarkeit angeben:

.....

☐ Das Unternehmen unterliegt nicht dem Geltungsbereich des ASchG.

Abschnitt	Ja	Nein	Anmerkung
.2 Wurde geprüft, ob auf Basis der ermittelten Gefährdungen (vgl. Abschn. 3) Zeitarbeitskräfte arbeitsmedizinisch untersucht werden müssen? ☐ Es gibt einen Nachweis über Eignungs- und Folgeuntersuchungen, die durch ermächtigte Ärzte durchgeführt werden. ☐ Es gibt keinen Nachweis über Eignungs- und Folgeuntersuchungen, weil diese nicht erforderlich sind.	☐	☐	
2. Organisation in Sicherheit, Gesundheits- und Umweltschutz (SGU)	—	—	—
2.1 Nehmen Führungskräfte und operative Arbeitnehmer an fachspezifischen Veranstaltungen über Arbeitssicherheit teil?	☐	☐	
2.2 Gibt es Anforderungsprofile für die Mitarbeiter?	☐	☐	
2.3 Erfolgen Schulungen von Führungskräften zum Thema „Sicherheit, Gesundheits- u. Umweltschutz"?	☐	☐	
2.4 Erfolgen Schulungen von operativen Arbeitnehmern zum Thema „Sicherheit, Gesundheits- und Umweltschutz"?	☐	☐	
2.5 Gibt es über die zuvor genannten Schulungen Nachweise?	☐	☐	
2.6 Steht bei firmeninternen Sitzungen das Thema SGU auf der Tagesordnung?	☐	☐	
3. Gefährdungsermittlung	—	—	—
3.1 Erfolgt eine Kontrolle der vom Entleiher durchgeführten Evaluierung (Ermittlung von Gefährdungen, Festlegung von Maßnahmen) durch das Unternehmen?	☐	☐	

	Abschnitt	Ja	Nein	Anmerkung
4.	**Personalauswahl**	—	—	—
4.1	Findet vor dem Einsatz der Zeitarbeitskräfte eine Überprüfung ihrer Qualifikation statt?	☐	☐	
4.2	Werden vom Entleiher die geforderten Qualifikationen genau definiert?	☐	☐	
4.3	Gibt es ein Verfahren zur Gegenüberstellung von geforderten und gebotenen Qualifikationen?	☐	☐	
4.4	Werden die getroffenen Vereinbarungen durch das Unternehmen kontrolliert?	☐	☐	
4.5	Werden über die Zeitarbeitskräfte Personalakte geführt?	☐	☐	
4.6	Erfolgen nach Ablauf des Verleihvertrages Nachbesprechungen mit dem Entleiher, sowie mit der Zeitarbeitskraft über die Durchführung der geleisteten Arbeit?	☐	☐	
5.	**Regeln, Vorschriften**	—	—	—
5.1	Werden Zeitarbeitskräfte durch das Unternehmen über allgemein gültige Vorschriften auf dem Gebiet von SGU unterwiesen?	☐	☐	
5.2	Gibt es hierüber Nachweise?	☐	☐	
5.3	Werden Zeitarbeitskräfte durch das Unternehmen über speziell gültige Vorschriften des Entleihers auf dem Gebiet von SGU unterwiesen?	☐	☐	
5.4	Gibt es hierüber Nachweise?	☐	☐	
6.	**Unfälle, Notfälle**	—	—	—
6.1	Werden schwere Unfälle, besondere Sach- oder Umweltschäden detailliert untersucht?	☐	☐	
6.2	Gibt es hierüber Aufzeichnungen?	☐	☐	

Anhang zum Fragebogen

Im Falle einer Beauftragung ist auf Anfrage vorzulegen:

- Nachweise betreffend Abschnitt 1 des vorliegenden Fragebogens

- Auflistung der Namen der auf der Baustelle eingesetzten Führungskräfte und operativen Mitarbeiter.

  Auf dieser Auflistung sind zusätzliche Angaben erforderlich betreffend

  -- fachliche Qualifikation
  -- besondere Qualifikationen, falls zutreffend (z. B. Staplerfahrer, Ersthelfer, etc.)
  -- Hinweis auf Deutsch-Kenntnis, falls erforderlich (zumindest 1 AN je Partie)

- Formblatt mit Inhalt und Datum der letzten Unterweisung durch das Unternehmen, sowie Namen und Unterschriften der unterwiesenen Mitarbeiter

Bei Veränderungen sind die Angaben zu aktualisieren.

....

Ort, Datum Für das Unternehmen

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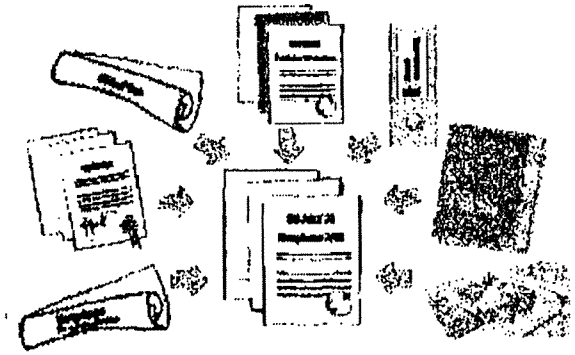
Baustellenordner

„Arbeitssicherheit“



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Baustellenordner

„Arbeitssicherheit"

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Sicherheit auf Baustellen

Sicherheitstechnisches Know How

- Hausverstand
- Wissenstand / Bildung
- Schulungen / Information
- Unterweisungen etc.

Unterlagen auf Baustelle

- Evaluierung
- Alarmpläne, SiGe-Pläne
- Prüfprotokolle
- Unterweisungen
- div. QM-Unterlagen etc.

Baustellenordner „Arbeitssicherheit

„Baustellenordner Arbeitssicherheit"

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Baustellenordner Arbeitssicherheit:

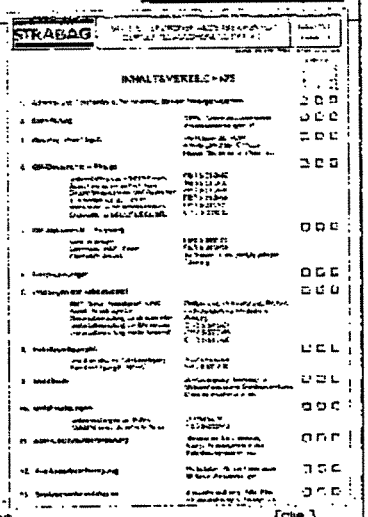
(FB 3.5-STO-01)

→QM-Formular!

→Baustellenordner lt. Vorgaben anlegen!

→Laufend aktualisieren/ergänzen!

Der Baustellenordner Arbeitssicherheit ist ein Leitfaden für Bauleiter/Poliere für die ordnungsgemäße sicherheitstechnische Abwicklung von Baustellen und muss natürlich den Baustellenanforderungen angepasst und erweitert werden.



„Baustellenordner Arbeitssicherheit"

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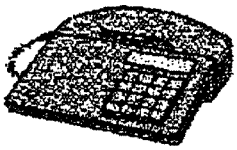
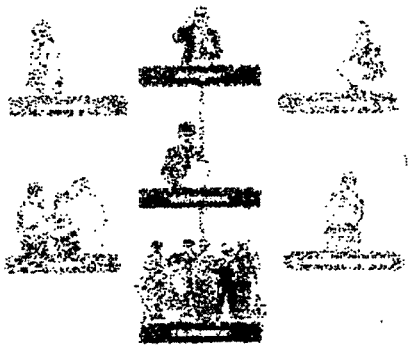
→ **1. Adress- und Telefonliste, Firmenliste, Baustellenorganigramm:**





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➔ **2. Evaluierung:**

Evaluierung mit ÖBEV:

+ Baustellencheckliste !!!:

„Baustellenordner" Arbeitssicherheit

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➔ **2.1. Beilagen zur Evaluierung:**

Das sind z.B.:

- ➔ Sicherheitsdatenblätter
- ➔ Betriebsanweisungen u. Bedienungsanleitungen
- ➔ Liste der verwendeten gefährlichen Arbeitsstoffe
- ➔ Messergebnisse (z.B. Lärmmessungen, MAK-Messungen etc.)
- ➔ Diverse Aufzeichnungen (z B. Arbeitsunfälle)
- ➔ z.B. Protokolle des Arbeitsschutzausschuß
- ➔ Betriebsanlagengenehmigungsbescheide
- ➔ sonstige relevante Unterlagen, Pläne, etc.

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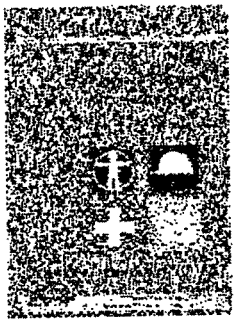
➔ **3. Gesetze und Unterlagen:**



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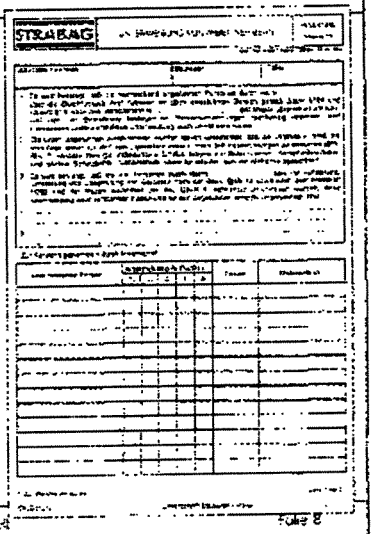
➔ **4. QM-Dokumente - Ablage:**

Unterweisung von Arbeitnehmern:

(FB 3.5-STO-02)

- Pkt. 1 – Allgemeine Unterweisung
- Pkt. 2 – Unterweisung PSA
- Pkt. 3 – Unterweisung Gerüste
- Pkt. 4+5 – baustellenspez. Unterweisung



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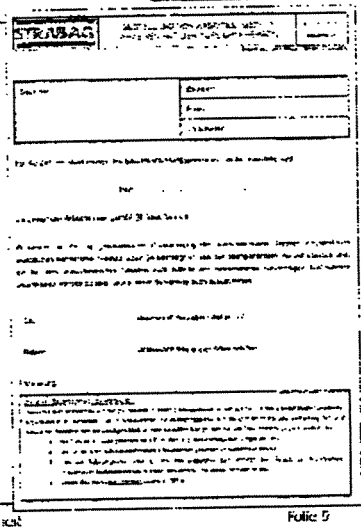
Bestellung von Arbeitnehmern in Abwesenheit der Aufsichtsperson:

(FB 3.5-STO-03)



„Baustellenordner Arbeitssicherheit"

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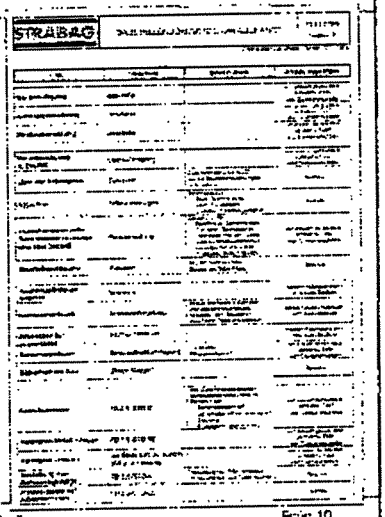
Baustellendokumente und Aushänge:

(FB 3.5-STO-04)



„Baustellenordner Arbeitssicherheit"

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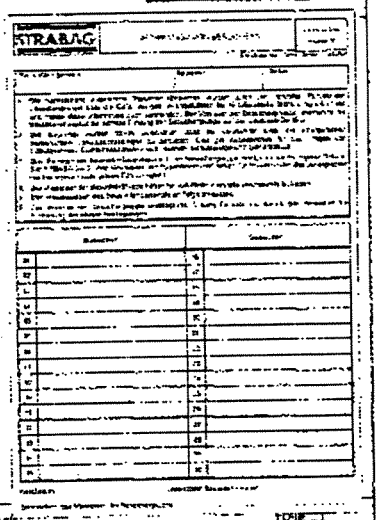
Information von Besuchern:

(FB 3.5-STO-06)



01. März 2004

Strabag Arbeitssicherheit
Ing. Jochen Berger

Folie 11

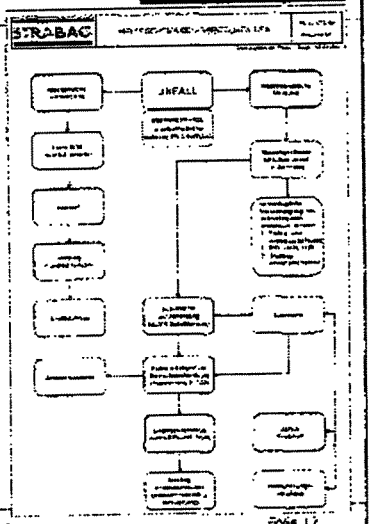
„Baustellenordner Arbeitssicherheit"

STRABAG

Meldeschema bei Arbeitsunfällen:

(FB 3.5-STO-09)

NEU: Meldung eines Beinahe-Unfalles !!!



01. März 2004

Strabag Arbeitssicherheit
Ing. Jochen Berger

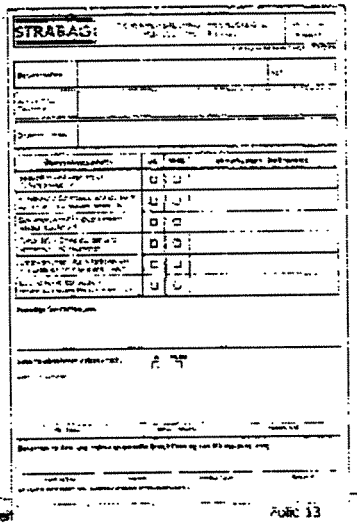
Folie 12

„Baustellenordner Arbeitssicherheit"

STRABAG

Sicherheitstechnische Checkliste für UBL-DRL-BRL-GRL:

(CH 3.5-STO-02)



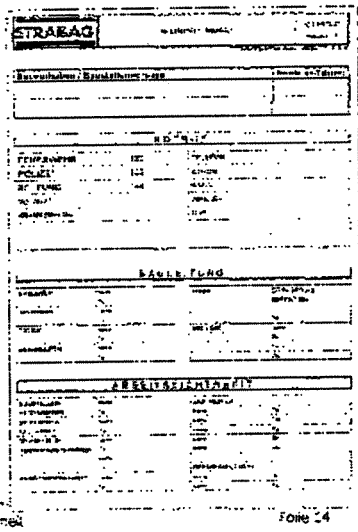
„Baustellenordner Arbeitssicherheit"

STRABAG

➔ **5. QM-Dokumente - Aushang**

Notrufnummern:

(FB 3.5-STO-07)

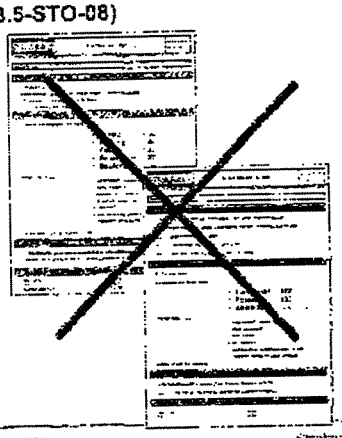


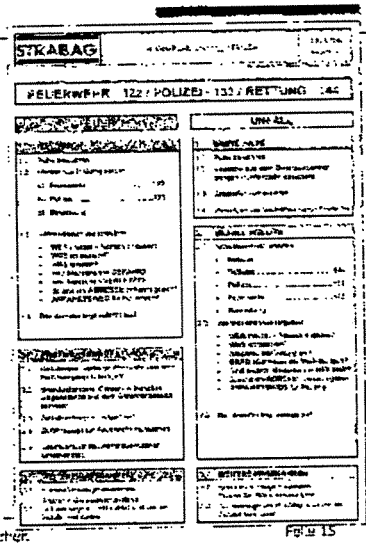
Baustellenordner "Arbeitssicherheit"

STRABAG

Alarmplan Unfall / Feuer:

(FB 3.5-STO-08)





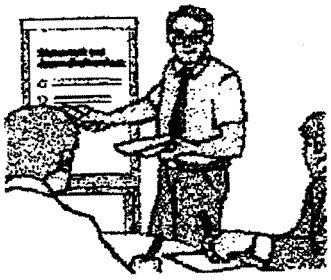
Baustellenordner "Arbeitssicherheit"

STRABAG

➔ **6. Unterweisungen:**

Durchführung und Dokumentation der Unterweisungen !!!

Ablage der ausgefüllten Unterweisungsformulare



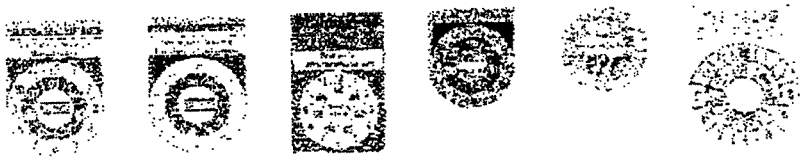
„Baustellenordner Arbeitssicherheit"

STRABAG

→ 7. Prüfungen der Arbeitsmitttel:

BMTI Gerät, Fremdgerät, GWG, Kranz, Anschlagmittel

Prüfplan, Abnahmeprüfung, Prüfung nach Aufstellung, wiederkehr Prüfung



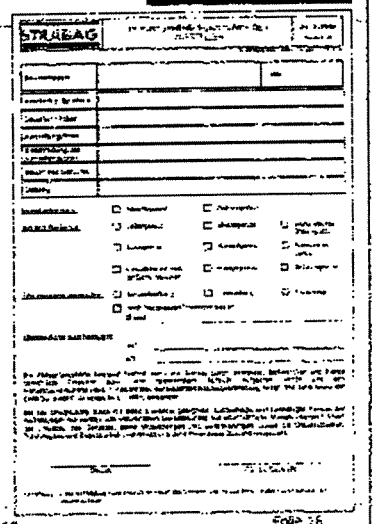
Gerüstüberprüfung durch Aufsteller	CH 3.5-STO-04
Gerüstüberprüfung vor Ersteinsatz	CH 3.5-STO-05
Gerüstüberprüfung wiederkehrend	CH 3.5-STO-06

„Baustellenordner Arbeitssicherheit"

STRABAG

Gerüstüberprüfung durch den Aufsteller:

(CH 3.5-STO-04)

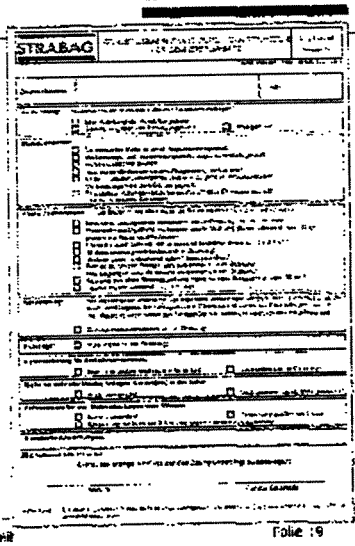


„Baustellenordner Arbeitssicherheit"

STRABAG

Gerüstüberprüfung durch den Benutzer vor dem Ersteinsatz:

(CH 3.5-STO-05)

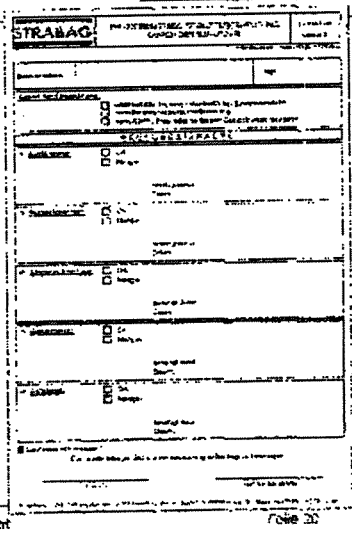


„Baustellenordner Arbeitssicherheit"

STRABAG

Wiederkehrende Gerüstüberprüfung durch den Benutzer:

(CH 3.5-STO-06)

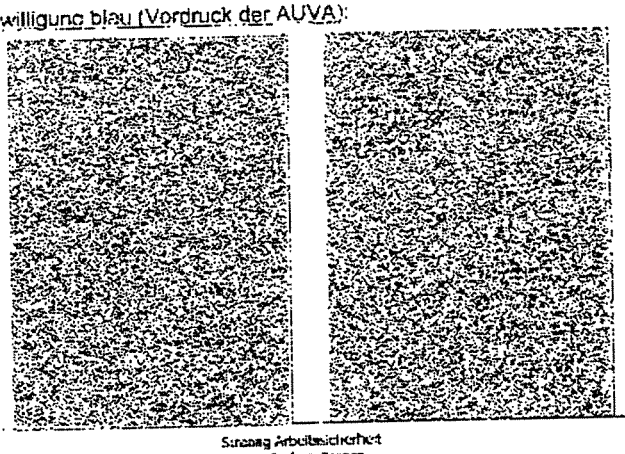


Baustellenordner „Arbeitssicherheit"

STRABAG

→ **8. Fahrbewilligungen:** 2 Arten

-) Fahrbewilligung blau (Vordruck der AUVA):

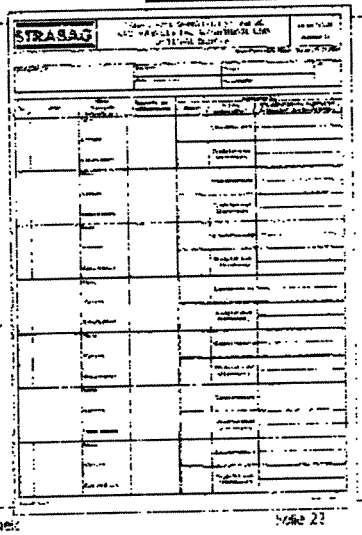


Baustellenordner „Arbeitssicherheit"

STRABAG

Fahrbewilligung lt. AM-VO:

(FB 3.5-STO-05)



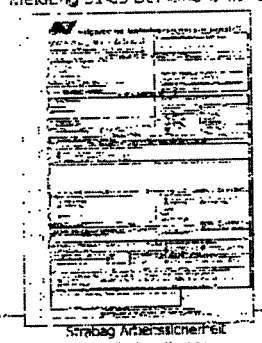
„Baustellenordner Arbeitssicherheit"

STRABAG

➔ **9. Bescheide etc.:** Baubewilligung, Genehmigung, Straßenbenutzung, Sonderarbeitszeit, Baustellensicherung, etc.

➔ **10. Unfallmeldungen:** Unfallmeldungen der AUVA, Meldung eines Beinahe-Unfalles

Leerformular FB 3.5-STO-12



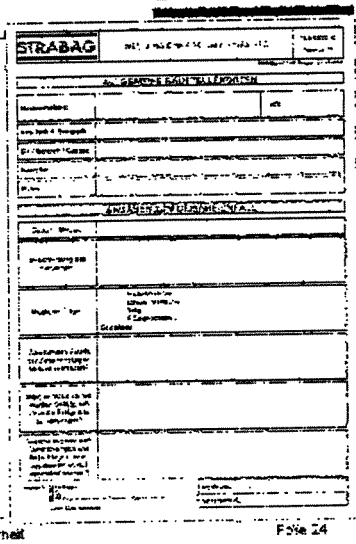
„Baustellenordner Arbeitssicherheit"

STRABAG

Meldung eines Beinaheunfalles:

(FB 3.5-STO-12)

NEUES DOKUMENT !!!



Baustellenordner „Arbeitssicherheit"

STRABAG

➔ **11. ADR – Gefahrguttransport:** Merkblätter, Unterweisung
Ablage Unterlagen in Kopie
Beförderungspapier, etc.

➔ **12. Ausländerbeschäftigung:** Merkblätter, Ablage Unterlagen,
ID-Karte, Reisepass, etc.

➔ **13. Bauarbeitenkoordination:** Baustellenordnung, SiGe-Plan
Vorankündigung, Unterlage etc

STRABAG

Gorman

Annex E
Risks Evaluation on Site

BAUSTELLE
ASA 2002

Firma:

Strabag AG

Herbststraße 6 - 10
A 1160 WIEN
0043 1 49112 4413
0043 1 49112 4403

STRABAG

Beschreibung:

Art und Umfang der Baustelle:

Aufsichtsperson:

Vertretung der Aufsichtsperson:

Beginn der Bauarbeiten:

Voraussichtliches Ende:

Voraussichtliche Anzahl der Beschäftigten:

Ersteller: Administrator

Erstelldatum: 22.11.02

Die Evaluierung besteht aus:

Deckblatt
Inhaltsverzeichnis
Besonderheiten der Baustelle

Mitgeltende Unterlagen:

Inhaltsverzeichnis ASA 2002

	Ersteller: Administrator
	Erstelldatum: 22.11.02

Arbeitsvorgänge

Aushubarbeiten
Böschungen
Transport/Laden händisch
Transport/Laden maschinell

Arbeitsplätze

Arbeiten in Baugruben/Arbeitsgräben
Arbeiten in Künetten

Arbeitsmittel

Bagger
Bagger mit Hebevorrichtung

Arbeitsstoffe

Bauchemie allgemein
Stäube

BAUSTELLE

Checkliste - ASA 2002

	Ersteller: Administrator
	Erstelldatum: 22.11.02
	Anmerkung (z.B. Wer? Wann?)

Arbeitsvorgänge

Aushubarbeiten

- [ ] Sind erdverlegte Leitungen und Einbauten bekannt?

Böschungen

- [ ] Ist die Böschungsneigung entsprechend der Bodenart festgelegt?

Arbeitsplätze

Arbeiten in Baugruben/Arbeitsgräben

- [ ] Sind Schutzmaßnahmen für Arbeiten in Baugruben/Arbeitsgräben getroffen?

Arbeiten in Künetten

- [ ] Sind Schutzmaßnahmen für Arbeiten in Künetten getroffen?

Arbeitsmittel

Arbeitsstoffe

Bauchemie allgemein

- [ ] Sind die Gefahren durch Arbeitsstoffe bekannt?
- [ ] Sind der Einsatz und die Lagerung von Bauchemikalien geregelt?

BAUSTELLE

Besonderheiten - ASA 2002

	Ersteller: Administrator
	Erstelldatum: 22.11.02

Arbeitsvorgänge

Arbeitsplätze

Arbeitsmittel

Arbeitsstoffe

BAUSTELLE

ASA 2002

	Ersteller: Administrator Erstelldatum: 22.11.02

Arbeitsvorgänge

Aushubarbeiten

Maßnahmen: Für fachgerechten Verbau oder Böschung sorgen. * Einbauten (erdverlegte Leitungen sichern, ggf. verlegen), Geologie, Erschütterungen, Auflasten, Grundwasserstand etc. erheben und berücksichtigen. * Erdverlegte Leitungen sichern, ggf. verlegen oder ausbauen lassen. * Untergraben ist unzulässig, Überhänge sind zu beseitigen. * Gegen gefahrbringende Witterungseinflüsse schützen.

Gefahren: Verschütten * Absturz * Stürzen / fallen

PSA: Sicherheitsschuhe/-stiefel

Unterlagen: AUVA M 223 * BauV 6. Abschnitt * Baumappe C1-C6 * Baumappe 2002 D1 Böschungen * Baumappe 2002 D4 Baugrubenverbau * Baumappe 2002 D2 Grabenverbau

Böschungen

Maßnahmen: Die Böschungsneigung fachgerecht wählen (Bodenart, Auflasten, Erschütterungen, Grundwasser etc.). * Ohne Nachweis Regelböschung möglich; 45° für Stichböden; 60° für Hackböden; 80° für Schrämmböden; 90° für Sprengböden. * Bei Abweichung rechnerischer Nachweis erforderlich (aufliegend und Kontrolle ob der Boden dem Nachweis entspricht). * Ggf. Maßnahmen gegen Witterungseinflüsse wie Zementmörtelspritzer, Spritzbeton, Folienabdeckung. * Bei Gräben und Baugruben bis 1,25 m Tiefe können die Wände senkrecht angelegt werden, wenn der Boden standfest ist (Auflasten beachten).

Gefahren: Verschütten * Rollen/Gleiten/Abrutschen

Prüfungen: Regelmäßige Überprüfung

Unterlagen: Baumappe C4 * AUVA M 223 * BauV 6. Abschnitt * Baumappe 2002 D1 Böschungen

Transport/Laden händisch

Maßnahmen: Ladung ausreichend sichern (Verspannen, Verkeilen, Versperren). * Transportfahrzeug max. Breite/Höhe 2,5 m/4 m, sonst Ausnahmegenehmigung. * Sichere Auffahrtsrampe verwenden, geeignete Hebehilfen einsetzen.

Sonstiges: Auf physische Leistungsfähigkeit ist zu achten.

Gefahren: Quetschen * Kippen/Herabfallen * Überlastung

PSA: Sicherheitsschuhe/-stiefel * Ggf. Schutzhandschuhe

Fachkunde: Für Jugendliche ist das Manipulieren von schweren Lasten verboten

Unterlagen: Baumappe D4 * Baumappe 2002 D23 Transport / Ladungssicherung

■ **Transport/Laden maschinell**

Maßnahmen: Ladung ausreichend sichern (Verspannen, Verkeilen, Versperren). * Transportfahrzeug max. Breite/Höhe 2,5 m/4 m, sonst Ausnahmegenehmigung. * Sichere Auffahrtsrampen bzw. geeignetes Hebegerät einsetzen. * Keine Personen im Bereich der schwebenden Last. * Nicht neben oder hinter zu ladenden Fahrzeugen (Abroll-/ Kippgefahr). * Zwischenlastfälle beachten (Dreh-/ Kippbewegungen).

Gefahren: Quetschen * Kippen/Herabfallen

PSA: Sicherheitsschuhe/-stiefel * Ggf. Schutzhelm * Ggf. Schutzhandschuhe

Fachkunde: Ggf. Führerschein

Unterlagen: Baumappe D4 * Baumappe 2002 D23 Transport / Ladungssicherung

Arbeitsplätze

■ **Arbeiten in Baugruben/Arbeitsgräben**

Maßnahmen: Fachgerechten Verbau oder Böschung sicherstellen (ab 1,25 m Tiefe jedenfalls). * Schutzstreifen 50 cm freilassen. * Absturzsicherung vorsehen. * Zugang über Treppen oder Leitern. * Auf Schadstoffansammlung achten. * Auf ausreichende Arbeitsraumbreite achten. * Bei Ausführung steilerer Neigung als Regelböschung: Standsicherheitsnachweis.

Sonstiges: Böschung/Verbau regelmäßig prüfen (jedenfalls nach starken Regenfällen, Tauwetter, Sprengungen oder wesentlichen Belastungsänderungen).

Gefahren: Verschütten * Rollen/Gleiten/Abrutschen * Stürzen / fallen * Ausrutschen

PSA: Sicherheitsschuhe/-stiefel * Ggf. Schutzhelm

Unterlagen: Baumappe C3 * Baumappe C4 * Baumappe C5 * AUVA M 223 * BauV 6. Abschnitt * Baumappe 2002 D1 Böschungen * Baumappe 2002 D3 Leitungssicherung * Baumappe 2002 D4 Baugrubenverbau * Baumappe 2002 D5 Arbeitsraumbreiten

	Ersteller: Administrator Erstelldatum: 22.11.02

■ **Arbeiten in Künetten**

Maßnahmen: Auf sachgerechten und geeigneten Verbau achten. Ausnahme: standfester Boden bis 1,25 m Tiefe, wenn keine Zusatzlasten und Erschütterungen gegeben sind (standfester Fels). * Nicht an ungesicherten Künettenwänden aufhalten (unten und oben). * Schutzstreifen 50 cm vorsehen. * Sicherheitsabstand vom Grabwerkzeug einhalten. * Auf Schadstoffansammlungen achten. * Kreuzende Leitungen sichern. * Herabfallen von Gegenständen verhindern. * Für sichere Auf-/Abstiege sorgen.

Sonstiges: Umpölzungen nur nach Rücksprache mit Fachkundigen.

Gefahren: Verschütten * Rollen/Gleiten/Abrutschen * Ausrutschen

PSA: Sicherheitsschuhe/-stiefel * Ggf. Schutzhelm

Unterlagen: Baumappe C2 * AUVA M 223 * BauV 6. Abschnitt * Baumappe 2002 D2 Grabenverbau * Baumappe 2002 D3 Leitungssicherung

Arbeitsmittel

■ **Bagger**

Maßnahmen: Gegen unbefugte Inbetriebnahme sichern. * Keine Person im Gefahrenbereich dulden. * Mitfahrt von Personen nur auf geeigneten Plätzen. * Personen nur mit geprüften Arbeitsmitteln heben. * Grabwerkzeug gegen unbeabsichtigtes Lösen sichern. * Auf tragfähigen Untergrund und Geländestufen achten (Sicherheitsabstand). * Bei Sichteinschränkung Einweiser. * Für Wartung: Motor abstellen; Geräteteile absenken oder stützen. * Gefährdungen aus Antrieb beachten.

Gefahren: Quetschen * Kippen/Herabfallen * Überfahren

PSA: Ggf. Schutzhelm * Ggf. Sicherheitsschuhe / -stiefel

Prüfungen: Jährlich * Vor Inbetriebnahme

Fachkunde: Ausbildung/betriebliche Erlaubnis * Für Jugendliche mit Lernfahrausweis oder Lenkerberechtigung (kraftrechtliche Vorschriften) erlaubt

Unterlagen: Bedienungsanleitung * BauV 21. Abschnitt * Baumappe D1 * AUVA M 250 * Arbeitsmittelverordnung - AM-VO §§ 24, 53 selbstfahrende Arbeitsmittel * Baumappe 2002 E1 Baumaschinen

■ **Bagger mit Hebevorrichtung**

Maßnahmen: Gegen unbefugte Inbetriebnahme sichern. * Keine Person in Gefahrenbereich

dulden. * Mitfahrt von Personen nur auf geeigneten Plätzen. * Personenhub nur mit geprüften Arbeitsmitteln. * Grabwerkzeug gegen unbeabsichtigtes Lösen sichern. * Auf tragfähigen Untergrund und Geländestufen achten (Sicherheitsabstände). * Bei Sichteinschränkung Einweiser. * Für Wartung: Motor abstellen; Geräteteile absenken oder stützen. * Gefahren aus Antrieb beachten. * Zurücklaufen der Last verhindern, durch: Rückschlagventil zwischen Pumpe und Hubzylinder oder Windwerk mit selbsthemmendem Getriebe, oder selbsttätig wirkende Bremse. * Beim Heben von Personen Zusatzbestimmungen beachten.

Gefahren: Quetschen * Kippen/Herabfallen * Überfahren

PSA: Ggf. Schutzhelm * Ggf. Sicherheitsschuhe / -stiefel

Prüfungen: Abnahmeprüfung * Jährlich * Vor Inbetriebnahme

Fachkunde: Ausbildung/betriebliche Erlaubnis * Für Jugendliche mit Lernfahrausweis oder Lenkerberechtigung (kraftrechtliche Vorschriften) erlaubt

Unterlagen: Bedienungsanleitung * BauV 21. Abschnitt * Prüfbuch aufliegend * Baumappe D1 * AUVA M 250 * Arbeitsmittelverordnung - AM-VO §§ 24, 53 selbstfahrende Arbeitsmittel * Baumappe 2002 E1 Baumaschinen

Arbeitsstoffe

■ Bauchemie allgemein

Maßnahmen: Sicherheitsdatenblätter sammeln und betroffenen Mitarbeitern zugänglich machen. * Einkauf von Schutzausrüstung entsprechend Anforderungen laut Sicherheitsdatenblatt z.B. spez. Material beim Schutzhandschuh informieren. * Unterweisung bezüglich spezieller Maßnahmen. * Einsatz des jeweiligen am wenigsten gefährlichen Arbeitsstoffes anstreben.

Sonstiges: Jugendschutzbestimmungen beachten. * Bei Be- und Entladen stets geschlossene Gebinde. * Verschmutzung der Hände durch anhaftende Inhaltsstoffe vermeiden.

Gefahren: lt. Sicherheitsdatenblatt

PSA: lt. Sicherheitsdatenblatt

Prüfungen: lt. ASCHG 4. Abschnitt

Fachkunde: Präventivdienste: Mitwirken bei Auswahl und Verwendung

Unterlagen: BauV 2. Abschnitt * Sicherheitsdatenblätter * Gefahrenhinweise auf dem

Gebinde * Verordnung über Beschäftigungsverbote und Beschränkungen für Jugendliche

■ **Stäube**

Maßnahmen: Je nach Staubart, Anfall und Situation (z.B. Arbeiten in geschlossenen Räumen) im Einzelfall Maßnahmen gesondert vorsehen. * Ggf. Einsatzzeitbeschränkung. * Ggf. Absaugung. * Ggf. ärztliche Untersuchungen.

Sonstiges: z.B. Asbest: Abtragen von Spritzasbest. * Blei: Abschleifen alter Rostschutzanstriche. * Holzstaub: Sägen und Schleifen von Holz. * Quarz: Schleifen quarzhältiger Materialien.

Gefahren: Verätzen * Vergiften * Brand * Explosion * Staub/Dämpfe/Rauch

PSA: Ggf. Schutzbrille * Ggf. Schutzkleidung * Ggf. Atemschutz

Fachkunde: Für Jugendliche verboten

Unterlagen: AUVA M 201 * ASchG * AUVA M 390 * BauV 2. Abschnitt * AUVA M 290

BETRIEBSANWEISUNG

STRABAG

SEILBAGGER

Hinweis für den aufsichtspflichtigen Bauleiter / Polier

Für die Bedienung des übernommenen Baggers sind nur unterwiesene und bereits mit dem Gerät vertraute Arbeitnehmer heranzuziehen und eine Fahrbewilligung zu erteilen.
Vor der Verwendung eines für den Benützer neuen Gerätes hat dieser die Betriebsanleitung des Herstellers zu lesen und es ist eine gerätebezogene Unterweisung durch eine fachkundige Person zu veranlassen.(Besonderer Augenmerk bei fremdsprachigen Arbeitnehmern.)
Bagger mit vorhandener Überlasteinrichtung (Kranbetrieb) unterliegen bzgl. Abnahme- sowie wiederkehrender Überprüfung den Auflagen eines Autokranes und dürfen auch nur von Arbeitnehmern mit dem gesetzlichen Nachweis dieser Fachkenntnisse bedient werden.
Baustellenbezogene Besonderheiten sind im Zuge der Evaluierung zu erfassen.
Diese Betriebsanweisung ist Bestandteil der Evaluierung und ist dem Fahrer im Zuge der Unterweisung zur Kenntnis zu bringen.

SCHUTZMASSNAHMEN UND VERHALTENSREGELN

Kein Gerät ohne Fahrbewilligung durch den Arbeitgeber in Betrieb nehmen.
Machen Sie sich vor der Aufnahme der Arbeiten mit den Besonderheiten der Baustelle und der Arbeitsumgebung vertraut und informieren Sie sich insbesondere über Bodenbeschaffenheit, Erd- und Freileitungen sowie bestehende oder zu erwartende Windgeschwindigkeiten.
Beim Überschreiten der max.zulässigen Windgeschwindigkeit ist die Last abzusetzen und der Bagger in Parkposition zu bringen. Bei zu erwartendem Sturm über 20 m/sec bzw. Windstärke 8 muss der gesamte Ausleger flach auf dem Boden abgelegt werden.
Nehmen Sie nie ein Gerät ohne vorherigen Inspektionsrundgang in Betrieb.
Vergewissern Sie sich, daß alle Hauben und Deckeln geschlossen und alle Warnschilder montiert sind und kontrollieren Sie das Gerät auf augenscheinliche Mängel. Keine beschädigten oder in ihrer Tragfähigkeit unzureichenden Drahtseile oder Ketten verwenden.
Die Bedienungselemente dürfen nur vom Fahrersitz aus betätigt werden. Dulden Sie keine Beifahrer.
Im Gefahrenbereich des Baggers dürfen sich keine Personen aufhalten, der Aufenthalt unter schwebender Last ist verboten.
Bagger nur auf ebenem und festem Boden abstellen. Ausrüstung absetzen oder ablegen, Gerät gegen unbefugte Inbetriebnahme sichern.
Gerät nur bei abgestelltem Motor und ausgeschalteter Heizung tanken. Kein offenes Feuer, nicht rauchen, sich vom Standort des nächsten Feuerlöschers überzeugen.
Auf- und Abbau des Gerätes sowie Verladung nur nach den Angaben des Herstellers unter Beiziehung von diesbezüglich geschultem Personal auf ebenem und festem Untergrund mit ausreichender Bodenbeschaffenheit. Rampenverladung nur mit Einweiser.

WARTUNG und INSTANDHALTUNG

Wartungs- und Reparaturarbeiten dürfen nur von fachkundigen und dazu beauftragten Personen durchgeführt werden.
Für Arbeiten am Hydraulik- und Steuerungssystem sowie an den div. Bremsen sind spezielle Fachkenntnisse Voraussetzung.
Wartungsarbeiten nie an fahrender Maschine oder laufendem Motor vornehmen.
Vorhandene Wartungssperren verwenden.
Vor jeder Arbeit an Hydraulikleitungen diese drucklos machen. Vom Hersteller vorgesehene Wartungsschutzsperren verwenden.

ACHTUNG

Diese Anweisung ist nur ein Auszug der wesentlichsten Schutzmaßnahmen und Betriebsauflagen.
Die lückenlose Einhaltung der Betriebsanleitung des Geräteherstellers ist Voraussetzung für jeden sicheren und wirtschaftlichen Geräteeinsatz.

BETRIEBSANWEISUNG

STRABAG

BAGGERLADER

Hinweis für den aufsichtspflichtigen Bauleiter/Polier

Für die Bedienung des übernommenen Gerätes sind nur unterwiesene und bereits mit dem Gerätä vertraute Arbeitnehmer heranzuziehen und eine gerätebezogene Fahrbewilligung zu erteilen.
Vor der Verwendung eines für den Benützer neuen Gerätes hat dieser die Betriebsanleitung des Herstellers zu lesen oder es ist zumindest eine Unterweisung durch einen bereits mit dem Gerät vertrauten Mitarbeiter zu veranlassen.(Besonderer Augenmerk bei fremdsprachigen Arbeitnehmern.)
Achtung: Kennzeichen und Führerscheinpflicht auf öffentlichen Straßen oder Plätzen!
Bei Einsatz eines Gerätes mit Schnellwechseleinrichtung sowie einer Ausrüstung für das Heben von Einzellasten (abnahmepflichtig mit Prüfbuch und jährlich wiederkehrender Prüfung) sind dem Fahrer die diesbezüglichen Unterweisungen zur Kenntnis zu bringen und unterschreiben zu lassen. (siehe eigene Betriebsanweisung)
Baustellenbezogene Besonderheiten sind im Zuge der Evaluierung zu erfassen.
Diese Betriebsanweisung ist Bestandteil der Evaluierung und ist dem Fahrer im Zuge der Unterweisung zur Kenntnis zu bringen.

SCHUTZMASSNAHMEN UND VERHALTENSREGELN

Kein Gerät ohne Fahrbewilligung durch den Arbeitgeber in Betrieb nehmen.

Machen Sie sich vor der Aufnahme der Arbeiten mit den Besonderheiten der Baustelle u. der Arbeitsumgebung vertraut.
Nehmen Sie nie ein Gerät ohne vorherigen Inspektionsrundgang in Betrieb. Beim Befahren öffentlicher Straßen u. Plätze Gerät in den verkehrsrechtlich zulässigen Zustand bringen. Kennzeichen- u. Führerscheinpflicht beachten.
Vergewissern Sie sich, dass alle Hauben u.Deckeln geschlossen u.alle Warnschilder montiert sind u. kontrollieren Sie das Gerät auf augenscheinl. Mängel. Keine Inbetriebnahme eines defekten Gerätes.
Vor dem Starten : Fahrersitz, Lenksäule und Rückblickspiegel einstellen.
Sicherheitsgurt anlegen,.(Gerät nie von außen bedienen.)
Im Leerlauf Funktionsprobe der Betriebs- und Feststellbremse sowie Warneinrichtung durchführen.
Vor jeder Arbeitsaufnahme, auch nach Arbeitsunterbrechungen prüfen, ob sich Personen oder Hindernisse im Gefahrenbereich befinden. Im Bedarfsfall Warnzeichen geben. (Toter Sichtwinkel!)
Im Fahrbetrieb Laderschaufel immer in Bodennähe halten.(Bessere Sicht und Gerätestabilität.)
Mit voller Schaufel eine Höchstgeschwindigkeit von max. 10 km/h nicht überschreiten.
Nur auf ebenem Boden beladen, entladen und wenden.
Stets Tragfähigkeit des Bodens berücksichtigen und ausreichend Abstand zu Baugruben halten.
Beim Befahren von Steigungen empfohlene max.Werte nicht übersteigen, querfahren und drehen möglichst vermeiden, volle Schaufel möglichst bergseitig halten.
Im Baggerbetrieb immer Abstützungen verwenden.
Erkundigen Sie sich vor der Arbeit über erdverlegte Wasser-, Gasleitungen oder Stromkabel im Arbeitsbereich. Für Arbeiten unter Freileitungen vorgeschriebenen Sicherheitsabstand einhalten.
Gerät nur auf ebenem und festem Boden abstellen. Ladeschaufel absenken, Heckbagger in die vom Hersteller vorgesehene fixierbare Transportstellung bringen oder austrecken und absenken.
Feststellbremse anziehen. Fahrhebel in Neutralstellung bringen.
Motor abstellen und Zündschlüssel abziehen. Ev. vorhandene Sperre der Bedienungshebel einlegen.
Beim Absteigen vorgesehene Tritte und Haltegriffe verwenden, nicht am Lenkrad oder den Bedienungshebeln anhalten.
Bagger gegen unbefugte Inbetriebnahme sichern.
Gerät nur bei abgestelltem Motor tanken. Kein offenes Feuer, nicht rauchen, sich vom Standort des nächsten Feuerlöschers überzeugen.
Maschine verladen: Nur trockene und fettfreie Auffahrtsrampen und Transportflächen befahren. Mindestbodenfreiheit des Gerätes beachten, Einweiser beiziehen.

WARTUNG und INSTANDHALTUNG

Wartungs- u. Reparaturarbeiten dürfen nur von fachkundigen u. dazu beauftragten Personen durchgeführt werden.
Wartungsarbeiten nie an fahrender Maschine oder laufendem Motor vornehmen.
Ausrüstung immer absenken oder Hubarmsperren verwenden!
Vor jeder Arbeit an Hydraulikleitungen diese druckos machen.

ACHTUNG

Diese Anweisung ist nur ein Auszug der wesentlichsten Schutzmaßnahmen und Betriebsauflagen.
Die lückenlose Einhaltung der Betriebsanleitung des Geräteherstellers ist Voraussetzung für jeden sicheren und wirtschaftlichen Geräteeinsatz.

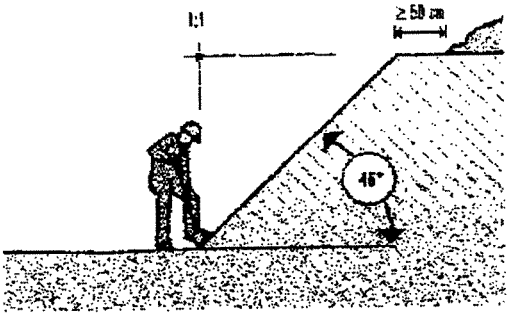
Böschungen

Böschungsneigung

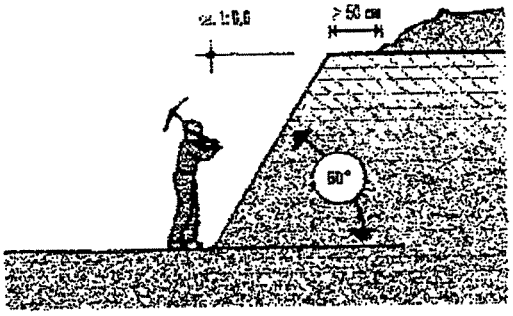
- Die Böschungsneigung richtet sich unter anderem nach
  - der Bodenart,
  - den vorhandenen Auflasten (z. B. Verkehr, Geräte, Aushub, angrenzende Bauwerke),
  - den möglichen Erschütterungen,
  - den Grundwasserverhältnissen,
  - den Witterungsverhältnissen,
  - den geologischen Verhältnissen.

- Ohne rechnerischen Nachweis dürfen die untenstehenden Böschungswinkel nicht überschritten werden.

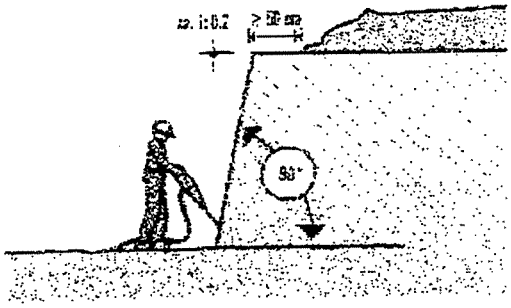
- **Nicht bindiger oder weicher bindiger Boden**
  z. B. Sande, Kiese, Mutterboden



- **Steifer oder halbfester bindiger Boden**
  z. B. Lehm, Mergel, fester Ton, Böden mit festem Zusammenhalt



- **Leichter Fels**
  nicht gebrach und nicht verwittert, keine zur Baugrube einfallenden Schichten, ohne Klüfte



- Schwerer Fels
  nur durch Sprengen lösbar

Böschungswinkel 90° erlaubt.

D 1

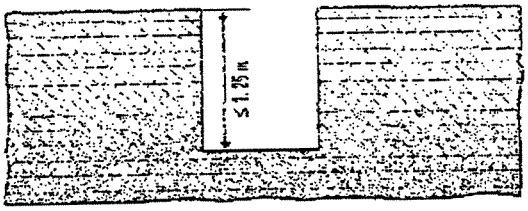
Böschungen

Standsicherheit

- Die Neigungen der Böschungen sind zu verringern, wenn besondere Einflüsse die Standsicherheit beeinträchtigen (z. B. Störungen im Bodengefüge, Auffüllungen, Wasserzuflüsse, Auflasten, Erschütterungen).
- Bei Schichten aus unterschiedlichen Bodenarten ist es notwendig, den Böschungswinkel nach dem Boden mit der geringsten Standfestigkeit anzulegen.
- Ein Nachweis der Standsicherheit ist erforderlich, wenn
  - eine steilere Böschung als in D 1 angegeben angelegt werden soll;
  - besondere Einflüsse vorliegen;
  - bauliche Anlagen gefährdet sind.
- An jedem Böschungs- oder Grabenrand ist ein Schutzstreifen mit einer Breite von 50 cm von Aushub, Geräten und Material freizuhalten.

Baugruben und Gräben geringer Tiefe

- Bei Baugruben und Gräben bis 1,25 m Tiefe können die Wände senkrecht angelegt werden, wenn der Boden ausreichend standfest ist und keine besonderen Einflüsse vorliegen.

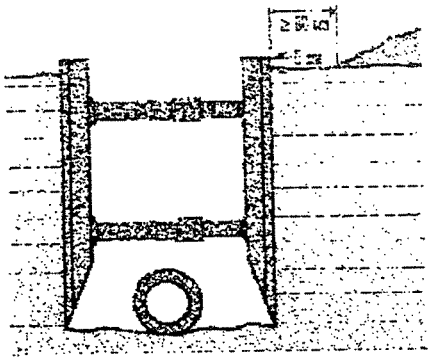


Vorschriften und Regeln

- BauV 8. Abschnitt
- M 223 Gruben, Gräben, Künetzen

Maschinenarbeiten unter www.auva.sicherheit

Künettenverbau



Allgemeine Forderungen

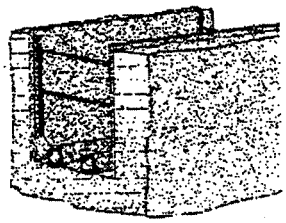
- Senkrechte Künettenwände.
- Beidseitig lastfreier Schutzstreifen mindestens 50 cm.
- Ungesicherte Künettenwände nicht durch Baugeräte und Fahrzeuge belasten.
- Künetten mit ungesicherten Wänden nicht betreten.
- Zufluss von Oberflächenwasser verhindern.
- Sich nicht an ungesicherten Künettenwänden aufhalten (weder oben noch unten).

D 2

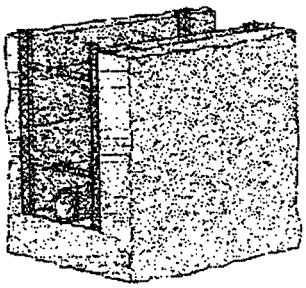
Der Verbau

- Der Verbau muss für die anstehende Bodenart geeignet sein.
- Er muss die auftretende Erddruckbelastung aufnehmen können.
- Er muss nach der ungünstigsten Beanspruchung bemessen werden.
- Er muss in allen Bauzuständen (Einbau und Rückbau) standsicher sein.
- Er muss ausreichend dicht sein und von der Künettensohle bis mindestens 5 cm über die Geländeoberkante reichen.
- Er muss ganzflächig am Erdreich anliegen und einwandfrei hinterfüllt sein (keine Hohlräume).
- Die Künette muss über Leitern o. Ä. begangen werden können.

Verbaugeräte (Beispiele)



Randgestützte Verbaugeräte



Gleitschienen-Verbaugeräte

Voraussetzungen für den Einsatz von Verbaugeräten

- Verwendungsanleitung des Herstellers beachten (Tragfähigkeit bei verschiedenen Künettenbreiten und -tiefen, Montage).
- Belastung ermitteln, z. B. aus Erddruck oder Gebäuden, und mit der Belastbarkeit des Verbaugerätes vergleichen.
- Keine ausfließenden Böden.

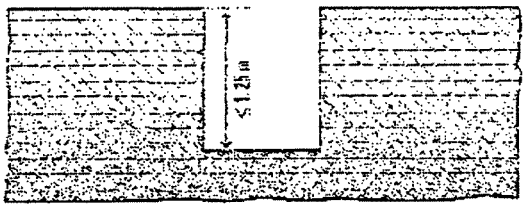
Böschungen

Standsicherheit

- Die Neigungen der Böschungen sind zu verringern, wenn besondere Einflüsse die Standsicherheit beeinträchtigen (z. B. Störungen im Bodengefüge, Auffüllungen, Wasserzuflüsse, Auflasten, Erschütterungen).
- Bei Schichten aus unterschiedlichen Bodenarten ist es notwendig, den Böschungswinkel nach dem Boden mit der geringsten Standfestigkeit anzulegen.
- Ein Nachweis der Standsicherheit ist erforderlich, wenn
  - eine steilere Böschung als in D 1 angegeben angelegt werden soll;
  - besondere Einflüsse vorliegen;
  - bauliche Anlagen gefährdet sind.
- An jedem Böschungs- oder Grabenrand ist ein Schutzstreifen mit einer Breite von 50 cm von Ausnub, Geräten und Material freizuhalten.

Baugruben und Gräben geringer Tiefe

- Bei Baugruben und Gräben bis 1,25 m Tiefe können die Wände senkrecht angelegt werden, wenn der Boden ausreichend standfest ist und keine besonderen Einflüsse vorliegen.



Vorschriften und Regeln

- DenV 8, Abschnitt
- M 228 Gruben, Gräben, Künetten

Merkblätter erhältlich unter www.[illegible]

Annex F

Example Accident Investigation Programm Manapouri

Accident/Incident & Near Miss Reporting, Recording and Investigation

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Accident/Incident & Near Miss Reporting, Recording and Investigation

This section covers the following topics of health and safety:

- Accident Reporting
- Accident Recording.
- Accident Investigation.

Accident has the meaning of any minor or major accident, incident or near miss in the context of this manual.

All accidents, incidents and near misses, must be recorded so that they can be investigated and analysed. Investigating a small accident, incident or near miss may well lead to preventing a future serious accident or recurrence.

Accident Reporting

The Site Health and Safety Officer (HSO) or the Project Manager shall verbally notify the Engineer of all accidents involving "serious harm" and significant "incidents" (as defined under HSE Act) as soon as practicable after the accident and submit a copy of all accident and incident reports involving Contractor personnel to the Engineer within two days of the occurrence.

In order to investigate an accident, incident or near miss, it is important that an **Accident Report form (see Appendix 1), Record of Incident/Near Miss (see Appendix 2) or Incident Damage Report (see Appendix 3)** is compiled. This is the responsibility of the Forman/Shift Boss. The report will then provide the necessary facts required during the accident, incident or near miss investigation.

While preventive action following an investigation into the cause of an accident will not prevent that particular accident, by establishing the facts and being able to take corrective action, future accidents may be avoided.

Even a minor incident may arise out of circumstances that, if left uncorrected, may have all the potential for disaster. An essential element of any reporting system is that the emphasis must be on finding facts, not on finding fault or apportioning blame.

Accident Recording

FDI is legally bound by Section 25 of the Health and Safety in Employment Act of 1992 to record accidents and serious injuries in an approved Accident Register.

When any serious accident occurs to any of our employees, the FDI Health and Safety Officer must notify the Occupational Safety and Health (OSH) Service as soon as possible. FDI Health and Safety Officer must carry out an investigation and file a written report to OSH within **seven** days of the accident happening. This written report is entitled **OSH Notice of Accident / serious harm** and is located in the back portion of the OSH Accident Register (see Appendix 4).

Accident Investigation

The purpose of an accident investigation is to find the causes of the accident and to determine if the accident was caused by a significant hazard. To take steps to prevent or limit the occurrence or repetition of similar accidents, and to establish if legal obligations were fulfilled by using the Hazard Identification programme in Section 3 of this manual.

Serious or potentially serious accidents or incidents will be investigated and remedial actions taken.

This is the responsibility of the Forman/Shift Boss with assistance from the Site Superintendent and Health and Safety Officer depending on the nature of the accident, incident/near miss.

Immediate Actions after an Accident

The following steps should be taken immediately after an accident involving a serious injury:

Important!

If a serious injury occurs:

1) *Stay calm and check for any hidden or delayed hazards.*

2) *Arrange immediate First Aid and call for assistance.*

3) *Stay with the injured person. Ensure that the Health and Safety Officer is informed.*

4) *Do not attempt to move the injured person unless to prevent further injury.*

5) *Clear the area of personnel except those authorised to be there.*

6) *Do not disturb the accident scene in any way until investigations have taken place and the OSH Inspector has given permission to do so.*

Check List

The check list provides a means of ensuring that essential information for evaluation and reporting during an accident is available.

The following are the main aspects of an accident investigation check list:

- Details concerning the work place.
- Details of the accident.
- Details of the victim or victims.
- Details of witnesses.
- Points to be covered in the Accident Report or Record of Incident / Near miss.

At the Work Place

The following details concerning the work place should be noted:

- Check that the accident site is secure and no latent hazards exist.
- If a plan of the work place is not available, make a sketch of the accident area.
- Take necessary measurements and identify witnesses.
- Using the sketch plan, stand at points indicated by witnesses and take photographs facing the direction the witness was facing before the accident. Label the photographs when they are developed, indicating the positions of the witnesses.
- Make sure that other organisations involved in the investigation have been given the information they may require (Police, OSH, MOE, Emergency Services).
- Interview other workers who may not be witnesses but who can assist with details of training, supervision, work practices etc.
- Verify all statements given by the employer, workers and witnesses.

Details of the Accident

The following details of the accident should be noted:

- Specific location of the accident.
- Time and date of the accident.
- Time and date of the investigation.
- Weather conditions at the time of the accident.
- Hours worked by the injured person prior to the accident (was the injured person late for work).
- Exact area of the workplace where the accident occurred.
- Details of how the accident occurred.
- Was the injured person engaged on their own job or were they helping with an unfamiliar occupation?
- Who instructed the injured person to do this job - check on training and supervision?
- Were any other instructions given (by whom)?
- What was the injured person doing prior to the accident?
- How long has the injured person worked at their present occupation?
- How long has the injured person been with their present employer?
- How long has the injured person been at this workplace?
- What were the site conditions (housekeeping)?
- What were the lighting conditions at the scene of the accident?
- Was the appropriate safety equipment being worn, such as safety glasses, hard hat etc.?
- Name of immediate supervisor (in immediate control).
- Details of treatment administered to the injured person.
- Action taken to secure the accident scene and prevent recurrence.
- Identify the object or equipment that caused the injury. Note its position and serial number etc.
- If the equipment that caused the injury is mechanical plant, does it have guards in place, certificates of fitness warrants etc.

Victim (Injured Person)

The following details of the **victim or victims** should be noted:

- Full name.
- Home address (not box number).
- Age and telephone number.
- Position held in the company.
- Nature of injuries.
- Did they suffer from any disability prior to the accident?
- How much training had they received in the operation or occupation?

Witness

The following details of the **witness or witnesses** should be noted:

- Full name.
- Home address (not box number).
- Age and telephone number.
- Employer's name.
- Occupation.
- Position held and for how long.
- Check the time of the accident.
- What was the witness doing at the time?
- Where was the witness standing and in what direction were they facing (use the sketch map)?
- In relation to the witness, where were the victim and others standing or facing at the time of the accident?
- **Own** account of what happened from all witnesses.
- Opinion as to the cause of the accident and how it could be prevented from all witnesses.
- All witnesses to sign statement at the time of the accident.

Notes:

Listen to the witnesses, don't lead them.

Witnesses may work for an employer other than that of the accident victim

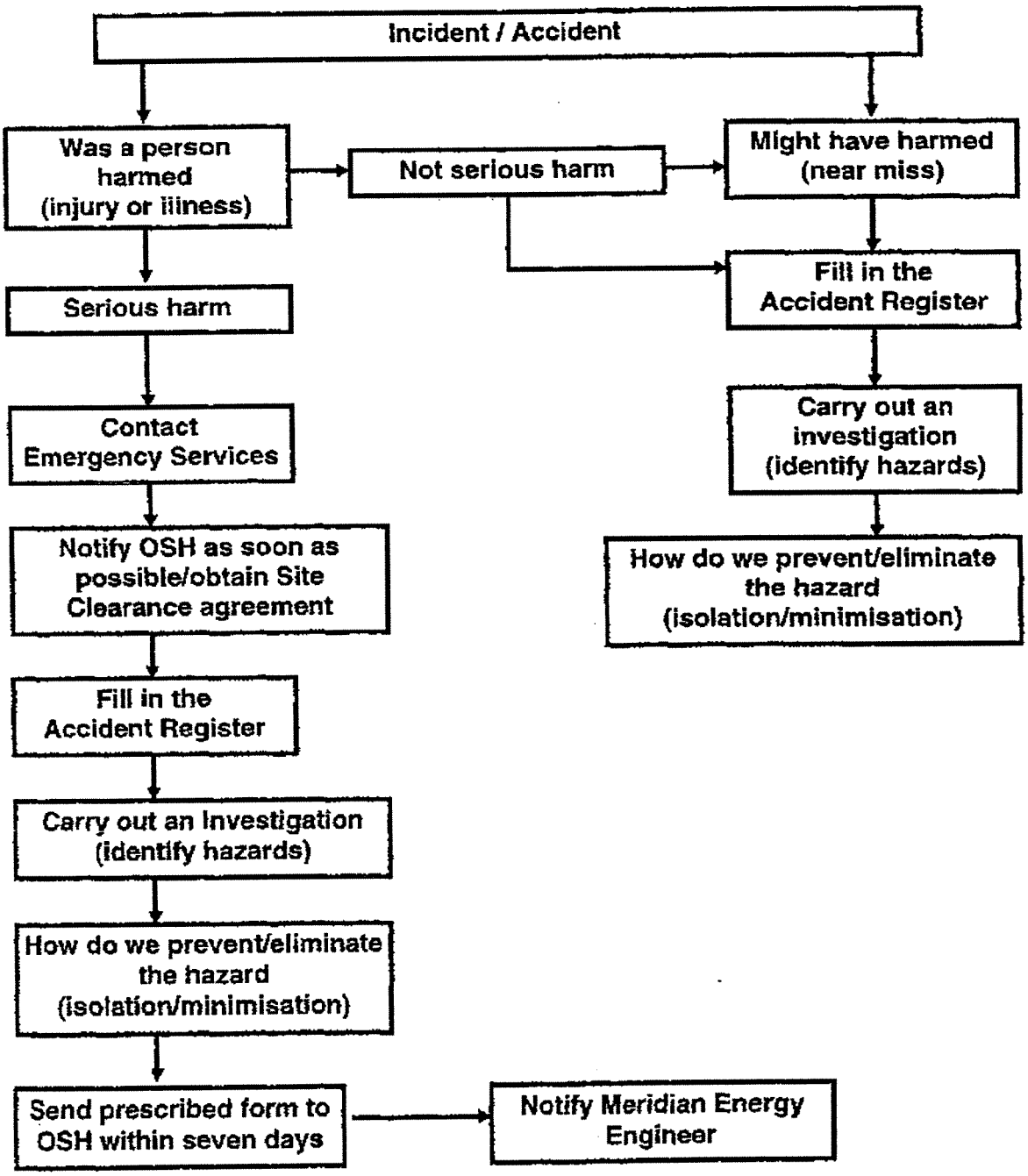
Accident Report, Record of Incident/Near Miss

The following points must be covered when compiling an Accident Report or Record of Incident/Near Miss:

- What happened.
- Where it happened.
- When it happened.
- How it happened.
- Why it happened.
- What should be done to prevent it happening again.

Flow Chart

The Incident / Accident flow chart shows the steps to be followed after an incident or accident has occurred:



APPENDIX 1

FDI Accident Report Form

Accident Report Form.

Distribution:

- ☐ Superintendent
- ☐ Foreman/Shift Boss
- ☐ Health & Safety Officer
- ☐ Project Manager

Project: _____

Location: _____

On Completion of Investigation:

WHO?	Name of Injured Person:		Employer:	
	Area:	Trade/Occupation:	Sub:	
	Address of Injured Person:			
	Personal Details	Age: years	Male/Female:	Length of service: years
WHEN?	Date of accident:	Time of Accident:		am/pm
WHERE?	Describe where the accident happened:			
RESULT?	Part of body injured:			Severity (tick)
	Nature of injury:			Major ☐
	First Aid	Date:	Time am/pm	By:
				Serious ☐
	Other medical treatment received:			Entered on register Y/N

WHY?	Lack of Management	Basic Causes	Immediate Causes	Incident
	Commitment, Accountability and Responsibility	Personal Factors or Job Factors	Substandard practices and conditions	Contact with Energy or Substance
	List of Hazards Associated with this Incident :			
HOW?	How did the Accident Happen?			
OSH	OSH Notified:		Accident Scene Secured?	
REMEDIAL	What Remedial Steps have been taken?			
	By whom:	When:	Project Manager:	Date:

COMMENTS BY MANAGER | Witness(es) if any:

Details of Lost Time: Hours Estimated/Actual | Manager's Signature: Date:

APPENDIX 2

Record of Incident / Near Miss

Record of Incident / Near Miss

Project:

Company Name:

Location:

Name of Person/s Involved:

Type of Equipment/Plant:

Nature of Incident:

Date & Time:

Description of Incident:

Has Incident Investigation been Carried Out/Report on File? Yes ☐ No ☐

YES

NO

Completed by	Company	Position	Date

Signed FDI Site Safety Manager

APPENDIX 3

Incident Damage Report

INCIDENT REPORT

PLEASE PRINT ALL ANSWERS

Supervisor's Name .....

Driver's Name .....

Plant/Equipment .....

Date & Time of Incident .....

Details explaining precisely what occurred
(provide sketch)

.....
.....
.....
.....
.....

To whom and when was incident reported .....
.....

Estimated value of damage .....

Length of time to repair damage .....

Signed ..... Date .....

(Print Name) .....

APPENDIX 4

OSH Notice or Record of Accident / Serious harm

NATIONAL SAFETY HEALTH SERVICE

Notice of Serious Accident

Complete this form and forward it to your nearest OSH office within 7 days of incident.
Keep a copy for your own records.

HEALTH & SAFETY IN EMPLOYMENT ACT 1992

rticulars of employer: (Business name and address)

cation of place of work:

, shed, unit no, floor, building; Street no and name ; Locality / suburb

rsonal data of Injured person:

ntial address

Birth

Sex (M/F)

cupation or job title of injured person:

riod of employment of injured person:

- st week
- 1st month
- 1-6 months
- months - 1 year
- 1-5 years
- Over 5 years
- on-employee

eatment of injury:

- First-aid
- Doctor (not hospitalised)
- ospitalised

ne and date of accident / serious harm:

am / pm

- Day
- Afternoon
- Night

worked since arrival at work

echanism of accident / serious harm:

- , trip or slip
- ound or pressure
- dy stressing
- ological factors
- ental stress
- Hitting objects with part of the body
- Being hit by moving objects
- Heat, radiation or energy
- Chemicals or other substances

9 Agency of accident / serious harm:

- Machinery or (mainly) fixed plant
- Mobile plant or transport
- Powered equipment, tools or appliances
- Non-powered handtools, appliances and equipment
- Chemical or chemical products
- Material or substance
- Environmental agency
- Animal, human or biological agency (not bacteria or virus)
- Bacterial or virus

10 Body part:

- Head
- Neck
- Trunk
- Upper limb
- Lower limbs
- Multiple location
- Systemic (internal organs)

11 Nature of injury or disease: (specify all)

- Fatal

- Fracture of spine
- Other fractures
- Dislocation
- Sprain or strain
- Head injury
- Internal injury of trunk
- Amputation, incl. eye
- Open wound
- Superficial injury
- Bruising or crushing
- Foreign body
- Burns
- Nerves or spinal cord
- Puncture wound
- Poisoning and toxic effects
- Multiple injuries
- Damage to artificial aid
- Disease, nervous system
- Disease, musculoskeletal syst
- Disease, skin
- Disease, digestive system
- Disease, infectious or parasit
- Disease, respiratory system
- Disease, circulatory system
- Tumour (malignant or benign)
- Mental disorder

12 Where and how did the accident / harm happen?
If not enough room, attach separate sheet or sheets

13 Has an investigation been carried out? yes/n

Was a significant hazard involved? yes/n

pleted by: Employer or employer's representative (delete which is not applicable)

Date

Annex G
Examples Job Safety Program

SWISS NATIONAL ROADS

Road No.

N4

Nat. Str. 2 Kl.

Flüelen Bypass
Tunnel Section T1

Safety, Alarm and Rescue Concept

TUF – JV Tunnel Flüelen Bypass

Murer AG Erstfeld	Prader AG Tunnelbau Zürich	Zschokke Locher AG Zürich	CSC Impresa Costruzioni SA Lugano	Rothpletz, Lienhard + Cie AG Aarau

Atag Bau AG, Schattdorf Bau AG, Erstfeld Gebr. Bonetti AG, Andermatt J. Baumann Söhne AG, Altdorf

Robert Gamma AG, Schattdorf Adolf Infanger AG, Flüelen Sicher Bau AG, Gurtnellen

Copies:

PLF 1x, OBL 1x, BL 1 x,

JV TUF:

BC Members 5x, BSL 3x, Pa Uri 1x each,
Building site 3 x

MU Archive: 5 Format: A4

Plan No. MU: 10-99-2034-005

Rev.	created / revised		reviewed		released	
	Date	Signed	Date	Signed	Date	Signed
•	03.08.00	Le/Wk	07.08.00	Wk/Kp		
a						
b						
c						

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1 General

1.1 Objective

Extract from PHB, Section 3.4, Safety and Alarm Concept

Objective: To minimise potential incidents through prevention.

The guidelines developed in the concept must allow emergency and rescue organisations to act quickly.

Procedure: The individual procedures are listed in detail in the safety and alarm concept.

The general procedure is as follows:

- Identification of an incident
- Classification of the incident
- Alerting of the responsible organisations
- Initiation of immediate measures
- Registration / reporting of the incident

Incidents: The potential incidents are listed non-exclusively in the following:

- Gas	Gas incident
- Fire	Fire on the various building sites and installation sites
- Oil	Leaking oil on the building sites and installation sites (environmental protection)
- Chemicals	Leaking, explosion, etc. of chemicals stored on the building sites
- Electricity	Securing of high- and low-voltage systems
- Traffic	Traffic safety on the building sites Safety at the points of contact with road/rail traffic
- Work safety	General work safety in accordance with SUVA during the tunnel heading / shaft sinking on underground sites General work safety in accordance with SUVA during work on the portals, north and south junctions.

The Safety, Alarm and Rescue Concept will be coordinated by OBL in collaboration with PLF.

The section-related specific chapters will, as soon as the works have been contracted, be discussed with the relevant contractors. Subsequently these chapters will be submitted to PLF for approval. The approval will be recorded at the site managers' meeting.

After approval, the chapters will be integrated in the Safety, Alarm and Rescue Concept.
The Safety, Alarm and Rescue Concept will be updated at regular intervals parallel to the Project Manual. In the case of significant amendments / modifications, these shall be integrated as they occur.

2 Safety Concept

2.1 General

The safety measures must be coordinated and implemented as early as possible in order to be able to prevent incidents.

The various sources of danger are discussed in the following.

In the event of an incident, the procedure set out in Chapter 3 must be followed.

2.2 Work Safety

The JV is responsible for work safety. It shall appoint one person who shall be responsible for work safety on the building site. The SUVA ordinance and the EKAS guidelines must be complied with.

In particular the following items must be observed:

- Obligation to wear a hard hat
- Protective jacket when working in the road area
- The site fencing must be set up
- Crossing Flüelerstrasse is forbidden. The pedestrian bridge must be used. (BB p. 27 / Chapt. 523)

2.3 Traffic

In order to minimise the risk of accidents when working in the immediate vicinity of the road, the following measures must be implemented:

- The building site must be separated from road traffic using suitable means (e.g. Jersey elements). The site management is responsible for implementation.
- Neither building materials nor equipment must be placed on traffic surfaces. The JV is responsible for implementation of this safety measure.
- For works at or on roads, permission must be obtained from the Traffic Group of the Canton Engineering Staff (AfT) 30 days in advance.
- The site organisation must be reported to the Traffic Group of the Canton Engineering Staff (AfT) not later than 8 days before commencement of the building works.
- Unobstructed pedestrian and bicycle circulation must be guaranteed at all times.
- The Butzigried forest road is also a hiking trail. Hikers must be able to use it without obstruction at all times.

2.4 Migrol Petrol Station

In the vicinity of the Migrol petrol station and the internal fuel storage tanks, the works must be carried out with particular care. Welding or grinding works that produce sparks must be screened off.

In addition, the following points must be observed when working in the vicinity of the Migrol petrol station:

- The petrol station management must be informed by the building site management as early as possible about any works in the vicinity of the petrol station.
- Pedestrian and vehicle access to the petrol station must be regulated by mutual agreement between the contractor and the petrol station owner. (BB p. 16 / Chapt. 454)

2.5 Works in the Vicinity of the Railway

The conveyor belt facility crosses the SBB railway line.

The site management shall contact SBB as early as possible to discuss the safety measures. The requirements of SBB must be complied with.

The site management is responsible for coordination of the safety measures when installing the conveyor belt crossing.

The requirements of the Special Provisions, Chapt. 454 (p. 15/16) and Annex 2 (BB) must be complied with.

2.6 High-voltage Cables

There are high-voltage cables within the building site area.

The JV is responsible for ensuring that personnel and machinery (especially cranes, excavators, etc.) keep the minimum distance as set out in the SUVA regulations.

In sensitive areas, this shall be ensured by using protective scaffolding.

2.7 Utilities

Prior to commencement of the building works, the JV shall obtain information about the quantity and location of utility cables and pipelines from the relevant utility owners.

2.8 Works in Groundwater

The building site is located in a Class A Water Zone.

The JV is responsible for compliance with all the requirements of the AfU. (BB Annex 3)

It is also responsible for functioning water retention in the construction pits.

2.9 Gas

During the tunnel heading, gas deposits must be expected in accordance with the geological report (Annex G, Chapt. 6 of the Submission).

The heading breast must be well ventilated. Especially after longer work interruptions during which the ventilation is shut down, the entire tunnel must be ventilated properly before it may be accessed. The SUVA "Guideline for the Prevention of Accidents due to Fire and Explosion during Construction Works in Rock Layers Containing Natural Gas" must be complied with (BB p. 40). The gas concentrations must be monitored (as set out in BB p. 38).

The Safety Commission Gas (Chairman Dr. R. Wyss) will supervise the heading phase and issue appropriate instructions.

If gas deposits are identified, the JV must notify the site management immediately. The site management shall ensure that the gas expert visits the site immediately to assess the situation.

2.10 Environment

The instructions in the Special Provisions, Chapter 460 ff, must be complied with.

3 Alarm Plan

3.1 Incident

INCIDENT			
Work accident (except minor cases) Electricity Traffic	Fire Oil Chemicals Gas	Water	Railway

Alarm by the construction company

4 Picket Services

4.1 Picket List JV

Leadership:	Murer AG Bifang 4 6472 Erstfeld Tel. 041 880 11 77 Fax. 041 880 11 85
Commercial management:	Zschokke Locher AG Pelikanplatz 5, Postfach 8022 Zurich Tel. 01 218 91 11 Fax. 01 218 92 05
Building site:	Building site TUF Flüelen Tel 041 874 80 00 Fax 041 874 80 01
Site management:	Kobel Roland Natel 079 664 79 70 Home 01 830 37 97
	Morger Kurt Natel 079 434 35 61 Home 081 353 10 28
	Baggenstos Roland Natel 079 231 16 74 Home 041 741 10 79
Site manager:	Kunz Walter Natel 079 205 97 33 Home 055 284 11 15
Deputy site manager:	Keller Markus Natel 079 648 41 18 Home 062 751 00 96

4.2 Important Phone Numbers

Project organisation			*Telephone*	*Fax*
Project manager:	R. Kocherhans		041 875 26 11	041 875 26 10
Contract manager:	B. Gugger		041 872 14 15	041 872 14 16
		Natel	079 302 67 58	
Site manager:	H. Breitenmoser		041 872 16 17	041 872 16 18
		Natel	079 468 52 02	
	P. Widmer		031 352 69 11	031 352 72 05
Section manager:	Th. Scheidegger	Natel	079 642 53 12	041 872 16 18
			Telephone	*Fax*
Environmental officer:	W. Jauch		041 871 22 30	041 871 22 60
Gas expert:	R. Wyss		01 344 55 66	01 344 55 91

Geologist:	R. Kocher	061 921 24 28 Natel 079 311 97 25	061 921 38 63

		Telephone
Police		117
Police station	Altdorf	041 875 22 11
Traffic police	Werkhof Flüelen	041 874 53 53
Doctors / Hospital		
General practitioners:	Gamma Philipp, Flüelen	041 870 96 36
	Della Pietra Clemens, Altdorf	041 870 55 25
	Raab Heinz, Altdorf	041 870 35 33
	Baumann Kar, Altdorf	041 870 73 44
	Griesemer August, Altdorf	041 870 86 86
Ophthalmologists:	Piller Annemarie, Altdorf	041 870 35 85
	Osusky Roman, Altdorf	041 870 31 00
Canton Hospital Uri	Altdorf	041 875 51 51
Paraplegics	Nottwil	041 939 56 06
Toxicological Centre	Zurich	01 251 51 51
SUVA		
Head office	Lucerne	0848 83 08 30
REGA		1414
Base station	Erstfeld	041 882 03 33
SBB		
Railway manager	Walker Edwin	041 855 45 35
Flüelen Station		041 870 10 93
Utilities		
EWA	Altdorf	041 875 08 75
Swisscom	Altdorf	041 874 00 84
Cable television		041 870 64 49
Waterworks	Altdorf	041 874 12 12
Waterworks	Flüelen	041 870 10 40
Municipal councils		
Altdorf		041 874 12 12
Flüelen		041 870 10 40

4.3 Alarm List Environmental Protection Agency (AfU)

In the case of accidents which must be reported to the Environmental Protection Agency as set out in the Alarm Plan of the Cantonal Police (with the exception of chemical incidents) or other incidents and reports for which the KAPO requires the support of the AfU, proceed in the order set out below:

Name, address	Telephone work	Telephone home	Natel	Oil accidents	Fertilizer on frozen soil	Contamination of surface water	Death of fish	Waste incineration
Schilter Edi Mühlehof 3 6467 Schattdorf	875 24 48	870 07 94	079 439 18 09+	1	1	1	1	5
Colombo Konrad Rüttistrasse 5 6467 Schattdorf	875 24 11	870 69 93		2	2	3	4	-
Cathomas Norbert Wegmatt 11 6460 Altdorf	875 24 20	871 05 55		3	3	5	5	3
Bühlmann Benno Hofstatt 6466 Bauen	875 24 10	878 13 09	079 439 18 03	4	5	4	2	4
van der Pluym Piet Feldgasse 14 6463 Bürglen	875 24 09	870 12 07		5	6	6	6	-
Imhof Alexander Wegmatt 13 6460 Altdorf	875 24 49	871 35 59		6	4	2	3	-
Akermann Franz Grünring 6 6300 Zug	875 24 21	711 49 71		-	-	-	-	2
Baumann Remo Allenwindenweg 43 6460 Altdorf	875 24 17	870 31 65	079 414 13 53	-	-	-	-	1
Zieri Hansruedi Attinghauserstrasse 29 6460 Altdorf	875 29 29	870 33 55	079 302 67 94	In the case of death of fish, the President of the Fishing Authority must always be notified				

5 Helicopter Landing Pads

5.1 Area Building Site South ☐ yellow

Coordinates roundabout 690 530 / 194 480 X red

Area tubbing factory Aschoren O green

Map scale: 1:5'000

5.2	**Area Building Site North**	☐	yellow
	Coordinates bus stop 690 790 / 197 500	X	red
	Map scale: 1:5'000		

5.3	**Area Butzigried Building Site**	☐	yellow
	Coordinates forest road 690 890 / 195 530	X	red
	Map scale: 1:5'000		

INTEGRAL SAFETY PLAN

(VERSION 07 / 06 2003)

REVISED 26. 05. 03

SATCO

3717 BLAUSEE – MITHOLZ

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Annex H
Safety Personnel

Sicherheitsfachkräfte Österreich 2004

STRABAG

Nachname	Vorname	aktiv	Div.	Adresse 1	Adresse 2	Telefon	Fax	Handy	E-Mail
ATZLINGER	Helmut	☐	AE	Enzersberg 123	A - 5303 Thalgau	06235 / 6471 - 158	06235 / 6471 - 199	0664 / 2347039	helmut.atzlinger@bauholding.at
BAIER	Wolfgang	☑	AE	Salzburger Straße 32	A - 4021 Linz	0732 / 3731 - 364	0732 / 3731 - 371	0664 / 1442357	wolfgang.baier@bauholding.at
BERGER	Jochen	☑	04, AD	Polgarstrasse 30	A - 1220 Wien	01 / 217 28 - 276	01 / 217 28 - 112	0664 / 5451279	jochen.berger@bauholding.at
BISCHOF	Julia	☑	AR, AU	Donau City - Straße 9	A - 1220 Wien	01 / 22 4 22 - 1611	01 / 22 4 22 - 1554	0664 / 5311917	julia.bischof@bauholding.at
BLANK	Johann	☐	BR Arb.	Bad Fischau - Brunn	A - 2721 Bad Fischau	02622 / 42410	02622 / 42410	0664 / 5446447	johann.blank@bauholding.at
BRAUNER	Michael	☐	AD	Tultnerstrasse 341	A - 3464 Hausleiten	02265 / 7501 - 0	02265 / 7501 - 29	02265 / 7501 - 29	michael.brauner@bauholding.at
BUCHBERGER	Gerhard	☑	AE	Schatzdorferstr. 9	A - 4021 Linz	0732 / 3885 - 605	0732 / 3885 - 699	0664 / 2347704	gerhard.buchberger@bauholding.at
DAMBERGER	Robert	☑	AD	Donau City - Straße 9	A - 1160 Wien	01 / 22 4 22 - 1836	01 / 22 4 22 - 1838	0664 / 5409281	robert.damberger@bauholding.at
EBERDORFER	Robert	☑	AG	Maggstraße 40	A - 8042 Graz	0316 / 3131 - 317	0316 / 3131 - 450	0650 / 5463461	robert.eberdorfer@bauholding.at
EBNER	Martin	☐	AV	Enzersberg 123	A - 5303 Thalgau	06235 / 6471 - 0	06235 / 6477	0664 / 1442119	martin.ebner@bauholding.at
GROHE	Eduard	☑	02, ID, IP, AE, AV	Salzburger Straße 32	A - 4021 Linz	0732 / 3731 - 446	0732 / 3731 - 560	0664 / 5044781	eduard.grohe@bauholding.at
GUMPENBERGER	Gerhard	☑	AE	Schatzdorferstr. 9	A - 4021 Linz	0732 / 3885 - 402	0732 / 3885 - 299	0664 / 1045896	gerhard.gumpenberger@bauholding.at
HARDER	Bernd	☑	02	Orienburgerstraße 27	A - 9800 Spittal/Drau	04762 / 820 - 803	04762 / 620 - 140		bernd.harder@bauholding.at
HUBER	Thomas	☑	AO, AP, AQ	Donau City - Straße 9	A - 1220 Wien	01 / 22 4 22 - 1608	01 / 22 4 22 - 1554	0664 / 1823367	thomas.huber@bauholding.at
KENDLBACHER	Johann	☐	BR Arb.	Brucker Bundesstras	A - 5700 Zell am See	06542 / 53003 - 0	06542 / 53003 - 23	0664 / 8100137	johann.kendlbacher@bauholding.at
KERN	Daniel	☐	AE	Enzersberg 123	A - 5303 Thalgau	06235 / 6471 - 161	06235 / 6471 - 199	0664 / 1315856	daniel.kern@bauholding.at
KOLLMITZER	Heinz	☐	AC	Triglavstraße 9	A - 9500 Villach	04242 / 3033 - 0	04242 / 3033 - 10	0664 / 2434716	heinz.kollmitzer@bauholding.at
KOSCHIAK	Oswald	☑	AA, AC, AW	Boltzmannstraße 8	A - 9020 Klagenfurt	0463 / 32700 - 305	0463 / 32700 - 231	0664 / 1534068	oswald.koschiak@bauholding.at
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Nachname	Vorname	aktiv	Dir.	Adresse 1	Adresse 2	Telefon	Fax	Handy	E-Mail
KRENN	Hannes	☐	AG	Maggstraße 40	A - 8042 Graz	0316 / 3131 - 209	0316 / 3131 - 251	0664 / 1858877	hannes.krenn@bauholding.at
KROPF	Franz	☐	BR Arb	Hagau 6	A - 6233 Kramsach	05337 / 62373	05337 / 62373 - 16	0664 / 2409524	franz.kropf@bauholding.at
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RADOSZTICS	Josef	☐	BR	Polgarstrasse 30	A - 1220 Wien	01 / 217 28 - 220	01 / 217 28 - 373	0664 / 357 40 84	josef.radosztics@bauholding.at
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RICHTER	Sarah-Maria	☐	AU	Donau City - Straße 9	A - 1220 Wien	01 / 22 4 22 - 1614	01 / 22 4 22 - 1554		

Nachname	Vorname	aktiv	Dir.	Adresse 1	Adresse 2	Telefon	Fax	Handy	E-Mail
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SCHROTTNER	Thomas	☐	AG	Maggstraße 40	A - 8042 Graz	0316 / 3131 - 304	0316 / 3131 - 450	0664 / 4638634	thomas.schrottner@bauholding.at
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SOLDERER	Anton	☐	BR Arb.	Maggstraße 40	A - 8042 Graz	0316 / 3131 - 0	0316 / 3131 - 150	0664 / 3072376	anton.solderer@bauholding.at
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STORER	Felix	☐	BR Arb.	Hebbelgasse 5	A - 1100 Wien	01 / 6026329	01 / 6075329	0664 / 5342543	felix.storer@bauholding.at
SUNDL	Herbert	☐	BR	Maggstrasse 40	A - 8042 Graz	0316 / 3131 - 580	0316 / 3131 - 583	0664 / 2331018	herbert.sundl@bauholding.at
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THEIS	Gerold	☑	AE	Schatzdorferstr. 9	A - 4021 Linz	0732 / 3885 - 408	0732 / 3885 - 290	0664 / 5469528	gerold.theis@bauholding.at
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URBANTSCHNIG	Alois	☐	BR						
WEBER	Josef	☑	AD	Pernerstorferstr. 9	A - 2700 Wr.Neustadt	02622 / 23574 - 13	02622 / 23574 - 50	0664 / 3142293	josef.weber@bauholding.at
WENDL	Roland	☑	AG	Döllachstr. 3 - 3b	A - 8940 Liezen	03612 / 22537 - 20	03612 / 22537 - 7	0664 / 4421048	roland.wendl@bauholding.at
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McNally

HEALTH & SAFETY POLICY AND PROGRAM

Tables Package

(Updated: **May 27, 2005**)

Policy and Program Tables Package

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Table 1: Employee Orientation Checklist

Employee Name: _____ **Job Site Location:** _____

Item No.	Description	Worker Initials	Super. Initials
1	Job Organization (ie/hierarchy, supervisors)		
2	General overview of project		
3	General Safety Rules (see Table 3)		
4	Location of Fire Equip., First Aid Box, WHMIS Book		
5	Personal Protective Equipment (Table 2)		
6	Refusal to work policy and disciplinary procedures Get worker to sign Refusal Policy (Sect 8.2)		
7	Joint Health and Safety Committee/Safety Rep.		
8	Accidents/Incidents/First Aid reporting & Functional Abilities Form (1 copy to go in lunchbox or vehicle)		
9	Back to Work policy – sign Section 10.2		
10	Emergency/Fire procedures and Hazard reporting		
11	Confined Space Training (if required)		
12	Tag in/out employee identification (if applicable)		
13	Lock out procedures (if applicable)		
14	Safety for Marine work (if required) (Table 7)		
15	Safety for Office and Shops (if required)		
16	Tool box talks and site inspections (When/Where etc)		
17	Drug/Alcohol - Zero tolerance policy		
18	Fall arrest requirement		
19	Cellphone and smoking Policies (Sect 4.2 & 4.3)		
20	Do you have any medical conditions or allergies we should be aware of? (Circle) Yes or No If yes please print on back of this page.		
21	Do you have any safety training that is current? If yes please submit copies of certificates.		
22	**Operators and Captains -** You must submit a copy of your current license within 48 hours of hire.		
23	Company Policy Statement (Section 1.0)		

PLEASE READ THE FOLLOWING CAREFULLY!

I declare that I understand the above subjects as reviewed with me. A copy of the company's Health & Safety Program is available from my Supervisor. It is MY RESPONSIBILITY to read through the entire Program and ask questions concerning things I do not fully understand (as applicable to my position). By signing below I am declaring that I understand it is my right & responsibility as an employee to report possible safety hazards and to work safely at all times.

Printed name: _____ **Employee signature:** _____

Printed name: _____ **Co. representative:** _____

Date: _____

Table 2: Materials Issue Form

Division: _____

Location: _____

Date: _____

		Type of Equipment
Boots	☐	_____
Rain suit	☐	_____
Hard hat	☐	_____
Glasses	☐	_____
Gloves	☐	_____
Hearing muffs	☐	_____
Personal Floatation Device	☐	_____
Other	☐	_____

Signature: _____

Printed Name: _____

Table 3: General Safety Rules

Employee Responsibility

1. No person under the influence of alcohol, non prescribed drugs or in possession of alcohol or illicit drugs shall enter the property. Employees must inform supervisor if they are on prescribed medication prior to shift.
2. No person shall wilfully damage or, without proper authority, remove or render useless any electrical, fire fighting rescue or first aid equipment, deface, destroy any signs, remove guards or disarm a safety device.
3. No person is to tamper with any machinery or equipment in or about the project.
4. No pushing, scuffling, horseplay, fighting or verbal abuse is permitted.
5. Report ALL injuries, accidents and incidents to your supervisor at once. If medical attention is sought as a result of an injury at work the doctor must fill out the WSIB "Functional Abilities Form" and a copy of this form is to be given to your immediate supervisor.
6. All workers have a responsibility to actively participate in the company safety program and a legal obligation to abide by the safety rules and regulations of the Occupational Health and Safety Act.
7. Clothing covering the full trunk, shoulders and legs is required. Shorts, mid-drift shirts or ragged clothing is not allowed. Neck chains, rings and all other loose jewellery is not to be worn where they present a risk for injury.
8. No use of personal cell phones during company time.
9. No smoking in any company building, trailer or marine vessel.

Personal Protective Equipment

1. All workers, visitors and delivery personnel shall wear CSA approved hard hats on all construction sites.
2. Respiratory protection is to be won as circumstances warrant. Employee to see supervisor for type of respirator required.
3. Eye protection is to be worn as required to reduce the risk of eye injury. Specific classes of eye protectors shall be matched to specific hazards.
4. Hearing protection is to be worn as required.
5. Foot protection must meet Federal and/or Provincial regulations and must be worn by all workers, visitors and delivery personnel on all construction sites and in all shops.
6. Fall Arrest Systems are to be worn to provide maximum safety from falls.
7. Hand protection suitable to the hazard is to be used.

Table 4: Sub-Contractor/Supplier Orientation Checklist

Sub-Contractor/Supplier Company Name: _____

Item No.	Description	Worker Initials	Super. Initials
1	Job Organization (ie/hierarchy, supervisors)		
2	General overview of project		
3	General Safety Rules (see Table 3)		
4	Location of Fire Extinguishers, First Aid Box, WHMIS Book, Washrooms, Lunchroom etc		
5	Personal Protective Equipment (See Materials Issue Form Table 2)		
6	Joint Health and Safety Committee (if applicable)		
7	Emergency/Fire procedures and Hazard reporting		
8	Emergency Marine Procedures Table 7 (if required)		
9	Safety for Office and Shops (if required)		
10	Tool box talks and site inspections (When/Where etc)		
11	Zero tolerance for working under the influence of drugs and/or alcohol		
12	No Smoking in any McNally building, trailer or marine vessel.		
13	When using a cellphone you must stay clear of any path where a moving vehicle or equipment might be.		
14	Workers Compensation Clearance Certif. Provided		
15	Copy of Sub-Contractor's Policy & Program Provided		
16	Form 1000 or Notice of Project Submitted		

PLEASE READ THE UNDERSIGNED CAREFULLY!

I declare that I understand the above subjects as reviewed with me and items required for submission have been provided. I agree to take every reasonable precaution to protect the Health and Safety of myself and fellow workers on this job.

Printed name: _____ **Employee signature:** _____

Printed name: _____ **McNally representative:** _____

Date: _____

Table 5: Visitor Orientation

Prior to any visits commencing a safety orientation must be carried out. This will involve a short safety talk identifying the major hazards.

Visitor Safety Rules:

1. Visitors are required to sign Release from Liability Statement. Safety equipment will be issued as required. A visitor pass will be issued which must be prominently worn.
2. No visitor is to go around site unaccompanied. They will be escorted through the works by a company representative and must take notice of all instructions given by the representative.
3. For repeat visits an assessment will be made and further instruction given to explain any variance in circumstance
4. **NO PHOTOGRAPHY WILL BE PERMITTED BY VISITORS UNLESS APPROVED BY THE WORKPLACE MANAGER.**

Item No.	Description	Visitor Initials	Super. Initials
1	General overview of project		
2	General Safety Rules (see Table 3)		
3	Location of Fire Extinguishers, First Aid Box, WHMIS Book, Washrooms etc		
4	Personal Protective Equipment (See Table 2: Materials Issue Form)		
5	Joint Health and Safety Committee (if applicable)		
6	Emergency/Fire procedures		
7	Visitor's Liability Form (Table 6)		
8	No Smoking in any McNally building, trailer or marine vessel		
9	No cell phone use on property unless you are clear from the path of any vehicle or equipment.		

Printed name: _____ **Visitor signature:** _____

Printed name: _____ **Co. representative:** _____

Date: _____

Table 6: Visitors "Release from Liability Statement"

Name: _____

Date/Time of Entry Request: _____

Reason for Entry: _____

I hereby declare that I have been provided with an orientation session and have had General Safety Rules explained to me. In consideration of my being permitted to enter the McNally job-site under contract with The Owner and/or in charge of the agent, servant or workman of The Owner, I understand and agree that neither I nor my executors or administrators will make any claim against McNally International Inc. or its subsidiary or against any officer, agent, servant or workman of McNally in respect of any loss or injury to property or person including injury resulting in death which I may suffer while or in consequence of by being so permitted on the said site and/or workings and I understand that no compensation will be paid by McNally in respect of any such loss or injury and I agree so as to bind myself, my heirs, executors and administrators to indemnify McNally and any officer, agent, servant or workman of against any claim which may be made by any third party against them or any of them arising out of any act or default on my part during or in connection with the said visit.

Signed: _____

Date: _____ **Time:** _____

Witnessed by: _____

Date: _____

Table 7: Emergency Procedures for Marine Work

(Worker's to read and sign – one copy to be sent to head office)

The following procedures are to be initiated, where appropriate.

Emergency Phone Nos.

911 Fire, Police & Ambulance
MOL (416) 235-5330 (Toronto)
Canadian Coast Guard (Marine Communications & Traffic Services: MCTS)
Sarnia (519) 337-6572
Prescott (613) 925-0618
Thunder Bay (807) 345-4618
DIALING **16** on your Bell Cellular, Cantel or Thunder Bay Cellular Telephone.

VHF MARINE RADIO CHANNELS

Channel 16 Distress, Safety & Calling
Channel 21B & 83B Weather & Navigation

HAND HELD PORTABLE RADIOS

Position 1 CH7A	156.35 MHz	Marine Construction
Position 2 CH16	156.80 MHz	Distress Safety Calling
Position 3 CH21B	161.65 MHz	Weather – Listen Only.
Position 4 CH83B	161.77.5 MHz	Weather – Listen Only

Rescue Equipment: (On Barges & Tugs)

1. Rigid stretcher unit, complete with securing harness, neck brace and lifting attachments.
2. Dedicated Fire Extinguishers, and First Aid equipment (As required by CCG. Regulations). A first aid kit, blankets, fire extinguisher, stretcher & Confined Space Entry Equipment will be maintained on the Working Barge.
3. An outside Telephone will be maintained to enable the Emergency Services to be called. (See list)
4. A suitable boat, equipped with ring buoy attached to fifteen metres of polypropylene rope that is 9.5 millimetres in diameter, a boat hook, a life jacket for every person in the boat. The boat shall be power driven if the water is likely to be rough or swift.
5. An alarm system: boat whistle, bell, horn, or ship to shore radio.
6. An Oil Spill Kit
7. Immersion Suits, Life Jackets, Inflatable Life Raft, Distress Signals (Flares): List depends on vessel size, type & area of operation, as required by CCG. Regulations.

Medivac

In the event of an injured person, an assessment will be made by the person in charge as to the severity of the injury and the necessity for outside assistance, if outside assistance is required, give the following information:

1. Your name.
2. Name of injured person.
3. Location of incident.

4. What the injuries are to the best of your knowledge.
5. If 911 services are required
6. Any special equipment required, such as stretcher, backboard, splints, additional first aid equipment etc. to be brought to the barge.

For an injured worker the following steps will be taken:

1. A competent person, fully trained in first aid will take charge of the situation.
2. Call for assistance from fellow workers.
3. Assess the hazards at the scene; make the area safe for yourself and others.
4. Identify yourself to the casualty as first aid person and offer assistance.
5. Quickly assess the casualty for life threatening conditions. (ABC).
6. Give first aid for life threatening condition.
7. If Paramedics are required at the scene of injury, make arrangements for their transport by boat, and send a person to direct ambulance to the boat.
8. If injured person is capable of walking, send a person with the casualty to assist him to the boat to be taken to shore.
9. If the injured person requires a stretcher, send a person ahead to insure there is a clear space on the boat to place the stretcher.
10. If ambulance is not required, make arrangements for a pick up to be available at the shore to transport the person to the office, or the Hospital, depending on the injury.
11. Should the accident involve a fatality or critical injury, the MOL shall be notified immediately. Additionally, the accident scene must not be interfered with or disturbed. Nothing at the scene shall be destroyed, altered or carried away, except that required to assist the casualty, until the MOL inspector gives permission.

Man-Overboard

In the event of a man- overboard incident, the following process will be initiated:

1. Sound alarm – 3 long blast on Whistle or general alarm 'Bell.
2. Locate and maintain visual contact with person.
3. Deploy life ring, Buoyant life line and self igniting light
4. Manoeuvre the vessel to permit recovery.
5. Place engines in neutral when next to the person.
6. Effect recovery of person in a safe manner.
7. Administer appropriate first aid. (Follow procedures for MEDIVAC).

Fire

The following should be initiated in the event of a fire onboard:

1. Sound the alarm, continuous ringing of general alarm, horn or whistle.
2. Identify type and location of fire.
3. Contact appropriate shore authorities.

4. If crew cannot put out the fire, remove crew and tow equipment to dock so fire dept can fight fire.

Abandon Ship

The decision to abandon ship is the responsibility of the Captain or senior person onboard, given by verbal command only. The vessel is equipped with life saving equipment applicable to her size and function. The following process should be initiated once abandon ship order has been given:

1. Immersion Suits to be worn when ordered to or life raft is deployed.
2. Personnel to proceed to their abandon ship station.
3. Ensure Raft latches are released.
4. Ensure painter is secured to a strong point.
5. Ensure the water below the raft is clear.
6. Deploy life raft, as boat drill requires.
7. Board raft.
8. Manoeuvre clear of vessel.

Procedure for Fuelling Vessels

1. Material Safety Data Sheet to be reviewed by workers handling fuel.
2. The on site storage of bulk fuel is to be restricted to the delivery truck and fuel storage tanks aboard the vessel.
3. Fuelling equipment to be grounded during fuelling operations, Fuel nozzle is grounded to steel vessel that is in the water.
4. Fuel truck to have ABC fire extinguisher.
5. Vessel to be equipped with fire extinguishers.
6. All equipment to be in good working order and free of leaking seals to prevent lubricants from entering the environment.
7. In the event of any chemical spill, immediately notify appropriate authorities.
8. Fuel truck to have hose nozzle with a positive shut-off.
9. Fuelling port on vessel to have a sealed cap.
10. Vessel is equipped with absorbent pads in the event of a minor spill.

Hazardous Materials Spills

Upon discovery of a hazardous materials spill, personnel will assess the situation to determine the severity, and potential for escalation of the danger. At this point it will be decided whether action can be taken to control the situation using vessel personnel or to request assistance.

If it is decided that the incident could be taken under control immediately, steps are to be taken to contain the spill and initiate cleansing operations. Priority of containment is to prevent liquid from spilling overboard. The spill is to be contained by the use of environmental kits retained onboard and if possible and necessary, coordination with the bridge to induce appropriate roll and pitch or to minimize ship motion. Cleansing will include transferring the material to a holding area. In addition, residue will be soaked up with rags and other available absorbent material.

In the event that the situation cannot be controlled immediately, and potential exists for increased danger, assistance will be requested at once. The first priority will be to secure the safety of the vessel and personnel and to pursue all action necessary to prevent environmental pollution. Appropriate authorities shall be notified of the situation and advised of the vessels position and weather conditions and the following:

1. Approximate location and size of the spill.
2. That the Person in charge contacting Applicable Response Organization is the person authorized to implement the arrangement. (See contact list)
3. The name of the vessel.
4. The type of liquid or material involved.

Heavy Weather

The weather conditions will be monitored via the marine weather channel. When heavy weather conditions are predicted the vessels shall make for protected waters or ensure that they are moored in a satisfactory condition to ride out the weather conditions.

The tug designated as the dredge tug shall be assigned the responsibility of safety boat

Certification

I hereby certify that I have read and understand the above emergency procedures.

Application received by: _____ Date: _____

Employee signature: _____

Employee Printed name: _____

Table 8: Accident/Incident/First Aid Investigation Report

Accident type:
Lost time injury ☐ Medical aid ☐ Recordable Injury ☐ First Aid ☐ Incident ☐ Near Miss ☐

PART 1 – EMPLOYEE

Last Name:_____ First Name:_____ Phone #: _____

Employee Address: _____

Employee Position: _____ Employee #: _____

PART 2 – WHAT HAPPENED?

Incident Date: _____ Time: _____ am/pm

Date Reported to Supervisor: _____ Time: _____am/pm

Date Reported to Head Office: _____ Time: _____ am/pm

Reason for Delay in reporting if there was a delay: _____

Did employee go to the Doctor? Yes/No (Circle answer)

If yes – Doctor name, address, phone #: _____

_____

SUPERVISOR: Did you remind employee about our Back to Work/Light Duty Policy and the use of the Functional Abilities Form if they seek Medical Attention?

Circle – YES/NO Supervisor's Signature for this question: _____

Was there any property damage? YES/NO (circle answer) Estimated damage: _____

Describe Property Damage: _____
(Please take pictures of any property damage)

Who saw this accident happen? _____

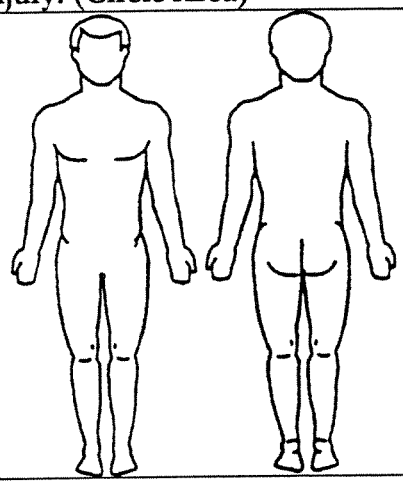
What happened? (Use back of page if more space is needed) _____

_____

_____

_____

_____

Sketch/Diagram or Photograph	Front Back Body Injury: (Circle Area)
	

Was this incident caused by failure of machine/equipment or a third party? YES/NO (circle)

If Yes, explain: _____

Think about what happened – what would you say was the main cause of the accident?

_____

_____

What were the underlying causes (other events or factors that contributed to the incident)?

_____

_____

In your opinion – how could this accident be prevented from happening again?

_____

_____

Completed By: (print) _____ Signed: _____ Date: _____

Employee: (print) _____ Signed: _____ Date: _____

Reviewed By: (print) _____ Signed: _____ Date: _____

Workplace Manager: (print) _____ Signed: _____ Date: _____

Safety Coordinator: (print) _____ Signed: _____ Date: _____

Table 8 Cont'd

Table 9: Safety Items required on Site for Workplace Managers/Superintendents

√ **Check when completed**

- ☐ **Workplace Notice**

  Notice of Workplace No. _____

  Notice for tunnels, shafts caissons and Cofferdams No. _____

  Notice for Sub-Contractors _____

  Notice of Project (Diving) _____

- ☐ Structural Drawings to MOL (Shaft, tunnel, supports, forms etc.)
- ☐ Copies of Policy and Program on site (along with Procedures for that job)
- ☐ Orientation Packages (to include Tables 1 – 5 and Tables 10 and 18 if applicable) and Hiring Forms
- ☐ Accident/Incident Reporting Form (Table 11)
- ☐ WSIB Functional Abilities forms (As per Table 4 and Back to Work Policy Sec1.11)
- ☐ Tool Box Talk Forms (Table 13) and Safety Talk suggestion cards
- ☐ Monthly Site Inspection Forms (Table 14 for Job Sites)
- ☐ Safety Citations (Table 19)
- ☐ Forms for Marine Emergency Procedures (Table 10) -if applicable to job
- ☐ Confined Space Permits, (Table 16) Confined Space Units & Gas Testers (if required)
- ☐ Visitor Forms (Tables 7 and 8)
- ☐ Personal Protective Equipment as required (Hard Hats, gloves, rubber boots, rain suits, eye protection, hearing protection, Fall Protection, Dust Masks, Reflective Vests etc.)
- ☐ WSIB Poster "In all cases of Injury/Disease" – to be posted in an inconspicuous place
- ☐ McNally International Inc. Poster for Reporting of Accidents (Table 20)
- ☐ WHMIS book (obtain from Head Office) and put in a common place (ie/ lunch room or first aid room)
- ☐ First Aid – Boxes as required by Regulation 1011 (See Section 1.10.6 of the Policy and Program), List of people with up-to-date First Aid (Certificates to be posted)
- ☐ Post names of Joint Health and Safety Committee members or Health and Safety Representative (whichever applicable – See Section 1.5 in the Policy and Program)
- ☐ Fire Extinguishers and flashlights
- ☐ MOL forms for Sub-contractors and a copy of our Policy and Program for Subs
- ☐ Log Books, foreman's diary, operating manuals/instructions etc for equipment,
- ☐ Oil Spill kit

- ☐ Eyewash station
- ☐ Full Body harnesses and lifelines (as required)
- ☐ Copies of Union Agreements (where applicable)
- ☐ Emergency Contact List - Posted in an inconspicuous place (to include 911, Police, Ambulance, Fire, Spill Centre, Gas, Hydro, Sewer, Water, Cable, Ministry of Labour, Hospital, Canadian Coast Guard etc – See Section 5.3 in the Policy and Program)
- ☐ Drawing showing route and phone number to nearest Hospital to be posted near exit door(s)
- ☐ Copies of the Occupational Health and Safety Act (OHSA) and regulations (Industrial for Shops and Offices and Construction for Job Sites) and any other acts/regulations as required by the OHSA.
- ☐ Rescue Procedures as applicable to job
- ☐ Signs for Hard Hats and Safety Boots
- ☐ Danger construction signs and other signs as required
- ☐ Bulletin Board for workers
- ☐ Sub-contractor /Supplier Orientation Checklists (Table 6) and Copies of Form 1000 for Sub-contractors to complete if required

To be signed by Workplace Manager/Superintendent and a copy sent to Head Office (Safety Co-ordinator) indicating that the above items are on site unless otherwise indicated:

Date: _____ **Signed:** _____

Printed Name: _____

Table 10: Tool Box Talks/Safety Meeting

Site Location: _____ Date: _____

Subject: _____

Talk Given By: _____

Discussion of upcoming tasks, safety hazards associated with these tasks: _____

_____

_____

Accidents/Incidents/Near Misses from the past week: _____

_____

Safety Issues from Inspections: _____

_____

_____

Follow-up from Topics brought up at last week's Tool Box Talk: _____

_____

_____

Ask employees for any safety items that need to be discussed, Record these items or document that no one had anything to bring up: _____

_____

_____

ALL EMPLOYEES MUST SIGN OFF ON THE FOLLOWING PAGE!!!

Person Giving the Talk: (Signature) _____

Workers Rep: (Indicating the above information is correct)

(Print) _____ (Signature) _____

Safety Co-ordinator (Indicating the above information has been reviewed in Head Office:

(Print) _____ (Signature) _____ Date: _____

Employees must sign for Tool Box Talk.

Name – PLEASE PRINT NEATLY (this is proof of your attendance)	Signature

Table 11: Monthly Site Inspections

ITEM (and Location of Item)	HAZARD(S) OBSERVED	CLASS A, B Or C	REPEAT ITEM		RECOMMENDED ACTION	FOR FUTURE FOLLOW-UP	
			Yes	No		Action Taken	Date

Rating Hazards = Severity x Frequency divided by 2

Severity = # from 1 to 10 where 10 is life threatening and 1 is minimal harm

Frequency = # from 1 to where 10 is worker does task all day and 1 is occasional

Class A – Rating is between 40-50 – A condition or practice that could result in death, permanent disability or expensive damage

Class B – Rating is between 29-39 – Serious injury or illness or major property damage that is disruptive but not as serious as Class A

Class C – Rating is between 1-24 – Minor injury or illness that is non-disabling or property damage that is non-disruptive

Jobsite Location: _____ Date Inspection Completed: _____

Worker Rep Signature: _____ Supervisor Signature: _____

Reviewed by Safety Coordinator: Date: _____ Signature: _____

	Hazard Rating	Remarks
Personal Protective Equipment (Available and being used?)		
Cranes/Hoists – inspection & maintenance Log books, fire extinguishers, rigging etc.		
Heavy Equipment – only by licensed operator, flagman needed?		
Environmental – Hazardous Material Storage, Handling, Erosion control measures, debris stockpiles, parking and vehicle maintenance areas		
Excavations, shoring and sloping		
Welding/cutting operations – permits, fire control, welding helmets & jackets, eye protection, cylinder storage, proper venting?		
Office/Trailers- are there sufficient exits for quick escape (not blocked by anything)? Cleanliness, Drinking water?		
Fire Extinguishers- Available? Inspected?		
Smoke Detectors- Available? Checked?		
Is the first aid area kept clean and supplies adequate to meet min. regulations?		
Are eyewash stations available and refilled on a regular basis?		
Are First Aid records kept and a trained and qualified first aider available?		
Are floors clean, dry and free from debris, clutter, trip and slip hazards?		
Are ladders in good condition/broken, Defective Ladders tagged/destroyed?		
Are ladders unpainted, free from grease?		
Are ladders properly positioned and secured when in use (kept away from electrical equipment/sources)?		
Are there barricades, handrails and fall arrest protection in areas where required?		
Are all working areas adequately lit with lights in good operating condition?		
Are machines in good general condition?		
Are all guards and safety devices in place?		

Table 11 Cont'd

Do emergency stop buttons work properly?		
Are operating controls locked off & the key removed when not in use?		
Are safe operating instructions clearly posted on or near equipment?		
Are tools and equipment in good condition, stored in designated areas when not in use?		
Are guards and electrical cords in good condition and do they work properly?		
Is required personal protective equipment worn when operating tools or equipment?		
Are stairs, stairwells and landings kept clear and unobstructed? Adequately lit?		
Are outdoor stairs made of grating so that water and snow can't build up on them?		
Overall is housekeeping taken care of?		
Are bathrooms/wash areas clean and tidy? Soap and paper towel available for washing?		
Are WHMIS books available? Do employees know where they are? Easily accessible?		
MSDS sheets current/applicable for work		
Are WHMIS labels on all containers?		
Is WHMIS training for employees updated?		
Are signs posted advising where Personal Protective Equipment should be worn?		
Cranes/Hoists- are Cranes and hoists inspected on a regular basis?		
Are flammable/combustible materials stored correctly?		

Other observations and/or Notes:

Table 12: Supervisor's Weekly Jobsite Inspection Checklist

Location: _____

Date: _____

Inspected By (Print): _____

Signature: _____

Check "yes" or "no" or strike out if not applicable. "No" indicates that action is required.	Yes	No
Is a copy of the Occupational Health and Safety Act (green book) and the company's policy statement (signed by president within the last year) posted?		
Has a Safety Representative or Joint Health and Safety Committee been elected (as req'd)?		
Are all employees trained in how to work safety in the hazards associated with their work?		
Is there at least one trained first aider on each shift and a first aid kit available?		
Are temporary space heaters located and maintained so as to prevent ignition of any material?		
Is there an adequate supply of fresh clean air in the workplace?		
Is the lighting adequate for the type of work being done?		
Is emergency lighting (if applicable) working?		
Is potable water for drinking and hand washing available?		
Are an adequate number of toilets provided?		
Is garbage and debris removed on a regular basis?		
Are piled materials such as boxes, sacks, pipes stables?		
Are walking surfaces maintained so that they are not slippery?		
Are portable ladders CSA grade; clean and grease free; well maintained and inspected before use?		
Do employees maintain 3 point contact on ladders and not stand on the top shelf of step ladders?		
Is appropriate fall protection equipment used as required? (and personnel trained)		
Are employees trained in the safe use and handling of hazardous products?		
Are controlled products properly labelled and Material Safety Data Sheets available?		
Is appropriate personal protective equipment used where a hazard exists?		
Are emergency eye wash stations available and working if required?		
Is all equipment operated, inspected and maintained according to manufacturer's specifications?		
Is adequate space provided around all machines to ensure safety?		
Are proper guards in place to prevent contact with or entanglement in moving parts?		
Is a written lock-out procedure in place and followed if required?		
Are tools inspected before use and only used as they were intended?		
Are electrically powered hand tools double insulated or grounded except where battery operated?		
Are falling object and rollover protectors in place and in good shape as required on equipment?		
Are all hoists inspected, operated and maintained as required by CSA standards and visually inspected daily before use?		
Are all hoists, forklifts and mobile equipment operated by designated competent people?		
Is all welding, cutting, burning etc done in compliance with CSA standards?		
Do you ensure that work on electrical equipment is only performed by competent people?		
Are people and equipment kept back safe distances from powerlines?		
Do you have a written confined space entry procedure (if required)? Is it followed?		
Is scaffolding constructed by a competent person and adequately secured?		
Are underground utility locates completed prior to any excavation or trenching?		
Are adequate precautions taken to ensure the safety of the public?		
Are trenches stable, adequately sloped or equipped with certified trench boxes?		
Are trenches equipped with a ladder not more than 15m from the worker(s)?		
Is material/overburden at least 1m from the edge of an excavation?		
Is testing done for hazardous gas, vapour, dust or oxygen rich atmosphere in a trench or excavation?		
Are excavations and trenches kept clear of stored or hazardous substances?		
Are barricades erected near any temporary excavation?		

Supervisors: completion of this checklist should not be construed as indicating compliance with all requirements of OHSA and the construction regulations but instead as a starting point for your site. Supervisors should review all relevant legislation and regulatory requirements. If you require additional information or help to comply with safety regulations on your site please contact the Health and Safety Co-ordinator in Head Office.

Table 13: Job Hazard Control Plan

Job Task	Hazard Description	Severity	Frequency	Class	Ideas for recommended action (Full breakdown on establishing a plan to be done on Table 14 – Pre-job Hazard Assessment Plan)

Rating Hazards = Severity x Frequency divided by 2

Severity = # from 1 to 10 where 10 is life threatening and 1 is minimal harm

Frequency = # from 1 to where 10 is worker does task all day and 1 is occasional

Class A – Rating is between 40-50 – A condition or practice that could result in death, permanent disability or expensive damage

Class B – Rating is between 29-39 – Serious injury or illness or major property damage that is disruptive but not as serious as Class A

Class C – Rating is between 1-24 – Minor injury or illness that is non-disabling or property damage that is non-disruptive

Plan Completed By: _____ **Date:** _____

Table 14: Pre-job Hazard Assessment Plan

Project: _____ **Date:** _____

Assessment Completed By: _____

Step 1: Define the job to be analysed

- _____
- _____

Step 2: Break the job into steps

- _____
- _____
- _____
- _____
- _____
- _____
- _____

Step 3: Identify hazards or potential accidents

- _____
- _____
- _____
- _____
- _____

Step 4: Identify High Risk Workers and Tasks

- _____
- _____
- _____
- _____
- _____

Step 5: Develop solutions

- _____
- _____
- _____
- _____
- _____

Step 6: Establish a plan to implement solutions, train and educate workers as necessary

- _____
- _____
- _____
- _____
- _____

Keep a copy of this assessment on site and send one to the H&S Coordinator in Head Office.

Table 15: Monthly Management Hazard Assessment

Location: _____

Date: _____

Inspected By: _____

Follow up action required from last assessment:

Item Noted	Completed?	Additional Action Required?

Present assessment:

	Yes	No
Administrative		
Is a copy of the Occupational Health and Safety Act (green book) available?		
Is a current company policy statement (signed by president within the last year) posted?		
Is a current copy of the Company Policy and Program available? Do employees know where it is?		
Is a current copy of the MSDS/WHMIS book available? Do employees know where it is?		
Is the WSIB Poser "In all cases of Injury/Disease" posted? A copy of McNally's Table 20?		
Is there a list of emergency phone numbers and a map to the nearest hospital posted?		
Has a Safety Representative or Joint Health and Safety Committee been elected (as req'd)?		
Have safety orientations been completed for all new employees?		
Are all employees trained in how to work safety in the hazards associated with their work?		
Weekly Tool box talks being conducted		
Monthly site inspections being completed		
Accidents, Incidents and Near Misses being reported		
Subcontractors- orientation and Form1000 completed		
First Aid		
Is there at least one trained first aider on each shift (certificate posted)?and a first aid kit available?		
Is there an appropriate first aid kit available? Sufficient supplies? Being checked on monthly inspections? Records being kept when someone takes something out of it?		
Supervisor Inspection Points		
Are temporary space heaters located and maintained so as to prevent ignition of any material?		
Is there an adequate supply of fresh clean air in the workplace?		
Is the lighting adequate for the type of work being done?		
Is emergency lighting (if applicable) working?		
Is potable water for drinking and hand washing available?		
Are an adequate number of toilets provided?		
Is garbage and debris removed on a regular basis?		
Are piled materials such as boxes, sacks, pipes stables?		
Are walking surfaces maintained so that they are not slippery?		
Are portable ladders CSA grade; clean and grease free; well maintained and inspected before use?		
Do employees maintain 3 point contact on ladders and not stand on the top shelf of step ladders?		
Is appropriate fall protection equipment used as required? (and personnel trained)		
Are employees trained in the safe use and handling of hazardous products?		
Are controlled products properly labelled and Material Safety Data Sheets available?		
Is appropriate personal protective equipment used where a hazard exists?		
Are emergency eye wash stations available and working if required?		

	Yes	No
Is all equipment operated, inspected and maintained according to manufacturer's specifications?		
Is adequate space provided around all machines to ensure safety?		
Are proper guards in place to prevent contact with or entanglement in moving parts?		
Is a written lock-out procedure in place and followed if required?		
Are tools inspected before use and only used as they were intended?		
Are electrically powered hand tools double insulated or grounded except where battery operated?		
Are falling object and rollover protectors in place and in good shape as required on equipment?		
Are all hoists inspected, operated and maintained as required by CSA standards and visually inspected daily before use?		
Are all hoists, forklifts and mobile equipment operated by designated competent people?		
Is all welding, cutting, burning etc done in compliance with CSA standards?		
Do you ensure that work on electrical equipment is only performed by competent people?		
Are people and equipment kept back safe distances from powerlines?		
Do you have a written confined space entry procedure (if required)? Is it followed?		
Is scaffolding constructed by a competent person and adequately secured?		
Are underground utility locates completed prior to any excavation or trenching?		
Are adequate precautions taken to ensure the safety of the public?		
Are trenches stable, adequately sloped or equipped with certified trench boxes?		
Are trenches equipped with a ladder not more than 15m from the worker(s)?		
Is material/overburden at least 1m from the edge of an excavation?		
Is testing done for hazardous gas, vapour, dust or oxygen rich atmosphere in a trench or excavation?		
Are excavations and trenches kept clear of stored or hazardous substances?		
Are barricades erected near any temporary excavation?		
Other		
Oil Spill Kit On site		
Confined space kit – all components in working condition		
Gas Testers – calibrated in past month		
Scott Air Pak – checked for air, cleaned, in working condition		
Rescue Procedures on site		
Danger construction signs and other signs posted as required		

Additional Comments:

Signature:

Table 16: Confined Space Permit

GENERAL INFORMATION:

Space to be entered: _____ Purpose of Entry: _____

Vessel: _____ Duration of Permit: Date: _____ Time: _____ To: _____

PERMIT SPACE HAZARDS

(Check appropriate box to indicate if item is a potential hazard)

Oxygen deficiency (less than 19.5%)	☐ Yes	☐ No
Oxygen Enrichment (greater that 23.5%)	☐ Yes	☐ No
Flammable gases of vapours (greater than 10% of LFL)	☐ Yes	☐ No
Air born combustible dust (meets or exceeds LFL)	☐ Yes	☐ No
Toxic gases or vapours	☐ Yes	☐ No
Mechanical hazards	☐ Yes	☐ No
Electrical shock	☐ Yes	☐ No
Materials harmful to the skin	☐ Yes	☐ No
Engulfment	☐ Yes	☐ No
Hotwork	☐ Yes	☐ No
Other	☐ Yes	☐ No

ENTRY/WORK EQUIPMENT

(Indicate equipment and/or PPE needed)

Hard Hat		☐ Yes	☐ No
Work Boots		☐ Yes	☐ No
Safety Glasses		☐ Yes	☐ No
Hearing Protection		☐ Yes	☐ No
Gloves		☐ Yes	☐ No
Full Body Harness		☐ Yes	☐ No
Respirator Protection		☐ Yes	☐ No
Communication		☐ Yes	☐ No
Rescue:	S.C.B.A.	☐ Yes	☐ No
	Tripod	☐ Yes	☐ No
	Oxy-K	☐ Yes	☐ No
	Lifeline	☐ Yes	☐ No

PREPERATION FOR ENTRY

(Check which of the following steps have been taken)

Notify personnel in affected work areas	☐ Yes	☐ No	☐ N/A
Isolate space by Lockout/Tagout	☐ Yes	☐ No	☐ N/A
Isolate space by blanking/blinding	☐ Yes	☐ No	☐ N/A
Purge/Clean	☐ Yes	☐ No	☐ N/A
Ventilate	☐ Yes	☐ No	☐ N/A
Barriers	☐ Yes	☐ No	☐ N/A
Signs	☐ Yes	☐ No	☐ N/A
Atmospheric Test	☐ Yes	☐ No	☐ N/A
Pre-Entry briefing (hazards/control methods)	☐ Yes	☐ No	☐ N/A
Notify Contractors	☐ Yes	☐ No	☐ N/A
Specify Other:	☐ Yes	☐ No	☐ N/A

COMMUNICATION PROCEDURES

(To be used by attendants and entrants)

Direct Verbal	☐ Yes	☐ No
Radio VHF/2-Way	☐ Yes	☐ No
Cell Phone	☐ Yes	☐ No
Life Line	☐ Yes	☐ No

1 pull – give rope
2 pulls take in slack
3 pulls – Emergency
Other: _____

EMERGENCY SERVICE	PHONE NUMBER	RADIO CHANNEL
Fire Department		
Police Department		
Ambulance		
Coast Guard		
Other:		

AUTHORIZED ATTENDANTS

(Print names)

AUTHORIZED ENTRANTS

TESTING RECORD

Component and acceptable Limit		Time	Time
Oxygen – Miinimum	>19.5%		
Oxygen - Maximum	<23%		
Flammability	<10% LEL		
H2S	<10 PPM		
CO	<35 PPM		

Instrument I.D. _____

Date Calibrated _____

SIGNATURE OF TESTER:

AUTHORIZATION BY ENTRY SUPERVISORS

I verify that all required precautions have been taken and necessary equipment is provided for safe entry and work in this confined space

Print Name _____ Signature _____ Date _____ Time _____

Table 17: Traffic Control Training

Guidelines for training Traffic Control Person

Type of Construction			
Tunneling		Paving	
Cut and Cover		Grading	
Installing Pipe		Marine Construction	
		Other _____	

Type of Equipment Being Used			
Loader		Trucks	
Crane		Compactors	
Excavator		Other _____	

Explanation of how the equipment will be used

Directing Construction and Public Traffic			
Positioning			
Side of work zone		Side of Through Traffic	
Review Where to stand		Review Communications	
Review how to signal			

Personal Protective Equipment			
Given Hard Hat		Wearing approved boots	
Given approved vest			

Employee name: _____ Employee Signature: _____

Supervisor name: _____ Supervisor Signature: _____

Table 18: Drug & Alcohol Acknowledgement Form

I hereby acknowledge that I have received, have reviewed, and understand the Drug and Alcohol Use Policy ("the Policy") of McNally International Inc. ("the Company") and I hereby agree to comply with all of the Policy's terms and conditions.

I understand and agree that my compliance with the terms of the Policy has been properly mandated by the Company for the safety of my co-workers, the public, and myself.

I hereby authorize substance abuse professionals and testing officials to release any information to the Company that is reasonably necessary to the implementation of the purposes and provisions of the Policy. I further hereby consent and authorize the Company to release to substance abuse professional and testing officials any information that is reasonably necessary to the implementation of the Policy.

I understand and agree that my compliance with the Policy is an essential and required term of my employment with the Company. I further understand and agree that my employment or continued employment with the Company is conditional upon me signing this Acknowledgement.

_____	_____	____/____/____
Employee Signature	**Print Name**	**Date**
_____	_____	____/____/____
Company Signature	**Print Name**	**Date**

Table 19: Safety Citation

_____	_____	_____	_____
Name	SIN	Employee #	Job #

Is hereby notified of a violation of safety rules. This notice is part of McNally International Inc.'s disciplinary action program.

Violation: _____

Violation Issued By: _____

Disciplinary Action Taken:

A. First Citation
- _____ Warning of violation only
- _____ Serious - Suspended 3 consecutive working days without pay
- _____ Severe or life threatening - Termination

B. Second citation
- _____ Automatic 3 day suspension without pay
- _____ Severe or life threatening - Termination

C. Third citation
- _____ Within 6 month period or history of repeat violations - Termination

_____ **Employee's Signature**

_____ **Foreman's or Witness's Signature**

Date: _____

Table 20: Work Injury Poster

If you are injured at work...

1

Tell Your Supervisor

Details of your injury

Even if it is small and you do not need medical attention - Your supervisor will need to log the details.

Obtain a "Functional Abilities Form" from your supervisor in case you

2

Tell Your Employer

Details of Medical Aid or need for Light Duty Work

Your supervisor must know if you seek medical aid in order to fill out the required paperwork for Head Office & the WSIB

If Light Duty Work is required we will do our best to accommodate you

3

Tell Your Doctor

Your injury is work related & you can be assigned light duties

Get your doctor to complete the "Functional Abilities Form"

Return this form to your supervisor so he can immediately assign you Light Duty Work until you recover

McNally Construction Inc. , Head Office
1855 Barton Street East, PO Box 3338, LCD 4
Hamilton, Ontario L8H 7L8
Phone 905-549-6561 Fax 905-549-3548
Email: safety@mcnallycorp.com

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1.0 CORPORATE POLICY STATEMENT

lanagement of McNally Construction Inc. is vitally interested in the health and safety of our employees. Management will ıeet or exceed the requirements of the Occupational Health and Safety Act and Regulations and work with the Joint Health ıd Safety Committee as outlined in the Act. As required by the Act Management will ensure that equipment, material and rotective devices as prescribed are provided and in a safe working condition and that measures and procedures prescribed are ırried out at each worksite. Protection of employees from injury or occupational disease is a major continuing objective. IcNally will make every effort to provide a safe and healthy work environment.

ll supervisors and workers must be dedicated to the continuing objective of reducing risk of injury. Supervisors will be held :countable for the health and safety of workers under their supervision. Supervisors are responsible for ensuring that ıachinery and equipment are safe and that workers work in compliance with established safe work procedures. Workers must :ceive adequate training in their specific work tasks to protect their health and safety.

.very worker must protect his or her own health and safety by working in compliance with the law and with safe work ractices and procedures established by the company.

: is in the best interest of all parties to consider health and safety in every activity. Health and Safety is a daily responsibility of very person within this company. Commitment to health and safety must form an integral part of this workplace, from all vels of supervision to all workers.

igned: _____ Date: _____

Patrick McNally, President

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
Feb. 8, 05	July 6, 2004	05	February 2006	P. McNally (President)

2.0 RESPONSIBILITIES

2.1 Scope and Purpose – Health and Safety Program

2.2 Internal Responsibility System

2.2.1 Health and Safety Reporting Structure

2.2.2 Networking

2.3 General Legal Duties

2.4 Officers and Directors

2.5 Senior Management

2.6 Supervisory Personnel

2.6.1 Competent Supervisor

2.6.2 Supervisory Responsibilities

2.7 Safety Co-ordinator

2.8 Workers

2.9 Observing Unsafe Acts

2.10 Company Vehicles

2.10.1 Driving Privileges

2.10.2 Maintenance

2.10.3 Vehicular Accidents

2.10.4 Defensive Driving

2.11 Review and Posting of Information

2.12 Management Health and Safety Meetings

2.13 List of Safety Items Required for each Workplace

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 27, 2005	April 11, 2005	09	May 2006	R. Cole, (Vice-President)

2.1 Scope and Purpose – Health and Safety Program

The purpose of this program is to reduce and eliminate accidents. A safety program is a success when all personnel do routine jobs in a safe manner and new tasks are not done until the method is a safe one. There is never a reason to get a job done, that time can not be taken to do it safely.

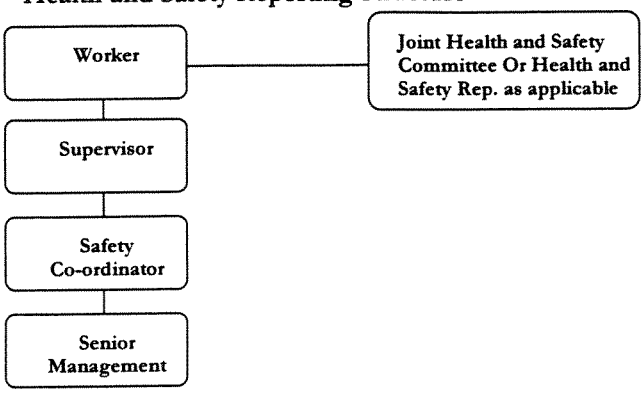
Management's desire is to provide a safe work atmosphere, safe equipment, proper materials, and safe methods and practice at all times. Each person who conducts company business no matter their position needs to accept this responsibility as well. The information contained herein, is for <u>all</u> McNally worksites and offices regardless of task at hand.

2.2 Internal Responsibility System

McNally Construction works on the basis of an Internal Responsibility System meaning that everyone, both management and workers, are to work together to ensure that every location is a safe and healthy place of work. Each individual work site is in the best position to identify safety problems and to help develop solutions. This shares the responsibility of eliminating hazards in the workplace between

management and workers and has an interlocking set of duties, obligations and rights for each party. Each supervisor from foreman to project manager is responsible to ensure that operations run in a safe manner. Each employee is responsible to report existing or possible hazards. By working together we will be able to achieve a healthier and safer work environment at all locations.

2.2.1 Health and Safety Reporting Structure



2.2.2 Networking

Networking is defined as "An extended group of people with similar interests or concerns who interact and remain in informal contact for mutual assistance or support".

In an effort to stay up-to-date on safety policies and procedures and to benefit from the experience of others, McNally will implement and maintain networking as part of its safety practice. By sharing this information in all levels of the company the Internal Responsibility System will be strengthened.

The Safety Management Team and/or Supervisory Personnel will complete a minimum of 5 forms of networking each year. This can include but will not be limited to:

- Training by other organizations
- Safety Conferences, Incentive programs and Tradeshows
- Sharing safety information with other companies either by exchanging policies or meeting in Joint Venture settings or calling for the reason of obtaining/sharing info.
- Research information on the Internet
- Safety Magazines, bulletins etc
- Participating in Organizations such as ORBA, OSWCA, IAPA, CSAO

2.3 General Legal Duties

All employers must comply with and provide for the health and safety of their employees in accordance with the provisions of the "Occupational Health and Safety Act" and applicable regulations. Each person in the workplace has duties and responsibilities under the Act according to their position.

The general legal duty of both the employer and the supervisors is to take all reasonable precautions to protect the workers' health and safety. For workers the legal duty is to work in accordance with the Act and its regulations. All employees are required to work in a manner that will not cause harm to themselves or others. All hazards must be reported to your supervisor.

The Occupational Health and Safety Act (OHSA) was established to protect workers against health and safety hazards on the job.

2.4 Officers and Directors

The Officers and Directors will take all reasonable care to ensure that McNally Construction complies with Occupational Health and Safety Legislation as well as the orders and requirements of the Ministry of Labour Personnel in their administration of the Occupational Health and Safety legislation.

2.5 Senior Management

Senior Management will:

- Ensure that a safety program is maintained
- Appoint only competent supervisors
- Ensure equipment, materials and protective devices are as required by the Act and kept in good working condition.
- Only employ those individuals of the legal minimum age
- Post in the workplace a copy of the Occupational Health and Safety Act
- Attend Monthly Management Health and Safety Meetings

2.6 Supervisory Personnel

2.6.1 Competent Supervisor

A competent supervisor as defined by OSHA (Section 1 – Competent Person) is a supervisor that is:

- Qualified because of knowledge, training and experience to organize the work and its performance,
- Is familiar with the Act and the regulations that apply to the work, and
- Has knowledge of any potential or actual danger to health or safety in the workplace

Supervisors will be designated, most supervisors will be promoted from within the trained workers. Training will be given to assist supervisors in their roles. Those employees anticipated to be future supervisors will also receive supervisory training. Refer to chapter 9.0 "Training" for supervisory training.

2.6.2 Supervisory Responsibilities

Supervisory Personnel, includes Project Managers, Superintendents and foremen, will:

- Lead by example at all times for fellow workers.
- Ensure the health and safety of their workers is protected
- Conduct and document job orientation training for all new employees and those returning to the site after an absence.
- Ensure workers have been advised of any potential or actual danger to the workers
- Supplies and enforces the use of proper protective equipment and tools for the job.
- Be familiar with and enforce all safety program rules.
- Ensure workers and subs. are working in accordance with the program and the Act.
- Quickly ensure that first aid or medical treatment is administered to anyone on crew that is injured, promptly investigate and document all accidents and ensure that appropriate corrective action is taken to prevent a reoccurrence.
- Assist and co-operate with the Joint Health and Safety Committee or Health and Safety Representative in completing their duties.

- Hold documented weekly "Tool Box Safety Meetings" with workers which consist of a weekly toolbox talk discussing a relevant topic or safety item with workers. This must be completed for all shifts where applicable.
- Complete all supervisory paperwork on time and in a coherent manner.

2.7 Safety Coordinator

- Responsible for maintenance of all health and safety programs and procedures
- Reports directly to Senior Management and maintains a direct line of communication with all supervisory personnel for the purpose of advice, recommendation and consultation on health and safety topics.
- Conducts regular surveys, inspections and routine monitoring of operations to ensure safe practices. Recommends observations for follow-up and action
- Co-ordinate safety activity with the owner, sub-contractors etc.
- Arranges for worker and supervisor training as required.
- Supports the efforts of the Joint Health & Safety Committee/Worker Trade Committee and Health and Safety Reps.

2.8 Workers

2.8.1 Worker Responsibilities

Workers are expected to follow the Procedures and Policies in this manual and work in compliance with the Provisions of the Health and Safety Act and Regulations.

Workers are to use or wear the equipment, protective devices or clothing as the employer directs

Workers are to report to the supervisor any equipment defect of which the worker is aware of, any contravention to the Act or the existence of any potential or known hazard.

The safety information in this manual does not take precedence over the Occupational Health and Safety Act and Regulations.

2.8.2 Worker Rights

To balance the employer's given right to direct the work force and control the production process in the workplace, the Act gives the worker three basic rights.

1. **The Right to Participate** – Workers have the right to be part of the process of identifying and resolving workplace health and safety concerns. This right is expressed through worker membership on the Health and Safety Committee or Representative as well as the opportunity for discussion in Tool Box Talks and Safety Meetings.
2. **The Right to Know** – The worker has the right to know about any potential hazards to which they may be exposed. In short, the right to be trained and have information on machinery, equipment, working conditions, processes and hazardous substances. McNally has two methods of getting hazard information to its employees – weekly tool box talks and WHMIS (Workplace Hazardous Materials Information System) training. Workers should report hazards they become aware of to their supervisor immediately.
3. **The Right to Refuse Unsafe Work** – When a worker believes that a situation/task is dangerous or outside of their physical limitations, they have the right to speak up and refuse this work. This privilege is to be taken seriously and not abused. A work refusal must follow proper procedures – these are detailed in Chapter 8 of this policy and program.

2.9 Observing Unsafe Acts

Our first obligation to our co-workers, the company and ourselves is to work in a safe and responsible manner at all times. To allow a co-worker or an individual from outside the company to perform an unsafe act may put your life or the lives of others in danger.

To knowingly stand by and watch an unsafe act be performed is in strict violation of this Health and Safety Policy.

2.10 Company Vehicles

2.10.1 Driving Privileges

Driving a company vehicle is viewed as a privilege not a right. A driver's abstract will be obtained from the Ministry of Transportation prior to any worker obtaining the privilege of driving a company vehicle. If an employee has a bad driving record than driving privileges using a company vehicle will be revoked. See defensive driving below for additional information on driving privileges.

2.10.2 Maintenance

Employees assigned a company vehicle are expected to do routine checks of their vehicle and report any concerns to their supervisor immediately. Regularly scheduled maintenance such as oil changes must also be completed. It is important that your vehicle is operated in a safe condition, please make sure that all safety concerns regarding your vehicle are addressed by either your supervisor or the equipment manager in Head Office.

2.10.3 Vehicular Accidents

Should an accident in a company vehicle occur:

1. Stop, turn off the vehicle and protect the scene from further damage.
2. Assist the injured if possible, call 911 if serious injuries occurred.
3. Call authorities and obtain all the information necessary to complete the Driver Report Forms.
4. Report this accident to the Health and Safety Coordinator or if not available your divisional manager.
5. Avoid discussing the accident or accepting responsibility with anyone except a law officer, your employer or McNally's Insurance Company.

In the glove compartment of all company vehicles is a Vehicle Accident Reporting form. It is the responsibility of the person assigned to the vehicle to ensure there is a copy of this form in the vehicle at all times, along with a copy of the ownership and insurance slips.

Should an accident occur in a company vehicle it is important that all essential information is obtained and the Vehicle Accident Reporting form is designed to ensure this. This accident must be reported to the Health and Safety Coordinator in Head Office no later than the first working day following the accident.

2.10.4 Defensive Driving

All employees' are expected to drive in a safe, law abiding manner. Because safe driving affects us all whether we drive a company vehicle or not, McNally will promote safe, defensive driving throughout the year by completing one tool box talk each month on a safe driving topic on all jobsites. These talks will cover such topics as safe braking, driving in a diversity of weather conditions, circle checks, maintenance of vehicles, watching for pedestrians and other related topics.

Driver's abstracts will be collected on a yearly basis for all employees' who regularly drive a company vehicle. Should an employee's driving record dramatically decrease from one year to the next that employee will be required to take a certified defensive driving course and improve their driving record prior to the next yearly abstract review. Should this same employee's record decrease even further on this second review, driving privileges will be revoked until the personal driving record has been improved.

2.11 Review and Posting of Information

McNally will review accident investigations, hazard assessments and accident reports on a monthly basis. These reports will be discussed at Joint Health and Safety committee meetings, supervisory meetings and management safety meetings, with discussion being documented in the meeting minutes.

McNally will ensure that any MOL orders and the minutes from the Joint Health and Safety Committee meetings are posted for employees to review. All employees are encouraged to read the posted information to keep informed regarding safety matters affecting their site. Safety statistics will be kept in the form of a spreadsheet to track safety performance improvement both by site and corporately.

2.12 Management Health and Safety Meetings

Senior Management will meet approximately once a month. Attendees at this meeting should include but are not limited to the President, Secretary-Treasurer, Division Vice-Presidents and the Health and Safety Co-ordinator. Agendas/Minutes will be kept using a numerical system. All new issues will be assigned a number for example issue 1 in meeting 18 would be 18.1, issue 2 at this same meeting would be 18.2. This will allow tracking how long an item has been in the old business section.

2.13 List of Safety Items Required for each Workplace

Table 9 "Safety Items required on Site for Workplace Managers/Superintendents" as found in the Tables package of this Program, outlines in detail all items required for every job site from a Health and Safety perspective. All items can be acquired from Head Office. Table 9 must be signed by the Supervisory Personnel once all items are on site and this form should be returned to the Health and Safety Co-ordinator in Head Office within the first 2 weeks of the project commencing.

3.0 ENFORCEMENT

3.1 Progressive Disciplinary Program

3.2 Documentation

3.3 Conduct

3.4 Ministry of Labour (MOL) Visits

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
April 18, 2005	June 29, 2004	05	April 2006	J. Carruthers (H&S)

3.1 Progressive Disciplinary Program

McNally believes in a progressive disciplinary program. The goal of this program is to provide supervision with a tool to educate workers in areas where safety risks are being taken.

The steps of Disciplinary Action will be as follows:

1. First Citation – Warning of Violation (For Serious or Life Threatening situations penalty could be suspension without pay or termination)
2. Second Citation – Automatic 3 day suspension without pay (Severe or Life Threatening – Termination)
3. Third Citation – Within 6 month period or for a history of repeat violations – Termination
4. Any worker receiving a 3-day suspension will be counselled on why disciplinary action was taken and how the individual's attitude or behaviour can be adjusted to a positive approach.
5. Any worker who receives either three (3) warning citations or two (2) 3-day suspensions will be terminated.

3.2 Documentation

Disciplinary action for contravention of safety rules and regulations will be documented on Table 19 "Safety Citation" and copies are to be given to the workplace manager and the safety co-ordinator.

3.3 Conduct

Examples of health and safety violations where any employee will be disciplined or subject to discharge:

1. Violation of health and safety rules, policies, or procedures
2. Stealing or wilful destruction of company property.
3. Violence, harassment, horseplay or disorderly conduct on company property.
4. Coming to work under the influence of drugs or alcohol or bringing these items to work.

3.4 Ministry of Labour (MOL) Visits

If the company's internal responsibility system fails to address adequately the health and safety issues in the workplace, or if the Act and regulations are not being followed, the MOL has the authority to enforce the law and to see that obligations to the Act and Regulations are being complied with.

An Inspector from the MOL, for the purposes of carrying out his or her duties and powers under the Act, may enter a worksite at anytime without prior warning or search warrant.

When the Inspector arrives on your site, the worker's representative and the site supervisor must accompany the inspector. If a worker is asked a question that they can not competently answer than the question is to be directed to someone who can.

While on site the inspector is required to comply with our Safety Program and wear appropriate personal protective equipment.

Always be kind and courteous to the inspector. Remember that they are there to do a job and can be a help to us. Answer questions asked to the best of your ability. Ask the inspector relevant questions to show that you are willing to comply and eager to learn.

If an inspector gives orders they must be dealt with ***immediately***. A copy of the orders given must be sent to Head Office along with a report on what was done for compliance to the orders.

For additional information on dealing with the Ministry of Labour inspectors for Critical Injuries see **Chapter 10** in this Policy and Program.

4.0 HEALTH AND SAFETY RULES

4.1 General Workplace Safety

4.2 McNally Smoking Policy

4.3 Personal Cellphone Use

4.4 Housekeeping

4.5 Sanitation and Hygiene

4.6 Physical Examinations

4.7 Common Office and Shop Hazards

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 27, 2005	January 14, 2005	05	May 2006	Patrick McNally, President

4.1 General Workplace Safety

These general safety rules can also be located in Table 3 of this policy and program.

Employee Responsibility

1. No person under the influence of alcohol, non-prescribed drugs or in possession of alcohol or illicit drugs shall enter the property. Employees must inform supervisor if they are on prescribed medication prior to shift.
2. No person shall wilfully damage or, without proper authority, remove or render useless any electrical, fire fighting or first aid equipment, deface, destroy any signs, remove guards or disarm a safety device.
3. No person is to tamper with any machinery or equipment in or about the project.
4. No pushing, scuffling, horseplay, fighting or verbal abuse is permitted.
5. Report all injuries, accidents and incidents to your supervisor at once. If medical attention is sought as a result of an injury at work the doctor must fill out the WSIB "Functional Abilities Form" and a copy of this form is to be given to your immediate supervisor.
6. All workers have a responsibility to actively participate in the company safety program and a legal obligation to abide by the safety rules and regulations of the Occupational Health and Safety Act.
7. Clothing covering the full trunk, shoulders and legs is required. Shorts, mid-drift shirts or ragged clothing is not allowed. Neck chains, rings and all other loose jewellery is not to be worn where they present a risk for injury.
8. No use of personal cell phones during company time.
9. No smoking in any company building, trailer or marine vessel.

Personal Protective Equipment (PPE)

1. All workers, visitors and delivery personnel shall wear CSA approved hard hats on all construction sites.
2. Respiratory protection is to be worn as circumstances warrant. Employee to see supervisor for type of respirator required.
3. Eye protection is to be worn as required to reduce the risk of eye injury. Specific classes of eye protectors are to be matched to specific hazards.
4. Hearing protection is to be worn as required.

5. Foot protection must meet Federal and/or Provincial regulations and must be worn by all workers, visitors and delivery personnel on all construction sites and in all shops.
6. Fall Arrest Systems are to be worn to provide maximum safety from falls.
7. Hand protection suitable to the hazard is to be used.

4.2 McNally Smoking Policy

There is to be absolutely no smoking in any company building, trailer or marine vessel. Smoking is to be kept to designated areas and away from all explosive materials. Smoking is not to take place in any confined space, tunnel, shaft or anywhere an explosive gas has the potential to exist.

4.3 Personal Cellphone Use

Personal cellphones are not to be used for any reason during company time. If a family member needs to get a hold of a worker during company hours they should call the site office number and someone will get the employee to the phone.

Personal cellphones may be used during lunch break however they must be used in a location where no moving vehicles or equipment are present.

Use of a personal cellphone during working hours or used where there is danger of moving vehicles and equipment is subject to disciplinary action.

4.4 Housekeeping

Good housekeeping means a tidy, clean, organized worksite. An organized worksite is one where things are arranged in some kind of logical order and consistently maintained. Poor house keeping can quite often be the root cause for a lot of slips, trips, falls and other minor personal injuries. The following housekeeping rules are to be followed without exception on all worksites:

1. Work and travel areas will be kept tidy, well lit and ventilated.
2. Trash such as drinking cups, cans and scraps from lunch are to be properly disposed of.
3. Available material, equipment, concrete forms etc. are to be stacked in an orderly fashion away from walkways, doorways, ladders and stairways.
4. Materials piled, stacked or otherwise stored are to be prevented from tipping or collapsing.
5. Materials are to be stored away from overhead power lines.
6. Leads, hoses and extension cords shall be hung up with a non-conductive material, off all floors, stairways and walkways.
7. All walkways are to be kept free of debris and hazards including ice and snow.
8. Each trade is responsible for the general housekeeping in their respective work areas.
9. Where such items as protruding rebar and anchor bolts create an impalement hazard or tripping hazard, they shall be properly protected and conspicuously marked.
10. Trash barrels and 45-gallon drums shall not be hoisted by holes cut in the sides; adequate means of support shall be used i.e. lifting harness for barrels.
11. A current floor plan which identifies emergency exits is to be posted near an exit door in all workplaces.
12. Oil, grease and other such liquid spills shall be cleaned up at the time of spill and are not to be left unattended.

13. Lighting in the workplace are to be adequate for the task being completed. Lighting is to be maintained. When light bulbs have burnt out maintenance is to be informed immediately for the bulb(s) to be changed.

4.5 Sanitation and Hygiene

Detailed information on Hygiene can be located in the Construction Occupational Health and Safety Act Regulations in Sections 28 and 29.

Drinking water shall be provided at each workplace. Toilet and wash-up facilities will be available at each workplace (as required) and facilities shall be maintained in a clean and sanitary condition at all times.

Potential health hazards, in the form of chemical agents such as liquids, vapours, dusts, gases, fumes and mists, exist in many workplaces. These may enter the body through breathing, skin contact, swallowing etc. Depending upon amount and toxicity may affect different people in different ways.

Never take food or cigarettes into work areas. Toxic substances that settle on them could be swallowed. For the same reason, wash your hands before eating.

If you should suffer any unusual symptoms such as headaches, eye irritation or nausea, report immediately to your supervisor.

4.6 Physical Examinations

Physical examinations will be arranged for employees engaged in special operations (For example compressed air, hazardous soil excavation, modified duties etc.) as per Federal and/or Provincial requirements.

4.7 Common Office and Shop Hazards

The following is a brief description of common office safety & shop hazards that all employees should be made aware of. All employees should ensure that these common hazards do not develop into an accident or injury.

1. Be aware of the specific requirements, precautions and work area hazards that exist in the office & shop setting.
2. Know the location, and be familiar with the use of, all safety equipment including personal protective equipment, fire extinguishers, first-aid kits and eyewash stations.
3. Office & shop staff shall exercise caution when walking around blind corners or entering/exiting rooms or hallways. This is particularly important when carrying hot cups of coffee, trays or bulky items.
4. Office & shop staff shall proceed cautiously when walking up and down stairs or outside steps. Handrails will be used where provided.
5. Office & shop staff shall not store materials in an unstable manner.
6. Materials shall not be stored in electrical or utility rooms. This storage could result in reduced access to these rooms during emergencies or for regular equipment maintenance.
7. When lifting heavy or bulky objects obtain assistance or use a handcart.
8. Sharp instruments, such as knives, scissors, letter openers, etc should always be kept in the front of a desk drawer where they can be readily seen when the drawer is open.
9. Desk drawers and file cabinet drawers shall be kept closed when not in use
10. To minimize overbalancing file cabinets office & shop staff should only open one of the upper filing cabinet drawers at a time.

11. Office & shop staff who become assigned field duties must observe the safety rules as applicable to the work site and if any office & shop staff are required to visit the field they shall wear appropriate personal protective equipment as required by that particular jobsite (could include hard hat, safety boots, safety glasses, safety vest or hearing protection).

12. A map of the work place that shows evacuation routes and head count location, as well as the location of emergency equipment, first aid station, fire sprinkles, alarm pulls and fire extinguishers must be posted at exit door.

5.0 SAFE PRACTICES AND PROCEDURES

This chapter includes Work Procedures and company policy for a diversity of areas within the company. Each topic has been placed on its own page or half page to allow for photocopying when copies of procedures of specific tasks are needed. As well, a revision key has been added after each provision to track changes and updates to ensure that procedures are updated at least once a year or more frequently if needed.

5.1 Attaching Cable Clips and Clamping

5.2 Boom Truck

5.3 Cleaning Solvents and Flammables

5.4 Compressed Gas

- 5.4.1 Compressed Air (Work Procedure)

5.5 Concrete Lining Forms for Tunnel (Work Procedure)

5.6 Confined Space

- 5.6.1 Definition
- 5.6.2 Confined Space Entry Permits
- 5.6.3 Hazards in Confined Space
- 5.6.4 Atmospheric Testing
- 5.6.5 Ventilation
- 5.6.6 Personal Protective Equipment (PPE)
- 5.6.7 Emergency and Rescue
- 5.6.8 Training and Supervision
- 5.6.9 Confined Space Openings
- 5.6.10 Responsibilities
- 5.6.11 Emergency Procedure for Injured Confined Space Worker

5.7 Conveyor Belt Operation (Work Procedure)

5.8 Cranes, Derricks and Hoisting Equipment

5.9 Diesel D-30 Pile Hammer

5.10 Drilling and Blasting on Water (Work Procedures)

5.11 Electrical/Mechanical Hazards and Lock-out Procedures

- 5.11.1 Hazards (Electrical/Mechanical)
- 5.11.2 Procedure

5.12 Elevating Work Platforms

5.13 Entry into Cutterhead Area (Work Procedure)

5.14 Equipment and Vehicles

5.15 Erection of Pre-cast Segments (Work Procedure)

5.16 Erection of Rib and Lagging (Work Procedure)

5.17 Excavation and Trenching Safety

5.18 Explosive/Powder – Actuated Fastening Tools

5.19 Fall Protection and Guardrails

5.19.1 General Procedures

5.19.2 Fitting a Body Harness

5.20 Fire Protection Requirements

5.20.1 Use of Fire Extinguishers

5.21 FitzWright "Explorer" Immersion Suits

5.22 Flammable and Combustible Liquids

5.23 Forklift

5.24 Fuel Handling Procedures

5.24.1 Responsibilities

5.24.2 Environmental Protection Procedures

5.24.3 Additional Requirements for Marine Operations

5.24.4 Spills

5.24.5 Posting of Procedure

5.24.6 Storage of Fuel on Site

5.25 Gas Testing

5.25.1 Use of Gas Testers

5.25.2 Zeroing the Instruments

5.25.3 Bump Test

5.25.4 Clearing Peaks

5.25.5 Calibration

5.25.6 Repairs

5.26 Grinding

5.27 Grouting (Work Procedure)

5.28 Hand Tools and Power Tools

5.28.1 General Guidelines for Hand Tools

5.28.2 Power Tools

5.28.3 Defective Tools

5.29 Heavy Equipment

5.29.1 Getting on and Off Heavy Equipment

5.30 Hoisting and Rigging

5.30.1 Rigging Equipment and Devices

5.30.2 Slings

5.31 Hot Work

5.32 Hydro Wires

5.32.1 Safety Precautions for working around Overhead Power Lines

5.33 Ladders and Scaffolds

5.33.1 Portable Ladders

5.33.2 Step Ladders

5.34 Material Handling

5.34.1 Manual Lifting

5.35 Moving (not hoisting) Steel Beams

5.36 Personal Floatation Devices (PFD)

5.37 Personal Protective Equipment (PPE)

5.38 Placing Concrete with Concrete Pump & Slick Line (Work Procedure)

5.39 Portable Grinders

5.40 Powered Saws

5.40.1 Use of Chainsaws

5.40.2 Use of Hand-Held Power Circular Saws

5.41 Propane

5.41.1 General Guidelines

5.41.2 Propane Cylinder Storage & Handling

5.41.3 Propane Heaters and Torches

5.42 Removing Rock from Teeth of Clamshell Bucket

5.43 Roof Support for Rock Tunnel

5.44 Scaffolds

5.44.1 Use of Wood Scaffolds

5.44.2 Use of Metal Scaffolds

5.45 Scows

5.45.1 Operation of Bottom Door Dump Scows

5.46 Setting Steel Piles in Driving Frame

5.47 Shaft Sinking

5.48 Soundings from Deck of Dredge

5.49 Splicing H Piles

5.50 Tiger Torches

5.51 Towing Scows

5.52 Track Laying

5.53 Traffic Control

5.53.1 Requirements for Traffic Control

5.53.2 Equipment Required

5.53.3 Dress for the Weather

5.53.4 Where to Stand

5.53.5 How to Signal

5.53.6 Communication

5.53.7 Encountering Problems

5.53.8 Preparing for Each Job

5.54 Underground Transport/Tramming (Work Procedures)

5.55 Unloading Segments (Work Procedure)

5.56 Ventilation

5.57 Vibratory Pile Hammer

5.58 Welding and Cutting

5.58.1 General Procedures

5.58.2 Portable Arc Welders

5.58.3 Torches

5.59 Work Boats (Getting on and off)

5.60 Working Alone

5.61 Working over Water

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 30, 2005	July 5, 2004	12	May 2006	J. Carruthers (H&S)

5.1 Attaching Cable Clips and Clamping

1. Wire the thimble to the rope at the desired point, then bend the rope around the thimble and secure temporarily by wiring the rope members together.
2. First attach the clip farthest from the thimble and tighten (be sure the base of the saddle rests upon the live end of the rope and the "U" bolts on the short end.) All clips must be attached in this manner.
3. The clip nearest the thimble goes on next. Do not tighten yet. If one or more additional clips are to be attached, place them at an equal distance apart between the clips already attached.
4. Before tightening, place some stress on the rope to take up the slack and equalize the tension on both sides of the clip. (Do not apply too much stress or the clip attached in step 1 will not hold). Tighten all clips.

Diameter of Rope (Millimetres)	Number of Clips	Spacing Between Clips Centre to Centre (millimetres)	Torque (Newton-metres)
6	2	38	20
8	2	51	40
10	2	57	65
11	2	64	90
12	3	76	90
16	3	102	135
19	4	114	176
22	4	133	305
25	4	152	305
29	5	178	305
32	5	203	488
38	6	229	488
44	7	267	628
50	8	305	881

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
April 18, 2005	June 29, 2004	02	April 2006	J. Carruthers (H&S)

5.2 Boom Truck

The importance of safe operation cannot be over emphasized. Carelessness and neglect on the part of operator, job supervisor and planners, rigging personnel, and job site personnel can result in their death or injury and costly damage to the boom truck or property.

Qualified personnel shall operate the Boom Truck, license for both truck & crane.

Procedure

The operator must not operate the Boom Truck when he is physically or mentally unfit.

The operator is responsible for all operations under his direct control. When there is doubt as to the safety of an operation, the operator has the authority to stop the operation and refuse to continue until the unsafe condition has been corrected. (ie/hydro wires, insufficient light, bad weather)

Before starting the engine or engaging the power takeoff, the operator is to make sure that:

1. All daily inspection and maintenance has been performed.
2. All controls are in the off position
3. All personnel are in the clear.

The operator must not start crane movement unless a designated signal person is within his range of vision. The operator will obey an emergency stop signal at all times, no matter who gives it.

The operator is to perform the following operations before leaving the control station or the boom truck for any reason:

1. Land any load.
2. Lower the boom onto the boom rest if possible, otherwise, securely fasten the boom from movement by the wind or other outside forces.
3. Move all controls to the off position.
4. Park boom truck.
5. Apply the truck parking brakes and chock the tires.
6. Stop engine.
7. Lock door of truck cab.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
April 18, 2005	June 29, 2004	05	April 2006	J. Carruthers (H&S)

5.3 Cleaning Solvents and Flammables

See Chapter 14: Hazardous Materials for more information on handling chemicals.

Cleaning solvents are used in the day-to-day construction work to clean tools and equipment. Special care must be taken to protect the worker from hazard that may be created from the use of these liquids. Wherever possible, solvents should be non-flammable and non-toxic.

The foreman must be aware of all solvents/flammables that are used on the job, and be sure that all workers who use these materials have been instructed in their proper use and any hazard they pose.

The following instructions or rules apply when solvents/flammables are used:

1. Use non-flammable solvents for general cleaning.
2. When flammable liquids are used, make sure that no hot work is permitted in the area.
3. Store flammables and solvents in special storage areas.
4. Check toxic hazard of all solvents before use. (MSDS)
5. Provide adequate ventilation where all solvents and flammables are being used.
6. Use goggles or face shields to protect the face and eyes from splashes or sprays.
7. Use rubber gloves to protect the hands.
8. Wear protective clothing to prevent contamination of workers' clothes.
9. When breathing hazards exist, use the appropriate respiratory protection.
10. Never leave solvents in open containers -return them to closed storage containers.

11. Ensure that proper containers are used for transportation, storage and field use of solvents/flammables.
12. Where solvents are controlled products, ensure all employees using or in the vicinity of use or storage are trained and certified in WHMIS and that all WHMIS requirements are met.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
April 18, 2005	June 29, 2004	03	April 2006	J. Carruthers (H&S)

5.4 Compressed Gas

Always use care in handling all compressed gas cylinders. They must not be dropped, jarred or exposed to temperature extremes and should always have their contents properly identified.

Cylinders must have the valve cap or valve protection device in place at all times, except when in actual use or connected to a welding set. Cylinders are never to be rolled or lifted by the valve or valve cap. A suitable cradle is to be used for transporting.

Compressed gas cylinders, whether full or empty, are to be stored and transported in an upright position and secured so they cannot fall or be upset. They must be stored separate from fuel-gas cylinders or combustible materials (especially oil or grease) a minimum distance of 20 feet or by a 5-foot high non-combustible barrier. In addition these cylinders must not be placed within 5 feet of an electrical outlet or where they might become accidentally a part of an electric circuit.

Never force connections that do not fit and never tamper with the safety relief devices of cylinder valves.

Before the regulator is removed from a cylinder, the valve needs to be closed and all pressure released from the regulator. Never use a leaking cylinder. Take the leaking cylinder outdoors and store away from any ignition source, notify the supervisor and deal with the situation immediately.

The recessed top of cylinders is not a resting place for tools.

A training course must be taken before working with propane.

Oxygen:

Oil, grease or similar materials can not be allowed to come in contact with any valve, fitting, regulator or gauge of oxygen cylinders. Also, oxygen shall never be used as a substitute for compressed air.

When an oxygen cylinder is in use, the valve should be opened fully in order to prevent leakage around the valve stem.

Acetylene:

Acetylene cylinders are to be properly secured and always used, transported or stored in a vertical position. Cylinders shall be protected from sparks, flames and contact with energized electrical equipment.

An acetylene cylinder valve shall not be opened more than one and one-half turns of the spindle and preferably no more than three-fourths of a turn.

Employees shall not use acetylene in a free state at pressures higher than 15 psi.

All gas bottles must be stored outdoors.

Fire Extinguisher must be provided at each storage area.

5.4.1 Compressed Air (Work Procedures)

Scope

To reach the work face, workers must pass through a man lock that is to be compressed to the working pressure. When leaving the compressed air workplace, workers must be decompressed to normal atmosphere by a controlled decompression, or release of air.

Potential Hazards

Health Effects (Compression):

Air Space Equalization: Lack of clear body airways for equalization causes an imbalance of pressures in body areas. For example, the Eustachian Tubes must be clear to allow the pressures on either side of the eardrum to balance, failure to do so will cause acute earache and possibly a perforated eardrum.

Health Effects (Decompression):

All decompression must be strictly controlled for the time periods laid down by the Ministry of Labour's Decompression Tables. If decompression is not controlled, nitrogen bubbles are formed in the tissues. Formation of nitrogen bubbles will lead to decompression sickness. There are two (2) main types of decompression sickness.

1. Type I: Usually called the "bends", this is manifested by pain in one or more of the limbs. This may commence at any time up to twelve (12) hours after decompression. The pain may be slight or agonizing.
2. Type II: Affects the cardiovascular, respiratory and neurological systems. Occasionally, limb pains are present and usually appear early at the end of decompression or within forty-five (45) minutes of decompression and may show up as:
   - Tingling, weakness, numbness or paralysis in the limbs, collapse with signs of shock
   - spots of flashes of light before the eye
   - loss of balance or consciousness,
   - cardiovascular problems
   - abdominal pains, with or without vomiting
   - disorientation, memory loss, malaise if the brain is affected.

Procedure
Compression, Decompression and Medical Locks

TBM Air Lock

Used to compress and decompress workers at the beginning and end of the work shift. The air lock is located forward on the TBM allowing access to the cutterhead or at the bottom of a shaft.

Medical Lock

Serves two (2) purposes:

- Medical testing of suitability of a worker to be exposed to compressed air.
- Therapeutic recompressions – this lock is located on the surface within close proximity to the shaft.

Lock Tenders

Lock-tenders for both the man lock and the medical lock will be competent people selected by the Project Superintendent to control the compression and decompression rates for the workers. Those chosen will be trained to understand the hazards associated with compression, decompression, decompression sickness and the importance of accurate record keeping. A lock-tender must ensure that the compression and decompression are accurate according to the established procedures.

If decanting rapid decompression to atmospheric pressure followed quickly by recompression in a separate chamber (e.g., medical lock) is conducted, the Project Physician must be notified.

In the event a worker collapses or becomes ill during decompression, the attendant must raise the pressure in the man lock to the equivalent pressure in the work chamber and immediately notify surface to alert the physician on call.

The medical lock attendant (who may also be the air lock attendant) will hold a current St. John Ambulance First aid Certificate with CPR and be familiar with the aspects of working in compressed air. He will work in harmony with the Project Physician with respect to handling the medical lock.

Treatment of Decompression Sickness

The treatment for all forms of decompression sickness is recompression. A supply of clean air at a pressure of at least 0.7 bar above the maximum working pressure used in any work chamber on the project must be available to the medical lock on site. Oxygen therapy, if used, must be given under the supervision of a physician. Because Type II-Decompression sickness may be difficult to diagnose, it is essential that all workers, who develop abnormal signs or symptoms within 24 hours of being exposed to compressed air, should be urgently recompressed.

Working Pressure and Medical Requirements:

Where workers are employed at pressure up to 14 psi:

1. Decompression procedures should be followed using the appropriate tables.
2. Exposure to pressure should be limited to two (2) periods in any 24 hour period.
3. Each worker must spend at least 12 consecutive hours at atmospheric pressure in any 24 hour period because the state of super-saturation still exists at the end of a normal decompression. This means that the period in compressed air plus the time required for decompression (including the time taken to reduce pressure during stages) must never exceed 12 hours.
4. Workers must undergo a radiographic examination of major joints unless they have been x-rayed within the previous 5 years and the x-rays results are available.
5. Provide health education to workers on the health hazards of working in compressed air; i.e., decompression sickness and the necessary precautions including the medical fitness criteria (to be completed by Safety Department).

Construction Projects Regulation Requirements:

The Regulations for Construction Projects requires a constructor of a tunnel in which workers work in compressed air to employ at least one qualified medical practitioner preferably experienced in hyper baric medicine as project physician to conduct medical examinations and establish a medical treatment program for workers.

Duties of Project Physicians:

Be available to render immediate medical treatment or advice on the treatment of decompression sickness to workers working in compressed air.

Conduct medical examinations for workers before beginning work in compressed air which include a physical examination and clinical tests as required. Results of an air test in the medical lock if a worker has not previously worked in compressed air shall be reported to doctor.

Complete fitness record forms for the examined workers. Advise the employer on the fitness of examined workers without disclosing to the constructor and employer the records or results of the examination or tests. Notify the Chief Physician of the Ministry of Labour in writing whether a worker is unfit or fit with limitations to work in compressed air.

Maintain the medical records in a secure place for at least six (6) years from the last entry at which time it may be forwarded to the Chief Physician, or a Physician designated by the Chief Physician. In any event, the records must not be destroyed for a period of forty (40) years from the time such records were first made or twenty (20) years from the time the last of such records were made, whichever is greater.

Air Lock

The air lock is a two compartment pressure vessel specifically designed to compress and decompress personnel entering or leaving the cuttinghead of the TBM. The air lock consists of a primary lock and an ancillary lock. The primary lock is the chamber generally used for access and egress from the work chamber. The ancillary lock is generally used in an emergency.

The lock is designated to be operated by competent and trained personnel, who are experienced in operating air locks and are familiar with compression and decompression procedures as required by local codes and legislation. A competent and approved person must be designated Lock Tender. It shall be the lock-tenders responsibility to effect the safe operation of the lock.

Badge (for compressed air worker only)

Wear badge for 24-hours after working in compressed air.

Badge shall state the name of constructor, name and telephone number of Physician, location of medical lock at project and the words "compressed air worker".

In case of decompression sickness, take the sick worker immediately to a medical lock.

Buzzer, Bell System

An electric buzzer or bell system shall consist of a switch and buzzer or bell located:

1. in every work chamber near the door that leads to an air lock;
2. in every air lock;
3. near every lock tender's work position.

Code of Signals (post signs)

1 - signal – when no people are in the air lock, material is coming out;

3 - signals – people are coming out of the air lock.

Smoke Line

A smoke line shall be provided from each work chamber if an air lock or bulkhead is located between the chamber and the surface. The smoke line shall extend from face to ventilation system at back of gantry, for air lock on TBM.

Supervision Decompression Procedures

The rate of decompression required by the "Tables" may be doubled with respect to a worker if and while performing the work in compressed air, the worker:

1. has not been exposed to air pressure greater than 220 kilopascals;
2. has remained under compressed air for a maximum of 30 minutes;
3. has not done manual work.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
April 18, 2005	June 29, 2004	05	April 2006	J. Carruthers (H&S)

5.5 Concrete Lining Forms for Tunnel (Work Procedure)

Scope

This procedure details the method of installing formwork for the construction of the secondary lining.

Potential Hazards

Feet slipping on curved surface when cleaning or placing concrete blocks for invert of forms.

Pinched fingers & feet when installing section of forms.

Oil spraying into eyes when oiling forms.

Workers may be struck by the traveller, when moving forms.

Chips of steel from bolts & nuts when using air gun to tighten bolts.

Procedure

1. In the initial set up of forms, invert section will be set up in bottom of shaft & braced
2. Traveller will be installed next, to move invert sections into tunnel
3. After all of the invert has been set & braced, sided top section will be installed
4. Invert section installed in shaft will be moved to front of forms
5. Top & side doors on forms will be opened; top & side bracing will be installed.
6. Bulk heads will be installed at end of forms & braced
7. Form vibrator & slick line will be installed as required
8. After first pour, side form & invert form will be stripped.
9. Invert form & one side & roof panel are moved to front of forms for placing
10. Concrete blocks or spuds are used to set invert forms.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
April 18, 2005	June 29, 2004	04	April 2006	J. Carruthers (H&S)

5.6 Confined Space

Sections 60-62 in the Occupational Health and Safety Act outlines the government requirements for confined space entry.

5.6.1 Definition

A "Confined Space" means a space where entry or exit to/from the space is restricted and where a hazardous gas, vapour, dust, fume, or any oxygen-deficient atmosphere may occur because of its construction, location, contents or the work activity therein. This could include a storage tank, ballast tank, pump room, cofferdam or other enclosure. It could also be a hold or structure that is not designed or intended for human occupancy, except for the purpose of performing work and has:

- poor ventilation,
- the possibility of an oxygen deficient atmosphere, or
- the possibility of an airborne hazardous substance.

It is both the supervisor and the employee's responsibility to ensure that safe working conditions for confined space entry are maintained. However, always assume that a hazard exists. It is the responsibility of any worker who must work in or around a confined space to follow this procedure.

Entry into a confined space shall be avoided if possible. Only employees properly trained on the hazards associated with confined space work shall be allowed to enter a confined space. Before entering a confined space, a confined space entry permit shall be obtained from the Constructor and posted. (See Table 16)

5.6.2 Hazards in Confined Space

Hazards encountered in a confined space can include the following:

- Oxygen deficiency or enrichment
- Toxic vapours of gases
- Temperature extremes
- Electricity (including static)
- Moving parts
- Slips and falls
- Hazardous chemicals
- Flammable liquids or gases
- Noise

Before any work is allowed in a confined space, it must be made safe for entry for the duration of the work. All existing and potential hazards must be eliminated. Smoking is not permitted in any confined space at any time.

Examples of Confined Space	Common Hazards
Vessel	Welding process may displace Oxygen and Create CO
Confined Areas	Co-emitting internal combustion engines operating Nearby (CO heavier than air and could leak into the pit)
Utility Maintenance Holes	Accumulation of toxic and/or combustible fumes from ducts entering the chamber.

5.6.3 Confined Space Entry Permits

Confined space entries must be planned. Entry permits must be completed for all confined space work prior to entry. The Supervisor must keep a copy at the workplace and send one copy to the safety coordinator.

Permits must be obtained separately for each specific job, location, person and time. Permits *must not* be carried from one shift to the next. A copy of the permit is to be signed off by the employee in the confined space prior to entry and posted at the entrance point to the confined space.

Work permits are available in the Site Office, Head Office and in the Supervisor's Job Start Up Kit. These permits must be kept on file for a period of two (2) years.

5.6.4 Atmospheric Testing

Prior to entering a confined space, all levels of the confined space must be tested for the presence of flammable or toxic gases and vapours, an oxygen deficient atmosphere, carbon monoxide and for any other hazards. If flammable or toxic gases or vapours are detected or if an oxygen deficiency is found, forced ventilation shall be used to maintain oxygen at a safe level and to prevent a hazardous concentration of flammable or toxic gases and vapours by using a fan or compressed air.

The person doing the testing must be trained. Testing must be done prior to entry and while the worker is inside. No entry to the confined space is to be made when:

- Explosive readings are above zero
- Oxygen readings are less than 19.5% or more than 23.5%
- Toxic vapours or fumes are above the safe threshold limit values are present

Electric welding, gas welding, cutting or any other hot work shall not be performed on the interior, exterior or near the openings of any confined space which may contain flammable or explosive gases or vapours until the space has been properly purged. See also procedure for **Gas Testing in Chapter 5** of this Safety Program.

5.6.5 Ventilation

The confined space must be ventilated with fresh air prior to entry. Confined spaces are to be ventilated either by natural or mechanical means but the effectiveness of natural ventilation is often unreliable. After the confined space has been cleaned, purged and ventilated, the atmosphere shall be re-tested of oxygen level, combustibility and toxicity. If the test still shows positive for any hazard, further cleaning, purging and ventilation may be required.

More information on Ventilation can be found in Chapter 5 in this safety program.

5.6.6 Personal Protective Equipment (PPE)

Those working inside a confined space must wear proper protective equipment. This equipment varies with the work to be performed and the type of atmosphere present. The equipment may include an approved respiratory protection device, protective clothing, approved chemical goggles, hard hats, gloves and safety boots.

Where the atmosphere of a confined space cannot be guaranteed because oxygen readings are less than 19.5 % toxic gases, or vapour fumes are present, self-contained breathing apparatus shall be worn during the complete duration of entry.

The approved self-contained breathing apparatus are:

- Self-contained Scott Air Pak – Pressure/Demand – 30 minute duration with alarm at 4 minutes of air remaining.
- Supplied air (High-pressure) – Pressure/Demand – approximately 6-hour duration with one person on 300 CF cylinder set at 750 PSI at the regulator.

Cylinders of oxygen or other gases *shall not be taken into confined spaces.* This does not apply to breathing equipment.

Protective clothing and respiratory equipment shall not be used as substitutes of proper cleaning and job preparation.

Employees working in sewers should launder coveralls frequently. Rubberized cotton gloves provide good hand protection. In wet places, boots and rubber overshoes protect against dampness and infection.

5.6.7 Emergency and Rescue

Before any person enters a confined space there must be an observer outside the confined space. This observer must be trained in both confined space and artificial respiration. A lifeline and harness assembly must always physically connect the observer to the person inside and they are to be able to communicate with each other.

The free end of the lifeline attached to the harness should be secured outside the enclosed space. The lifeline should be under the control of the observer who will keep the person inside under observation at all times.

A portable emergency alarm should be within reach of the person attending the lifeline. If the inside worker fails to answer the observer or seems to be behaving strangely, or if the alarm sounds on the monitor in the space, the outside worker must shout loudly to the inside worker to get out. If there is no response, the outside worker should begin pulling the person out by the harness.

If for some reason, the person in the confined space is in trouble and is not attached to a harness, or is attached to a harness but is stuck, the outside worker must not go in to rescue. Whatever overcame the person in trouble is just as likely to overcome the person going in. The observer must summons help by using the portable alarm or by yelling for assistance. Rescue training is absolutely necessary.

A rescue team consisting generally of at least two persons – an observer and a rescuer, accomplishes emergency rescues from confined spaces. The observer is equipped with a means of summoning assistance and remains stationed near the entrance of the confined space. The rescuer equipped with suitable protective equipment goes into the space to recover the casualty. The rescue team must be capable of bringing out any worker affected and may therefore require block and tackle, safety harness, stretcher and rope.

5.6.8 Training and Supervision

McNally will ensure that the workforce has been trained and made aware of the following:

- Potential health hazards of working in confined spaces.
- Proper procedures and precautions required for entry.
- Pre-entry procedures such as lockouts, blanking of supply lines and atmospheric testing.
- Use, maintenance and limitations of protective equipment.
- Proper rescue and emergency procedures.

Contractors and subcontractors must ensure that McNally is notified prior to confined space entry and the person in charge of the work operation must ensure that the necessary protective clothing, equipment and devices are available and that the workers are properly trained in both their use and care.

5.6.9 Confined Space Openings

When covers are removed from confined spaces, a railing, temporary cover or other temporary barrier or tripod shall guard the opening. Safe access to the confined space shall be maintained at all times. If possible, all cords, hoses, leads, etc. shall be routed through an entrance other than the employee access into the confined space.

Before employees are allowed to enter a confined space, all electrical and mechanical energy sources that could affect the employees working in the space shall be physically rendered inoperative, locked out and tagged. If required, the space shall be drained, vented and cleaned.

5.6.10 Responsibilities

Standby Person:

The "Standby Person" is the individual designated to stay outside of the confined space to assist the individual in the confined space area. This person should be a valid/certified First Aider. Should have a system for signalling if an emergency.

The responsibilities of the "Standby Person" include the following:

1. To maintain verbal communication with the confined space worker at all times.
2. To ensure a means of emergency signal is available. Also ensure that a fire extinguisher, mechanical ventilation, emergency stretcher and SCBA are available if required for rescue. Mechanical ventilation is supplied to the confined space as required.
3. Ensure that means of retrieval is available for the confined space worker, in the event of an emergency.
4. Obtain and post at the entrance to the confined space the Confined Space Entry Permit from the supervisor, or have it available for inspection. Return permits to Supervisor at end of shift.

5. Secure free end of lifeline outside confined space in the event of an emergency to aid removal of injured confined space worker.

Confined Space Worker:

The "Confined Space Worker" is the individual going into the confined space and responsibilities include the following:

1. Wear full body harness with lifeline when wearing a respirator to rescue a person.
2. Wear other personal protective clothing and/or equipment required.
3. If a compressed gas is required in the confined space:
   - The bottles are to be mounted outside the space.
   - A leak test must be conducted on the equipment, torch and hoses, prior to entering.
   - When work is completed, request the standby person to close the cylinder valves, bleed hoses and torches at the gauges, if possible, and remove the equipment.
4. Ensure your equipment/tools are in good working condition prior to entry (e.g. good insulation on welding electrodes and grounding on tools and equipment).
5. Ensure a confined space permit is posted or available for inspection and that you have signed this permit.

Supervisor:

The following are the responsibilities for the Supervisor watching over the confined space entry:

1. Has the obligation to assess the potential danger involved in an operation and provide the suitable protective equipment to his area members. If guidance is required, please contact the safety department.
2. Ensure this procedure is complied with and provide his/her workers with the appropriate training.
3. All workers working in the confined space shall be educated in this procedure.

5.6.11 Emergency Procedure for Injured Confined Space Worker

Standby Person:

1. If worker reports headaches, dizziness, irritation or other ill effects then stop work and evacuate the confined space.
2. Sound air horn or other emergency alarm to alert supervisor.
3. Remove confined space worker and perform First aid or CPR, if required, until the ambulance arrives.
4. If rescue is required, then standby must get help. Person entering confined space to remove injured worker must wear SCBA equipment, body harness and lifeline.

Supervisor:

1. React to emergency alarm from standby. Assess the danger/injury and call safety department and emergency services, if required.
2. Ensure confined space worker and standby are safely out of confined space. Ensure CPR or First aid is administered until the ambulance arrives, (if required).

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
April 18, 2005	June 1, 2004	06	April 2006	J. Carruthers (H&S)

5.7 Conveyor Belt Operation (Work Procedure)

Potential Hazards

Belt may overheat leading to an emission of toxic fumes from the components of the belt.

Toxic gases from the cuttings may be present as waste material is deposited onto the belt from the auger.

Pinch points exist at the drive, head, tail and tension pulleys.

Workers may be struck by material falling off the conveyor.

Worker may fall off moving conveyor or get caught on bracket holding equipment over top of conveyor.

Procedure

1. Hydrogen sulphide monitors will be placed at the discharge end of the auger to alert workers to the presence of a toxic level. To aid in the dilution of gases present, an adequate ventilation flow must be present.
2. No worker will ride the conveyor belt.
3. Before the belt is started up, an audible and visual alarm will alert the workers that the conveyor is about to operate .The control lever will have a lock out device to stop conveyor from moving when a person is on belt.
4. Fire extinguishers, 10 lbs ABC, will be readily available along the walkway of the conveyor.
5. Before any repairs, adjustments or maintenance is done, the conveyor shall be stopped and the prime mover de-energized, locked and tagged out.
6. To prevent material from falling on workers who may have to work below while the conveyor is operating guards will be in place under the conveyor at those locations.
7. To aid in the prevention of a worker becoming entangled in moving parts, any jewelry (rings, pendants, etc.) shall be removed. Workers with long hair (shoulder length or longer) whose duties require them to work in the area of the conveyor will tie their hair back or put it up in a hair net. Workers must ensure that there are no loose parts of their work clothes dangling that may become caught up in the moving parts.
8. Any work along the conveyor that requires the use of a shovel will require that the shovel does not have a hand grip, this is to allow the shovel to be pulled free from the hands in the event it becomes caught in a moving part.
9. Tripping hazards will be eliminated by maintaining a clear walkway along the conveyor.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
April 29, 2005	June 29, 2004	04	April 2006	J. Carruthers (H&S)

5.8 Cranes, Derricks and Hoisting Equipment

1. Cranes and rigging shall comply with the requirements of Federal or Provincial Regulations for mobile cranes and tower cranes.
2. Only authorized persons shall be permitted in the cab or on the equipment. No person shall be permitted to ride the hook, sling or load of any hoisting equipment.
3. Only operators, qualified by knowledge, training and experience to avoid endangering workers, equipment or materials, shall operate cranes of any types in all workplace locations.
4. Operators shall not leave their positions at the controls of cranes, hoists, derricks or other lifting devices while the load is suspended.

5. Load limits as specified by the manufacturer shall not be exceeded under any circumstances. Operating and maintenance procedures as specified by the manufacturer shall be followed.
6. Before a lift is attempted, the lifting mechanism shall be level, firmly supported with the hoist line centred over the centre of gravity of the load to be lifted.
7. For the first lift of each day, the load shall be test-lifted and the brakes checked (load lifted several inches and then tested). Slings and bindings shall be checked and shall be readjusted as necessary to ensure safety and stability. One person designated to perform this task shall give signals to the equipment operator.
8. The operator shall obey a "Stop" signal given by anyone.
9. Hoist lines, ropes or wire cables shall not be guided by hand when standing within reach of the drum or sheave. Proper splicing or mechanical clamping of the tail section shall make wire rope loops. Wire rope clips shall not be used to form eyes in wire rope bridles or slings.
10. Operators of cranes, derricks, hoists and other hoisting equipment shall exercise extreme caution when in close proximity to energized lines or equipment. Distance maintained from energized lines shall not be less than required By Federal or Provincial Regulations.
11. Tag lines shall be used on all loads where a worker may be endangered by the rotation or uncontrolled motion of a load being hoisted by a crane or similar hoisting device, one or more guide ropes or tag lines shall be used to prevent the rotation or uncontrolled motion. These guide ropes or tag lines must not be removed from the load until the load is landed and there is no danger of it tipping, collapsing or rolling. (OHSA Reg. 179)
12. All spreader bars shall be tagged and marked with the rated capacity.
13. Equipment repairs or maintenance needed must be recorded in Log Book, with copies going from the operator to foreman, to Office (with Time Sheets); to shop.
14. Shop foreman will review Log reports & inform equipment superintendent of any major repairs to be done or that has been done to Equipment. A list of all Major repairs to Equipment will be entered into a Computer File.
15. NO modification to hoisting equipment will be done without first getting head office approval.
16. Modification does not include Maintenance or Repairs to equipment.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
April 29, 2005	June 29, 2004	04	April 2006	J. Carruthers (H&S)

5.9 Diesel D-30 Pile Hammer

Conduct and record a Toolbox Talk before beginning this job so that everyone understands their duties.

1. Check the crane, crane cables, sheaves, blocks & safety hook to be sure all in good condition.
2. If working on land -make sure the crane is setting on a firm and level footing.
3. Check the diesel hammer and its sling for any defects.
4. Make certain that the diesel hammer has sufficient fuel and oil before start up.
5. Attach (2) two tag lines of sufficient size and length to the diesel hammer.

6. Make sure everyone is wearing the required P .P .E.
7. Make sure the hammer "trip" and fuel shutoffs are working properly.
8. Place pile helmet on top of pile. Check alignment of hammer and piles, pull trip rope, raise piston and start hammer. Leave trip device high enough so that it can't reset and catch piston. Follow pile with driving leads as pile is driven to refusal.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
April 29, 2005	June 29, 2004	04	April 2006	J. Carruthers (H&S)

5.10 Drilling and Blasting on Water (Work Procedures)

1. Drilling is to be done from an approved barge, which will be secured in place by two approved spuds to minimize any movement of the barge.
2. Divers are utilized at the project start to view the basin floor after dredging to identify any abnormal conditions that may effect the drilling operations. Divers to be used for the first three blasts to check results and then periodically throughout the remainder of the project.
3. Casing will be seated into the bedrock using a secured shorter template pipe to provide directional stability. Casing direction will be checked with a bubble level and a pitch indicator. All holes are to be 90 vertical, continually checked until complete.
4. Drill pattern and hole depth to be established for each project. Drill gridlines are established prior to drilling using a template and a DGPS tracking system to pinpoint exact hole locations.
5. The holes will be loaded down through the casing using 5" M210 cartridges and double primed with Pentex boosters and non-electric detonators to provide a back up for ensuring detonation. After holes are loaded the casing will be pulled and the shock tubes will be floated to the surface for connection when the shot is ready to be hooked up. Tubing is attached to small brightly coloured floats for visibility and will be tied off away from the drilling operation.
6. If holes must be left loaded overnight the site will be monitored by security staff. As well, the project is in a well-lit area and the actual site is only accessible on water.
7. In unsuitable weather conditions, work will be suspended until conditions improve.
8. After a blast is fired, initiation testing of each shock tube will be conducted. Should a misfire occur, the site will be secured and a diver will be sent down to assess the situation. A plan of action will be determined based on each individual situation. As well, all steps required by the Blasting Regulations and the Safety Act and Regulations will be followed.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
April 29, 2005	June 29, 2004	03	April 2006	J. Carruthers (H&S)

5.11 Electrical/Mechanical Hazards and Lock-out procedures

Additional information on this topic can be found in the OHSA Construction Regulations in sections 181 to 195.

The purpose of this procedure is to establish the requirements for the isolation of electrical and mechanical energy sources. Isolation shall be used to ensure the health and safety of workers where the unexpected start up or release of stored or residual energy could cause injury.

5.11.1 Hazards (Electrical/Mechanical)

- Electrical Safety Standards – All electrical installations and equipment used will meet Canadian Standards Association and Federal/Provincial Regulations.
- Temporary panel boards must be securely mounted, protected from weather and water, accessible to workers and kept clear of obstructions. All temporary panels to have labels showing voltage and breaker designation.
- Use only fuses or breakers of the recommended amperage.
- Follow approved procedures for tagging and lockout.
- Do not use extension or tool cords that are defective or have been improperly repaired.
- Do not wire plugs into outlets as disconnecting will take too long in an emergency.
- Protect cords from traffic.
- Protect Bulbs with cages.
- Always use a grout fault circuit interrupter (GFCI) with any portable electric tool operated outdoors or in wet locations.
- Any shock or tingle, no matter how slight, means that the tool or equipment should be checked and repaired if necessary.
- Locate all underground and overhead services before starting work. Determine voltage of electrical utilities.
- With backhoes, cranes and similar equipment near power lines, use a signaller to warn the operator when any part of the equipment or load approaches the minimum allowable distances.

Voltage Rating of Power Line	Minimum Distance
750 to 150,000 volts	3 metres (10')
150,001 to 250,000 volts	4.5 metres (15')
Over 250,000 volts	6 metres (20')

- Before moving ladders, rolling scaffolds or elevating work platforms, always check for overhead wires. Death and injury can be caused by electrical contact with access equipment.
- Unbroken electrical contact: If you don't know the voltage treat it as high.
- In some electrical accidents the injured or unconscious person remains in contact with the live wire or equipment. Rescue should only be attempted after power has been turned off.
- In some cases of low voltage, when power cannot be turned off, break contact if possible. Use a dry board, rubber hose or dry polypropylene rope to move either the injured person or the wire.
- ***Warning:*** Even with dry wood or rubber, touching the injured person can be dangerous. Give first aid only after the injured person is free of contact.
- Never put water on fires in live electrical equipment or wiring. Water is a conductor and increases the risk of flash, arc and electrocution.
- An electrical fire in a confined space can rapidly deplete oxygen and may release toxic fumes. If possible, switch off power. Avoid inhaling fumes and vacate the area at once. If necessary, breathe through a damp cloth and stay close to the floor.

- Use a Class C fire extinguisher; intended for electrical fires, this type employs a non-conductive extinguishing agent. An ABC fire extinguisher may also be used on an electrical fire. Report fires immediately.
- Wiring or equipment involved in a fire must not be used until a supervisor approves it.

5.11.2 Procedure

1. The supervisor involved in the electrical/mechanical work, determines where the isolation of electrical/mechanical source is required and is to notify all other supervision working in the vicinity of the systems requiring electrical or mechanical isolation and test and try to engage the equipment to confirm the isolation.
2. The supervisor will tag and lockout the disconnect device with a scissor-type device (if required), to allow for the multiple installation of locks for other trades.
3. All supervision of trades working on the isolated electrical/mechanical system will ensure that each of their workers install locks and tags for their protection. If the same work continues into the next shift the incoming crew is to follow the same procedure after the first crew has removed their locks.
4. Locks used for isolation will be individually keyed and numbered and are not be used for any other purpose. All locks and disconnects must have a "DANGER – DO NOT ENGERIZE OR OPERATE" tag securely attached.
5. Lockout procedure for mobile equipment including trucks is as follows:
   - Mobile equipment should be parked on a firm level surface, if possible.
   - All hydraulic attachments, such as blades and buckets, will either be placed on the ground, or properly braced against falling. Operator will set brakes, shut off engine and exit the cab taking the ignition key (if so equipped).
   - Ignition key will be given to mechanic. Mechanic will shut off the master switch.
   - Mechanic will place a lockout tag on an applicable part of the mobile equipment, i.e. the door handle or steering wheel.
   - The mobile equipment will only be started either after the mechanic has performed the work or under the direct supervision of the mechanic.
   - After the work has been finished the mechanic will remove the lockout.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
April 18, 2005	June 29, 2004	06	April 2006	J. Carruthers (H&S)

5.12 Elevating Work Platforms

Workers using elevating work platforms will be trained in its safe and proper use.

These platforms will be equipped with proper guardrails.

The platforms are to be used to raise workers and light tools only, not materials beyond its rated capacity. Workers on the platform must be protected from falling at all times using a fall arrest protection attached to the platform.

The operator's manual must be available at all times and no worker is permitted to use planks and/or ladders (step or otherwise) on the platform at any time.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 30, 2005	June 29, 2004	05	May 2006	J. Carruthers (H&S)

5.13 Entry into Cutterhead Area (Work Procedure)

Entrance into this area takes into consideration the requirements of confined space entry and working under compressed air (if required). Potential Hazards for this job are:

- A worker may slip and suffer an injury.
- Toxic gas or explosive gas build-up can lead to death of worker(s).
- Workers may suffer decompression sickness.
- Material may fall on a worker.
- Cutterhead movement while worker in the cutterhead area.
- Worker may fall into semi-fluid spoil in lower part of plenum chamber.

Procedure

1. Before any worker enters the cutterhead area, air sampling will be conducted for methane, hydrogen sulphide, carbon monoxide and oxygen levels. These will be recorded.
2. To reduce the risk of a fall resulting in injury and assist in recovery, the worker(s) will wear fall arrest devices complete with full body harness. No less than two people will enter and/or work in the cutterhead area, person will be trained in first aid, artificial respiration and CPR.
3. Good verbal communications via telepho ne or another device must be present before any worker goes through the door of the air-lock leading to the cutting head.
4. All material, not hand held, must be securely fastened and rigged before being lowered or raised in the work area. Use of web slings and a cable puller are recommended. The movement of the machine will be under the control of the person actually in the "head" to do examination or repairs.
5. All workers must follow the compression and decompression procedures to reduce the possibility of decompression sickness.
6. Before putting compressed air on in the cutterhead chamber, flood doors should be closed.
7. Propane to be used instead of acetylene when using cutting torch in compressed air.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 27, 2005	June 29, 2004	05	May 2006	J. Carruthers (H&S)

5.14 Equipment and Vehicles

Equipment will have regular maintenance completed by competent individuals.

For trucks and equipment circle checks are to be completed by the operator prior to use to ensure that they are in good working condition.

Safe operating instructions are to be posted in or near the equipment where applicable and the operators manual are to be in the equipment where applicable.

Where machine guards are required or in the best interest of the employees they are to be installed and utilized without exception.

Where a machine guard has been installed employees are not allowed to tamper with the guard or remove it.

Tampering or removing the guard without permission from management may result in immediate termination of employment.

Any problems/concerns with the way a piece of equipment is running or operating are to be reported immediately to the shop foremen or supervisor.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 30, 2005	June 29, 2004	04	May 2006	J. Carruthers (H&S)

5.15 Erection of Pre-cast Segments (Work Procedure)

Scope

Segments will be transported to the TBM on segment cars attached to the muck cars. There will be two (2) segment cars per train. The Segment Hoist Operator will signal the locomotive to move slowly to the heading until the segment car contacts the bumper lock. The Segment handler must ensure the cars are locked in position and the locomotive will be stopped with brakes applied.

Potential Hazards

Workers may be struck or run over by the cars as the cars enter the gantry. Personnel could be entrapped between the cars and the gantry.

Procedure

1. All personnel will remain out of the gantry while the trains are entering the tail area. The Segment Hoist Operator will not signal the locomotive forward until he is assured no one is in the gantry.
2. The Locomotive Operator will give 3 blasts of his horn before entering the gantry, this is to serve as a warning. The first car, when heading to the face, will be equipped with a green flashing light to serve as a warning of the approaching train.
3. The Segment Hoist Operator, once assured the cars are in position, will activate the automatic turn table and rotate the segments 90 degrees. Once all segments have been rotated, the Hoist Operator will lift the segments with the hydraulic lift, and when at the highest point, signal the locomotive to retreat from the gantry. After the cars have cleared the gantry, the Hoist Operator will lower the segments back onto the cradle.

Potential Hazards

Workers can be caught between the segments and the lower catwalk in the segment moving area during rotation. Also, pinch points are located at front of every car where the manual turn table release is located. If the segments are moved ahead too quickly and too far, workers in the erector area may be struck by the segment.

Precautions

Workers must not be on the lower catwalk during rotation of the segments. No worker will be between the cars during rotation. The Hoist Operator will ensure all personnel are clear of the lower catwalk region before rotating the segments and signaling the train to exit.

Under the guidance of the Segment Handler, the Segment Hoist Operator will move individual segments as required to the landing pad of the erector arm.

Procedure

1. The Segment Handler and Hoist Operator must have visual communications. Proper hand signals are of prime importance.

2. Workers may get trapped if standing in front of the segment when being moved to the erector landing pad. While the segment is in motion, the handler will stand slightly behind the segment on the lower catwalk and move with it.
3. To prevent workers in the erector area from being struck, the Segment Handler will bring the segment to rest on the carriage in line with the bumper block (this will be indicated by a red paint line).
4. The lift/lock key must be completely engaged before the segment is moved.
5. Personal protective equipment must be worn.
6. After installation of the first segment of the ring, the erector arm will be under the control of the Lead TBM Miner. The erector arm will pick-up each segment and move it into position for installation. This procedure will continue until the ring is "keyed".

Potential Hazards

Activity in this area will be extremely high and congested.

"Blind" spots are evident from the erector arm control stations (there are 2 [1 upper and 1 lower]).

A worker can be struck by falling objects e.g., bolts, impact wrenches etc., or a segment not installed correctly may fall on the worker(s) below.

Installation crew will have to reach over guardrails on platforms. This may place them in an unbalanced position and increase the risk of falling.

A worker may be struck by the erector arm when being moved back to the landing pad.

Exposure to an eye injury is increased due to the construction of the concrete rings.

During bolt installation and moving into position, the concrete may chip.

Unclear communications may lead to unwarranted movement of the erector arm by one of the people at the control station.

Procedure

1. Only one operator will begin segment movement. The other operator will stand clear of the control panel while the erector arm is being moved.
2. The lead installation person will maintain good visual and hand communications with the erector arm controller (L or R).
3. The erector arm is not to be moved until the segment has been securely installed, the rams reapplied and the installation crew cleared from the area.
4. Impact wrenches are to be secured to prevent falling.
5. Eye protection must be worn.
6. To prevent accidental movement of the work platform, a flip type of cover will be placed over the levers once platform is in position.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 30, 2005	June 29, 2004	04	May 2006	J. Carruthers (H&S)

5.16 Erection of Rib & Lagging (Work Procedure)

Scope

This procedure details the method of construction of a rib & lagging primary lining with a Tunnel Boring Machine.

Potential Hazards

Run over by lagging cars and load on cars may become unbalanced and tip.

Pinched fingers & slivers in hands when unloading & building lagging & ribs.

Lagging falling when building the ring.

Feet slipping on curved surface of lagging & tail of the Tunnel Boring Machine (TBM).

Using chain saw to cut or trim lagging.

Procedure

1. Tunnel lagging to be delivered to site in complete sets. Bundle will be packaged such that sufficient clearance beneath the TBM, trailing gear is maintained.
2. On site one set of ribs and a selection of packing pieces will be added to each bundle of lagging.
3. Sets will be loaded onto a flat car using the tunnel crane.
4. On arrival at the TBM the flat car will be disconnected to allow the muck boxes to move under the conveyor. During the mining cycle, the lagging will be unpacked and stacked ready for building, and the flat car will be reconnected to the train.
5. On completion of the mine cycle, the tail can will be cleaned out, the pushing ring will be retracted and two bottom sections of the ribs will be placed into the invert. To eliminate the ingress of fines, filter cloth will be installed behind the lagging as required.
6. Once the rib is in place the lagging will be slotted into the flanges of the rib. Lagging will be built up evenly on each side of the tunnel. The top section of rib will be erected with its expanding joint fully closed and the remainder of the lagging boards will be inserted.
7. Mining will then commence for the next set. During this mine cycle, the lagging is exposed behind the TBM, once clear of the tail can, the lining will be fully expanded using the rib expander, forcing the lagging against the excavated surfaces. In soft ground, little resistance may be experienced to the expansion; in this case the ribs will be expanded to their optimum diameter.
8. Once fully expanded, packing will be placed to close the expanded ring.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 30, 2005	June 29, 2004	04	May 2006	J. Carruthers (H&S)

5.17 Excavation and Trenching Safety

All excavation and trenching work must be in full compliance with Federal and Provincial Regulation and shall be barricaded with the appropriate barrier tape and other protective devices as required.

Excavations 1.2 metres or deeper or less than 1.2 metres in unstable soil shall be properly sloped, braced, or shored to prevent cave-ins as per Federal and Provincial Regulations manual and shall have a ladder

for access into the excavation with no more than 7.5 metres of travel in any direction as per Federal and Provincial Regulations manual.

All excavated and available material shall be retained 1 metre or more from the edge of the excavation.

When entering an excavation that may be considered a hazardous environment, by site safety representatives, proper personal protective equipment must be worn.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 30, 2005	June 29, 2004	04	May 2006	J. Carruthers (H&S)

5.18 Explosive/Powder – Actuated Fastening Tools

There are a number of tools utilizing an explosive charge in use throughout the construction industry to drive fastenings.

The manufacturers of these devices provide detailed instructions regarding their use and maintenance. These instructions, along with the legislation specifically set out for their use, shall be closely adhered to at all times.

The following general recommendations apply to all explosive/powder-actuated tools.

1. Only properly trained and qualified operators are to use this type of tool. The user shall possess proof of this training issued by the manufacturer, authorized dealer/distributor, or other competent source.
2. The tool must be CSA standard approved for Explosive Actuated Fastening Tools.
3. The tool should be loaded just prior to use with the correct load for the job anticipated. Tools should never be loaded and left to sit or be moved to an alternate work site after being loaded.
4. The tool should never be pointed at anyone, whether loaded or unloaded. Hands should be kept clear of the muzzle end at all times.
5. Explosive/powder actuated tools should always be stored in their proper lockable boxes.
6. Explosive/powder actuated tools must never be used in an explosive atmosphere.
7. When used, the tool must be held firmly and at right angles to the surface being driven into.
8. Eye protection must be worn by the operator. Where there is a danger of spalling, full-face protection must be worn. Hearing protection is also to be worn in confined areas.
9. To prevent free-flying studs, ensure that the material being driven into will not allow the stud to completely pass through it (i.e. glass block, hollow tile etc.)
10. Manufacturers' recommendations should be consulted and followed whenever there is a doubt about the material being driven into, maintenance procedures, or load strength to be used.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 30, 2005	June 29, 2004	02	May 2006	J. Carruthers (H&S)

5.19 Fall Protection and Guardrails

5.19.1 General Procedures

Fall arrest systems are required when a worker may fall 2.4 metres or greater or into operating machinery, water or other liquids, or onto other hazardous substances, objects or surfaces.

A fall arrest system consists of a full body harness, a shock absorbing lanyard or similar device, rope grab, lifeline and lifeline anchor that will not allow a worker to fall more than 0.6 Metres. All safety belts, full body harnesses and lanyards to meet Federal and/or Provincial regulation standards. Belts, harnesses and lanyards must carry a CSA label.

Lanyards must be 16 millimetres (5/8") diameter nylon or equivalent. Lanyards shall be attached to the D-ring on the harness by locking snap hook, a spliced loop and thimble, or a D-clip attached to a spliced loop and thimble.

All lifelines must be 16 millimetres (5/8") diameter polypropylene or equivalent and used by only one worker at a time. Lifelines must be free from any danger of chafing and free of cuts, abrasions and other defects. Lifelines should be long enough to reach the ground if they are not, then they must be knotted at the end, cable-clipped or otherwise provided with a positive stop, to prevent the lanyard or hitch from running off the lifeline. To attach the lanyard of a safety belt or safety harness to a lifeline, use a mechanical rope grab that meets CSA Standard Z259.2. Lifelines clipped, or otherwise provided with a positive stop to keep the hitch from running off the end of the lifeline.

If a worker falls they are not to grab the hitch lanyard or lifeline, in order to work properly the hitch must come under a load. All fall arrest equipment subjected to impacts caused by a free fall or by testing shall be removed from service.

Prior to each use, employees shall visually inspect all fall arrest equipment for cuts, cracks, tears, abrasions, undue stretching, overall deterioration, mildew, operational defects, heat damage, acid or any other corrosion. Equipment showing any defect shall be withdrawn from service and clearly marked as damaged (if not destroyed and thrown out).

Employees must not use the fall arrest equipment until they have been properly trained. Foremen shall ensure fall protection is available and used as required for all employees under their responsibility.

Fall arrest equipment is to be stored in a cool, dry place not subjected to direct sunlight and it is not to be used for any other purpose than Fall Arrest.

Proper guardrails shall be installed on open sides of all areas, holes in the floor where the fall distance exceeds 2.4metres. Guardrails will conform to Federal and/or Provincial regulations. Basic wood or wire rope guardrails will have a top rail, midrail and toeboard secured to vertical posts or supports.

5.19.2 Fitting a Body Harness

A poorly fitting harness may cause unnecessary injury, even when used correctly. Follow manufacturer's fitting instructions.

Fitting

1. Undo buckles, hold harness by front and rear Dee rings to ensure straps are untwisted.
2. Pass head through straps between Dee rings positioning smaller frontal Dee ring on the chest and allowing straps to drape behind the body. Ask fellow worker to check length of upper straps for correct Dee ring positions (see Dee ring adjustment procedure).
3. Standing erect, reach to back of thighs to locate ends of sub pelvic straps. Sub pelvic strap will not be the same colour as chest strap. Pull straps from both sides so webbing is snug under the buttocks. Sub pelvic strap buckles should just reach chest strap buckles. To adjust, move orange plastic strap keepers away from quick connect buckles. Connect chest strap to sub pelvic strap by threading quick connect bar through chest strap buckle. Repeat on other side.
4. Holding buckle, feed webbing to required length adjustment. Pull excess webbing snugly through keepers. Reach between legs and locate one leg strap. Pass leg strap around front of thigh and through adjuster buckle on front of hip as before.

5. Adjust buckles to a snug fit; do not over tighten. Slide plastic keepers against quick connect buckles or feed grommeted webbing through keeper loops.

Dee Ring Adjustment Procedure

1. Rear dorsal Dee Ring should be located between the shoulder blades. Frontal Dee ring should be located below the sternum. For most fittings the Dee rings should not require adjustment.
2. Holding plastic Dee ring plate with one hand pull Dee ring. Push three bar slider against plastic Dee ring plate. Holding Dee ring against plate, pull looped webbing on both sides through slots. Repeat procedure if more adjustment is required.

Once your harness has been adjusted according to the fitting instructions, have someone familiar with fitting procedure check adjustment of harness as outlined below. A loose or poorly fitting harness is unsafe.

Harness Adjustment Check

1. Check harness adjustment by looking at and touching all harness components. Check correct location of frontal and dorsal Dee rings.
2. Leg strap ends must be secured. Slide secondary plastic keepers towards end of strap and secure leg strap webbing on grommeted harness. *Loose ends are dnagerous.* If necessary tuck loose ends behind webbing.
3. Plastic strap keepers must be placed firmly against quick connect buckles. Check webbing is flat against the body, particularly in the leg loops. Hanging in harness with twisted leg loops can compromise circulation. Check correct location of sub pelvic strap.

Do NOT alter or adapt any portion of the harness in any way. Tampering with a harness could result in unnecessary injury or death.

Maintenance and Storage

A harness must be stored, maintained and inspected properly. Failure to do so could result in harness failure.

1. To clean, wipe with a wet sponge. Use a mild soap if necessary. **Do not use chemicals or detergents.** Rinse off soap with clear water and hang to dry. **Do not dry with heat.**
2. Harnesses should be hung up by the rear Dorsal Dee Ring, or placed loosely in a container. Store in a clean, dry area free from excessive hear, sunlight, harmful fumes, corrosive agents or rodents. Harnesses can be marked for identification with marker pens only on extreme end of webbing straps.
3. Any repairs to your harness must be carried out by an approved servicing agent.
4. Following any fall incident (even a light one) your harness should be inspected by a qualified safety officer/engineer, who will decide if the harness is safe for further use or if it should be repaired or destroyed.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 30, 2005	June 29, 2004	05	May 2006	J. Carruthers (H&S)

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5.20 Fire Protection Requirements

Be aware of the specific requirements and work area hazards that exist in your work area. Know the location, and be familiar with the use of, all safety equipment including personal protective equipment, fire extinguishers, first-aid kits and eyewash stations.

Office & shop staff should be familiar with all routes of exit from the office & shop building. Each office & shop will have an evacuation plan in place with a defined muster area. Each office & shop will appoint a competent person whose responsibility is to ensure that all office and shop staff are evacuated to the muster station and accounted for once a fire is discovered. As the situation dictates the designated person will contact the appropriate authorities and give them the pertinent information i.e. location and severity of fire, information regarding injured or trapped staff.

Do not attempt to fight the fire unless it is minor and easily confined using a fire extinguisher. Do not return to the building until notified to do so by a member of the Fire Department.

5.20.1 Use of Fire Extinguishers

Good Housekeeping is essential in the prevention of fires. Fires can start anywhere and at any time. This is why it is important to know which fire extinguisher to use and how to use it.

Always keep fire extinguishers visible and easy to get at. Fire extinguishers have to be properly maintained to do the job. Where temperature is a factor, ensure that care is taken in selecting the right extinguisher.

Types of Fires

Class A:

These fires consist of wood, paper, rags, rubbish and other ordinary combustible materials.

Recommended Extinguishers

Water from a hose, pump type water can, or pressurized extinguisher, and soda acid extinguishers.

Fighting the Fire: Soak the fire completely - even the smoking embers.

Class B:

Flammable liquids, oil and grease

Recommended Extinguishers

ABC units, dry chemical, foam and carbon dioxide extinguishers.

Fighting the Fire: Start at the base of the fire and use a swinging motion from the left to right, always keeping the fire in front of you.

Class C:

Electrical equipment

Recommended Extinguishers

Carbon dioxide and dry chemical (ABC units) extinguishers.

Fighting the Fire: Use short bursts on the fire. When the electrical current is shut off on a Class C fire, it can become a Class A fire if the materials around the electrical fire are ignited.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 30,2005	June 29, 2004	05	May 2006	J. Carruthesr (H&S)

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5.21 FitzWright "Explorer" Immersion Suits

Donning Instructions

Remove Shoes and pull on as you would a pair of overalls, then pull hood over head and close zipper with a slow even pull. Remove gloves from arm pockets and don. Inflate life vest only after entering the water.

Care and Maintenance

DO NOT Dry Clean – Buoyant Material is closed cell neoprene. After use rinse with cool or lukewarm fresh water and allow to drip dry, do not store in high temperature area. Lubricate zipper with paraffin wax and store with zipper in open position. Glue tears with neoprene contact cement.

Operation of Inflator

1. Bring inflation hose to mouth
2. Push inflation valve in with teeth and blow
3. Release between breaths and continue until fully inflated.

Zipper on Suit

1. The zipper is water-gas-and-pressure tight. It is a heavy duty precision product with each tooth individually riveted in place. The only way it can be damaged is by faulty handling. Therefore it is important to keep it clean and lubricated.
2. Periodically clean the zipper with a soft brush, making sure to remove all dirt and sand from between the teeth.
3. Lubricate the zipper with beeswax after every use. Lubricate inside teeth as well as the external parts and then close and open zip to dislodge excess wax.
4. Transport with the zipper closed to prevent sand or grit lodging in the teeth.
5. Store suit with zipper open so the rubber will not take a compression set.
6. Caution! Always close the zipper slowly and smoothly. If at any time the zipper will not close, it is probably a foreign object in the teeth and it should be reopened and cleared.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 30, 2005	June 29, 2004	02	May 2006	J. Carruthers (H&S)

5.22 Flammable and Combustible Liquids

"Danger No Smoking or Open Flames" signs shall be posted around all flammable and combustible liquid storage areas.

Tanks shall be vented with a pipe not less than 1.25 inch inside dia. And shall be 12 feet high from the adjacent ground level and shall be kept 20 feet from buildings.

At least one 20-pound Class B fire extinguisher shall be kept between 25 feet to 75 feet from tanks. All tanks shall be properly grounded and labelled with the contents and Owner's name. All tanks are to be double walled or have a Spill Tray under them.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 30, 2005	June 29, 2004	04	May 2006	J. Carruthers (H&S)

5.23 Forklift

When operating a forklift you must be trained. Training must be updated at a minimum every two years. Be aware of the specific precautions and work area hazards that exist.

Required personal protective equipment:

- Hard hat
- Safety boots
- Safety glasses - as applicable

- Hearing protection - where noise levels exceed 85 db

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Check the condition of the forklift prior to use. If there is a problem have it repaired or replaced, tag the unit out of service so no one else uses it. Prior to beginning the lift the operator must ensure good working order of the unit. This will include brakes, tires, cylinders, lights, fluid levels, hoses, etc.

Do not lift more weight than the manufacturer's weight rating with the equipment.

In the event that the operator does not have a clear line of sight, one employee will be designated as signal person to assist the operator. The signal person will use basic, mutually agreed upon hand signals to assist the operator and stand in such a position so that a clear view of the operator and the process to be performed is maintained.

There are two methods of lifting that may be employed. The first involves having the load positioned the forks. The second involves lifting apparatus that is attached to the forklift forks.

1. Load positioned on the forklift forks
   - Ensure that load is securely positioned. If necessary secure the load using either chain, rope or cable slings
   - Tip the forks back to more securely "cradle" the load while travelling.
2. Load involving lifting apparatus attached to the forklift forks
   - Position forks directly over the load so that the lifting direction is straight up, as opposed to lifting in a slanted direction. In the case of pulling, or towing, the cable will be in a slated position.
   - Attach load utilizing the appropriate method i.e. slings into eye hooks, spreader bars, lifting rings, lift pins into dowel holes, etc
   - Begin the lift and movement of the product.
   - Lift the load only high enough to complete the task.
   - Movement of the load will be done slowly.
   - Ensure that a clear pathway exists in the event that the load is dropped or begins to swing during the operation. This applies, firstly, to all individuals present, and, secondly, to associated property.
   - Upon completion of the move, the load will be lowered onto a stable surface.
   - Loads lowered onto a truck will be secured prior to leaving the site.

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May 30, 2005	June 29, 2004	05	May 2006	J. Carruthers (H&S)

5.24 Fuel Handling Procedures

5.24.1 Responsibilities

It is the primary responsibility of the Supervisor to see that all fuel handling and dispensing is done in a safe and proper manner in accordance with this procedure.

5.24.2 Environmental Protection Procedures

The following procedures are intended to prevent a loss or escape of product and, in the event of a spill, to minimize the impact on the environment.

Delivery of Fuel to the site:

Delivery of fuel is to be in approved tank vehicles or mobile refuelling tanks. Delivery can be directly into equipment or into storage tanks. Tank vehicles are to be operated only by a competent person

Dispensing of Fuel:

Someone must be present for all dispensing or transfer of fuel for the entire duration. The attendant is to be aware of proper fuel handling procedures. Transfer and dispensing of fuel is to be done utilizing pumping equipment, an approved hose and top-fill nozzle.

Absorbent pads are to be placed around the fuel inlet prior to dispensing as required. Ensure that a site-appropriate spill containment kit is readily available.

Unreeling of the fuel transfer hose and nozzle is to be done with the nozzle in the upright position. The nozzle is to be kept clear of the ground when it is returned to the reel or storage position.

Verify that that the proper connection of the fuel fill hose to the fill pipe of the tank vehicle, mobile refuelling tank or the equipment being filled and the fill valve are open.

Transfer of fuel is to be stopped prior to overflowing leaving room for expansion.

Operation of moving equipment in the area of a fuelling operation is to be temporarily suspended. Welding and/or burning operations within 3 metres will be stopped while fuelling is in progress.

Maintain regular inspections of fuel systems and their components for leakage, deterioration or damage, in accordance with construction regulations.

5.24.3 Additional Requirements for Marine Operations

Secure barge on which equipment is mounted, marine vessel or service barge to the work platform or wharf with proper marine lines. Prior to fuel transfer to mobile refuelling tank on barge, to marine vessel or to barge mounted equipment, establish direct communication between the tank vehicle operator or mobile fuelling attendant and the marine operator. This shall be maintained until fuelling is completed.

Where it is necessary to transfer a mobile fuelling tank from the wharf or work platform to a barge, or from one barge to another, the tank shall be engineered for lifting and equipped with proper lifting points and lifting tackle and the transfer shall be effected utilizing hoisting equipment in accordance with normal safety procedures. During marine fuelling operations, the attendant is to be particularly vigilant in scanning the water area adjacent to the fuelling operation for possible leaks or spills.

5.24.4 Spills

Preventative measures are the best means of avoiding accidental release of petroleum products for protecting our environment. In the event of an accidental release, the following will occur:

1. Appropriate spill response equipment is to be available for all phases of the project. The Spill response equipment that is to be available on site is to include:
    - A commercially available kit recommended for 40 gal. Spill which typically includes:
        - 10 No. - 3" dia. X 48" oil socks
        - No. – 3" dia. X 10' oil socks
        - 40 No. – 17" x 19" oil pads
        - 8 No. – 18" x 18" x 2" pillows
        - 10 No. – Disposable material containment Bags
        - 2 pair – Latex gloves
        - gal. Granular absorbent
        - Polyethylene salvage drum container (1 @ 55 gal. Capacity)

- For sites where fuel is dispensed only (no storage facility) a commercially available kit recommended for 10 gal. Spill which typically includes:
  - No. - 3" dia. X 48" oil socks
  - 25 No. – 17" x 19" oil pads
  - 2 No. – Disposable material containment Bags
  - 1 pair – Latex gloves
  - 1 gal. Granular absorbent
  - 1 No. PVC Bag container
- Where the site is within 30 metres of a waterway, the kit is to include absorbent boom supplies.

2. Cleanup action will follow the Hazardous Materials (Spill Procedures) (See section 6.9 of this policy and program)
3. All spills or suspected spills of petroleum products and other hazardous materials, on land or into the water, regardless of size, will be reported immediately to the Supervisor. The Supervisor will report the spill immediately to the Project Manager or Designate, who shall ensure notification of the appropriate Authorities.

5.24.5 Posting of Procedure

Procedures for fuel handling and instructions for spills are to be posted or available on site.

5.24.6 Storage of Fuel on Site

Where the circumstances require, fuel may be stored in an approved mobile refuelling tank. Storage of mobile fuelling tanks when not in use is to be within an area where there is no exposure to damage by vehicular movement. The storage area is to be located away from drainage channels. All tank vehicles and mobile refuelling tanks are to be properly labelled in accordance with the Transportation of Dangerous Goods regulations. Approved fire extinguishers (Minimum rating of 4A, 60-B, or C) will be located near the fuel storage areas and smoking will not be permitted in the area of this storage facility. "No Smoking" signs are to be posted and maintained in good condition. No smoking is to be permitted during any fuelling operation. No "hot work" is to take place within 3 metres of a storage zone. In cases where fuel is being stored on site a copy of these procedures are to be posted or available on-site and the instructions are to be relayed to employees in a Tool Box Talk session.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 30, 2005	June 29, 2004	06	May 2006	J. Carruthers (H&S)

5.25 Gas Testing

Gas detection instruments are potential life-saving devices and should be recognized as such. To ensure that this valuable piece of equipment is functioning properly a "bump test" should be completed either at the start of each day (if used continually each day) or prior to use (if only used occasionally). These instruments should be calibrated on a monthly basis to ensure that the sensors are at acceptable levels.

McNally currently uses 2 types of Gas Detection Monitors – all from Industrial Scientific. Employees are to be properly trained on the use of each unit prior to use.

5.25.1 Use of Gas Testers

Four steps to a successful Gas Detection Program:

1. Turn on instrument and check battery level

2. Zero the instrument (see procedure below)
3. Bump Test the instrument (see procedure below)
4. Clear the Peaks (see procedure below)

5.25.2 Zeroing the instrument

To zero the unit (both ITX and TMX412 are the same) do the following:

1. Turn instrument on by Holding the "Mode" button until the word "RELEASE" appears on the screen
2. The unit will count itself down and then stop at the "Realtime display" should have at least 3 numbers reading on the display in various corners.
3. Press the "Mode" button 2 times
4. The machine will say "Zero" and press "E" to start – Press the "E" button and unit will zero
5. Wait and it will return to the "Realtime display"

5.25.3 "Bump Test"

The "Bump Test" or Functional Test is defined as a brief exposure of the monitor to a known concentration of gas(es) for the purpose of verifying sensor and alarm operation. It is not intended to be a measure of the accuracy of the instrument.

If the instrument fails the bump test it should have a full calibration done prior to use.

How to complete a bump test
A bump test is completed as follows:

1. Turn the instrument on and warm-up.
2. Apply test gas.
3. Allow sensors to respond to the test gas.
4. Verify proper alarm function (ie/ lights and audible alarm)
5. Remove gas and allow the monitor to clear.
6. If any of the sensors fail to respond:
    a. Verify the gas cylinder has not emptied
    b. Verify regulator is turned on (if applicable)
    c. Verify tubing is in place and not clogged
    d. Verify sensor ports are not plugged (the grate portion of the testor on the TMX and ITX units)
    e. Remove the instrument from service and have it calibrated to verify operation.

5.25.4 Clearing Peaks

Clearing the peaks is similar to zeroing the instrument

1. Once instrument is on and at the "Realtime Display" press the "Mode" button 4 times.
2. Then press the "E" button to reset.
3. Machine will reset and return to the Realtime display.

5.25.5 Calibration

McNally Construction Inc. has purchased a docking station for calibrating instruments. Instruments must be returned to head office once per month to be docked and calibrated. If this is not feasible for a jobsite alternate arrangements will be made to ensure the instruments are calibrated on a monthly basis.

5.25.6 Repairs

When a gas tester is not working properly it ***must*** be returned to Head Office. The ***only*** person allowed to do any repairs or even open the instrument is the Health and Safety Coordinator, a certified Health and Safety Technician.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
April 7, 2005	June 1, 2004	01	April 2006	J. Carruthers (H&S)

5.26 Grinding

Severe injury may occur if proper protective equipment is not used and properly maintained.

1. Check the tool rest for the correct distance from the abrasive wheel, maximum 1/8" or 3 mm.
2. Replace the grindstone when adjustment of the rest cannot provide 1/8" or 3 mm clearance.
3. If the wheel has been abused and ground to an angle or grooved, reface the wheel with the appropriate surfacing tool.
4. Protect your eyes with goggles or a face shield at all times when grinding.
5. Each time a grinding wheel is mounted, the maximum approved speed stamped on the wheel bladder should be checked against the shaft rotation speed of the machine to ensure the safe peripheral speed is not exceeded. A grinding wheel must not be operated at peripheral speed exceeding the manufacturer's recommendation.
6. The flanges supporting the grinding wheel should be a maximum of 1/3 the diameter of the wheel, and must fit the shaft rotating speed according to the manufacturer's recommendation.
7. Bench grinders are designed for peripheral grinding. Do not grind on the side of the wheel.
8. Do not stand directly in front of grinding wheel when it is first started.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 30, 2005	June 29, 2004	02	May 2006	J. Carruthers (H&S)

5.27 Grouting (Work Procedure)

When installing either liner plate or concrete segments in tunnel or shaft, a void exists between the back of the rings & the ground. To prevent any ground settlement and to maintain the shape of the ring, it is necessary to fill this void as soon as practical after the ring has been constructed. This backfill is done by grouting through segments of the rings themselves or through the threaded coupling on the liner plate.

Potential Hazards

Liner plate will buckle if too much pressure is applied.

Grout spraying between joints of liner plate or out of hose when disconnecting grout hose from valve on liner plate or concrete segment.

Coupling on grout hose may break causing hose & grout to spray.

Finger & arms can get caught in the mixing arms of the mixer or agitator; grout can splash into a worker's eyes when mixing grout.

Procedures

1. A cementicious grout mix contains cement and water. Sand, flyash/bentonite, or other additives such as accelerators, anti-wash out etc., may be used as required.
2. Grout may be mixed on the job site or delivered in a concrete truck. Grout may be pumped from the surface or transported to the face in a agitator car & then into a grout pump.
3. At the end of the last mining shift or at any time where extended stoppage is expected all hoses and tubes will be fully flushed.
4. For segmental grouting it will be necessary to install a valve between the injection nozzle and the grout hole. If the grout holes do not have non return valves, a valve is required to enable hose disconnection.
5. On completion of grouting each ring, as well as clearing hoses etc. any spillage will be cleaned.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 30, 2005	June 29, 2004	04	May 2006	J. Carruthers (H&S)

5.28 Hand Tools and Power Tools

5.28.1 General Guidelines for Hand tools:

All tools, regardless of ownership, shall be approved by the supervisor and maintained in good condition. Tools are subject to inspection at any time. A foreman has the authority and responsibility to condemn unserviceable tools, regardless of ownership. Defective tools shall be tagged to prevent their use or they shall be removed from the job site.

Employees shall always use the proper tool for the job performed and only for the purposes for which they have been approved.

Tools shall not be thrown from place to place or from person to persons; tools that must be raised or lowered from one elevation to another shall be placed in tool buckets or firmly attached to hand lines. Tools shall never be placed unsecured on elevated places and they must not be left lying around where they may cause a person to trip or stumble. Tools with sharp edges shall be stored and handled so that they will not cause injury or damage. They shall not be carried in pockets.

When working on or above open grating, a canvas or other suitable covering shall be used to cover the grating to prevent tools or parts from dropping to a lower level where others are present or the danger area shall be barricaded or guarded.

Pipe shall not be used to extend a wrench handle for added leverage unless the wrench was designed for such use.

Wooden handles that are loose, cracked or splintered shall be replaced. The handle shall not be taped or lashed with wire.

All cutting tools such as saws, wood chisels, drawknives or axes shall be kept in suitable guards or in special compartments.

Impact tools such as chisels, punches, drift pints, etc. become mushroomed or cracked, and they shall be dressed, repaired or replaced before further use.

Chisels, drills, punches, ground rods and pipes shall be held with suitable holders or tongs (not with the hands) while being struck by another employee.

Hammers with metal handles, screw drivers, knives with metal continuing through the handle and metallic measuring tapes shall not be used on or near energized electrical circuits or equipment.

The insulation on hand tools shall not be depended upon to protect users from shock. The non-current carrying metal parts of portable electric tools such as drills, saws and grinders shall be effectively grounded when connected to a power source unless:

- The tool is an approved double-insulated type
- The tool is connected to the power supply by means of an isolating transformer or another isolated power supply.

5.28.2 Power Tools:

All power tools shall be examined prior to use to ensure general serviceability and the presence of all applicable safety devices. The electric cord and electric components shall be given an especially thorough examination. Power tools shall be used only within their capability and shall be operated in accordance with the instructions of the manufacturer.

All tools shall be kept in good repair and shall be disconnected from the power source while repairs are being made. Electrical tools shall not be used where there is a hazard of flammable vapours, gases or dust. All power tools and cord sets shall be protected by ground fault circuit interrupter.

Pneumatic tools shall never be pointed at another person. Pneumatic power tools shall be secured to the hose or whip by some positive means to prevent the tool from becoming accidentally disconnected. Safety clips or retainers shall be securely installed and maintained on pneumatic impact (percussion) tools to prevent attachments from being accidentally expelled.

5.28.3 Defective Tools

Defective tools can cause serious and painful injuries. If a tool is defective in some way, **DON'T USE IT**. Obtain a tag from the office and tag and defective tool "Out of Service".

Be aware of problems like:

- chisels and wedges with mushroomed heads
- split or cracked handles
- chipped or broken drill bits
- wenches with worn out jaws
- tools which are not complete, such as files without handles

To ensure safe use of hand tools, remember:

- never use a defective tool;
- double check all tools prior to use; and
- ensure defective tools are repaired

Air, gasoline or electric power tools, require skill and complete attention on the part of the user even when they are in good condition. Don't use power tools when they are defective in any way.

Watch for problems like:

- broken or inoperative guards,
- insufficient of improper grounding due to damage on double insulated tools,
- no ground wire (on plug) of cords of standard tools,
- the on/off switch not in good working order ,
- tool blade is cracked,
- the wrong grinder wheel is being used, or

- the guard has been wedged back on a power saw.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 30, 2005	June 29, 2004	05	May 2006	J. Carruthers, H&S

5.29 Heavy Equipment

5.29.1 Getting on and Off Heavy Equipment

1. Clean mud off boots before climbing onto the machine.
2. Use the machines side grab rails and steps.
3. Face the machine and step onto the first step.
4. Maintain three-point contact at all times. Two hands and one foot or two feet and one hand.
5. Climb into the operator's cab.
6. Before getting off the machine, make sure the machine is dogged out and further movement is prevented. Shut off machine if necessary.
7. Step out of the operator's cab, onto the ladder and while facing the machine, descend using the three-point method.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 30, 2005	June 29, 2004	02	May 2006	J. Carruthers (H&S)

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5.30 Hoisting and Rigging

5.30.1 Rigging Equipment and Devices

All rigging equipment shall be thoroughly inspected by a competent worker prior to each shift and then as often as necessary during the shift to ensure safety. Damaged or defective slings shall be immediately removed from service. Hoisting and rigging shall conform to Federal, Provincial (State) Regulations.

All rigging devices including slings shall be permanently affixed with identification stating size, grade and rated capacity.

Rigging not in use shall be removed from the immediate work area.

Rigging, including slings shall be hung on a rigging frame or otherwise stored in such a fashion to prevent bends and kinks.

Rigging equipment shall not be loaded more than its recommended safe working load as listed by the manufacturer.

Makeshift lifting devices formed from bolts, rods or reinforcing steel shall not be used.

5.30.2 Slings

Wire rope slings shall be lubricated as necessary during use. Slings shall be lubricated no less than every four months when in storage.

Slings shall not be left lying on the ground or otherwise exposed to dirt and the elements.

Eyes in wire rope bridles, slings or bull wires shall not be formed by wire clips or knots.

Protruding ends of strands, in splices on slings or bridles shall be covered or blunted.

Slings shall not be shortened with knots, bolts or other makeshift devices. Slings shall be securely attached to the load by the use of hooks with retaining devices or the use of shackles or other positive latching devices. Slings shall be padded or protected from the sharp edges of their loads and shall not be pulled from under a load when the load is resting on the sling. Slings shall be long enough to provide the maximum practical angle between the sling leg and the horizontal plane of the load.

Slings used in a basket hitch shall have the load balanced to prevent slippage.

Shackle pins shall never be replaced with bolts or other non-approved devices.

Only hooks with approved retaining devices shall be used. Hooks shall never be rigged so that they are point loaded at the tip of the hook unless they are designed for that purpose. The load shall be securely seated in the saddle of the hook. When eyebolts are used, care shall be taken to ensure the bolt is not side loaded.

Chain falls, come-alongs and other such devices shall not be loaded beyond their rated capacities and shall always be rigged for a straight pull.

The chain or hoist cable for chain falls, come-alongs or other such devices shall not be wrapped around a load and used in place of a sling unless specifically designed for that purpose.

Wire rope slings shall be removed from service when there is/are:

- Six (6) randomly distributed broken wires in one rope lay or three broken wires in one strand in one rope lay.
- Wear or scraping of one-third the original diameter of outside individual wires.
- Kinking, crushing, bird-caging or similar damage resulting in distortion.
- End attachments cracked, deformed or worn.
- Exposure to temperature in excess of 180°F (82°C) for fibre-core or 400°F (204°C) for non-fibre core.
- Corrosion of the rope or end attachments.

Natural and synthetic fibre rope slings shall be removed from service when:

- Abnormal wear is observed.
- Powdered fibres are found between strands.
- Fibres are cut or broken.
- There are variations in the size or roundness of strands.
- There is discoloration or rotting.
- There is distortion of sling hardware.
- Exposed to temperatures in excess of 180°F (82°C).

Synthetic web slings shall be removed from service when:

- Subjected to acid or caustic burns.
- Melting or charring of any part of the sling surface.
- Snags, punctures, tears or cuts are observed.
- Stitches are worn or broken.
- Fittings are distorted.
- Exposed to temperatures in excess of 180°F (82°C) for synthetic and at 200°F (93°C) for polypropylene web.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 30, 2005	June 29, 2004	04	May 2006	J. Carruthers (H&S)

5.31 Hot Work

Employees shall obtain authorization from supervisor before performing welding, cutting or grinding in a shaft, tunnel or confined space.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 30, 2005	June 29, 2004	04	May 2006	J. Carruthers (H&S)

5.32 Hydro Wires

Extreme caution must be used when working around overhead wires.

5.32.1 Safety Precautions for working around Overhead Power Lines

- Locate and identify all overhead power lines, determine voltage before construction begins
- Have lines moved, insulated, or de-energized, contact the local utility for this
- Use a signaller whenever a backhoe, crane or similar device is closer than one boom length to a live power line of 750 volts or more
- The signaller must warn the operator when any part of the machine or its load approaches the minimum distance allowed in the construction regulation

Voltage Rating	Minimum Distance
750-150,000 volts	3 metres
151,000 – 250,000 volts	4.5 metres
Over 250,000 volts	6 metres

- Never use aluminium or metal-reinforced ladders near overhead lines or live electrical equipment or wiring. Even contact with a wooden ladder can be fatal under wet conditions.
- Never store material or equipment under overhead power lines if current is more than 750 volts and cranes or similar lifting devices will be involved.
- Where material or equipment *must* be stored under power lines, hang warning flags so that personnel will not use hoisting and lifting equipment
- Remember that overhead lines can be struck not only by booms and ladders but also by long pieces of material being lifted by hand, such as pipe.
- Be aware of wind swaying power lines into contact with equipment, hoist lines, or loads and be aware of wind blowing hoist lines or loads into contact with power lines.
- For Procedures on what to do should equipment make contact with Overhead wires see Emergency Procedures section in this Policy and Program.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 30, 2005	June 29, 2004	04	May 2006	J. Carruthers (H&S)

5.33 Ladders

5.33.1 Portable Ladders

Ladders can be used safely if they are given the respect they deserve. Before using any ladder, make sure that it is in good condition and is the right ladder for the job to be done.

1. A single section ladder shall not exceed thirty feet in length.
2. An extension ladder shall not exceed sixty feet in length.
3. A ladder shall not be used when it has a broken or loose member or other fault.
4. A ladder shall have rungs evenly spaced at not more than twelve inches on centres.
5. A ladder shall have side rails not less than sixteen inches apart.
6. Ladders shall not be spliced together to provide long sections.
7. The minimum overlap on an extension ladder should be one (1) metre unless the manufacturer specifies the overlap.
8. Don't overreach while on a ladder. It is easier and safer to climb down and move the ladder over a few feet to a new position. Always face the ladder when using it. Grip it firmly and use the three point contact method when moving up or down.
9. Ladders shall not be placed in front of doors opening toward the ladder unless the door is blocked open.
10. Ladders shall not be used in any horizontal position such as a platform, runway or scaffold.

5.33.2 Step Ladders

As with all ladders, make sure that the stepladder is in good condition, and is the right ladder for the job to be done.

1. Stepladders are to be used only on clean and even surfaces and no work is to be done from the top two steps of a stepladder, counting the top platform as a rung.
2. When in the open position ready for use, the incline of the front step section shall be one (1) horizontal to six (6) vertical.
3. The stepladder is only to be used in the fully opened position with the spreader bars locked.
4. Tops of stepladders are not to be used as a support for scaffolds.
5. Only CSA Standard ladders will be used.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 30, 2005	June 29, 2004	05	May 2006	J. Carruthers (H&S)

5.34 Material Handling

An employee shall obtain assistance in lifting heavy objects or power equipment shall be used. Back belts or back braces shall be used as required.

When two or more persons are carrying a heavy object that is to be lowered or dropped, there shall be a prearranged signal for releasing the loads and if possible, everyone should face the direction in which the object is being carried.

The right way to lift is easiest and safest. Crouch or squat with the feet close to the object to be lifted, secure good footing, take a firm grip, bend the knees, keep the back vertical and lift by bending at the knees and using the leg and thigh muscles. Employees shall not attempt to lift beyond their capacity. Caution shall be taken when lifting or pulling in an awkward position. Employees should avoid twisting or excessive bending when lifting or setting down loads. When moving a load horizontally, employees should push the load rather than pull it.

When performing a task that requires repetitive lifting, the load should be positioned to limit bending and twisting. The use of lift tables, pallets and mechanical devices should be considered.

When using such tools as screwdrivers and wrenches, employees should avoid using their wrist in a bent (flexed), extended or twisted position for long periods of time. Employees should maintain their wrists in a neutral (straight) position.

When gripping, grasping or lifting an object such as a pipe or board, the whole hand and all the fingers should be used. Gripping, grasping and lifting with just the thumb and index finger should be avoided.

When handling hazardous material proper personal protective equipment must be worn.

5.34.1 Manual Lifting

1. Size up the load. If you think you need help, ask for it.
2. Get a good footing.
3. Bend your knees, get a good grip on the object to be lifted.
4. Keep your back straight, lift with your legs and keep the object being lifted close to your body.
5. Keep your balance and do not twist or turn as you lift.
6. To put the object down again, do not bend from the waist. Keep your back straight and bend your knees, keeping the object close to your body until it is placed in a secure position.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 30, 2005	June 29, 2004	05	May 2006	J. Carruthers (H&S)

5.35 Moving (not hoisting) Steel Beams

Because of the many varied sizes, weights and site conditions, it is very important that each operation be observed for its own obvious hazards.

1. Discuss the proposed work with all employees who will be involved.
2. If there are any other workers in the immediate area, advise them of your work.
3. Determine the size, length and weight of the beams to be moved.
4. Check that your slings, chains and hooks are of adequate size and in good condition.
5. Check the beams for any obvious projections that may cause a problem.
6. Check the area for debris, electrical wires, buried cable, vehicles, etc.
7. Designate one person to be the signalman for the machine operator.
8. The signalman is to make sure that all others are "out of harms way" before signalling the machine operator to proceed.
9. The machine operator will pull the beams at a slow speed.
10. Always keep observers well away from the work area.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 30, 2005	June 29, 2004	02	May 2006	J. Carruthers (H&S)

5.36 Personal Floatation Devices

Immersion in cold water is a hazard for anyone who participates in activities on oceans, lakes and rivers, etc. The survival time in these waters is primarily dependent on the water's temperature and the insulating protection available.

Body size and build are significant physiological variables affecting cooling rates. Protective clothing such as an immersion suit help to minimize heat transfer and loss to the water. These suits can contribute and provide considerably more survival time than normal clothing.

Marine survival products are made from high tech materials to provide comfort, durability and protection. To ensure maximum performance, however, they must be maintained, cleaned and inspected on a regular basis. The procedures outlined below are a simple way to ensure consistent performance.

INSPECTION:

Before each use, inspect the following on your personal floatation device:

1. Seams for separating, tearing or fraying.
2. Shoulder and sleeve areas for separation or slippage of foam interliners.
3. Zippers for ease of movement and overall condition.
4. Snaps, buckles and tug-tites are in good condition.

TESTING:

Test your PFD at the start of each job for buoyancy. Products that are not in proper condition must be replaced.

SUNLIGHT:

To avoid premature aging of the nylon shell and stitching, PFD's. should not be hung in direct sunlight for extended periods of time.

DRYING:

Unless your PFD is properly dried, you will encounter dampness and mildew. To avoid mildew, hang-dry after each use in a well-ventilated area away from direct sunlight. Do not stow PFD's while drying.

WASHING INSTRUCTIONS:

Personal floatation devices should be hand washed using a mild soap or detergent. Rinse thoroughly in clean water. Hang-dry in a well-ventilated area and out of direct sunlight. **Do not dry clean or tumble dry.**

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 30, 2005	June 29, 2004	02	May 2006	J. Carruthers (H&S)

5.37 Personal Protective Equipment

1. All workers, visitors and delivery personnel shall wear hard hats on all construction sites. Hard hats shall meet Federal and Provincial regulations.
2. Respiratory protection shall be won as circumstances warrant. Employee to see supervisor for type of respirator required.

3. Eye protection shall be worn as required to reduce the risk of eye injury. Specific classes of eye protectors shall be matched to specific hazards.
4. Hearing protection to be worn as required.
5. Foot protection shall meet Federal and/or Provincial regulations and must be worn by all workers, visitors and delivery personnel as required.
6. Fall Arrest Systems to be worn to provide maximum safety from falls. For additional information refer to the Fall Protection and Guardrails section of this Health and Safety Policy and Program.
7. Hand protection suitable to the hazard shall be used.
8. All workers are to complete Table 2 "Materials Issue Form" for personal protective equipment.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 31, 2005	June 29, 2004	05	May 2006	J. Carruthers (H&S)

5.38 Placing Concrete with Concrete Pump & Slick Line

This is a procedure for placing concrete in tunnel forms using a concrete pump & steel slick line with victaulic couplings.

Potential Hazards

1. Finger & arm caught in agitator paddle in hopper of concrete pump.
2. Finger being cut off in swash valve of concrete pump.
3. Concrete sprayed into eyes.
4. Victaulic coupling coming apart when pumping concrete.
5. Concrete vibrator falling off forms & hitting a worker.
6. Concrete dripping through joints of forms onto bare skin causing burns.
7. Placing concrete too fast causing forms to shift due to improper bracing.
8. Being struck by rabbit or slick line when cleaning out line.

Procedures

1. Set up slick line from surface down shaft or alignment hole.
2. For vertical drop pipes, secure pipes by welding joints together or otherwise secure pipe so that pipe will not fall down shaft or alignment hole and hit a worker.
3. Run slick line along bottom of tunnel, to tunnel forms.
4. Connect slick line to pumping ports on top of concrete forms.
5. When concrete forms are filled to door level that you are pumping through, close doors & move to next door down the line.
6. A phone system must be established between concrete pump, bottom of drop pipe, and forms in tunnel.
7. When forms are full a rabbit is pushed through the slick line to clean out the concrete using either air or water. Extreme caution should be observed when performing this operation.

Clear warning to be given to all personnel within the vicinity of the forms before commencing clean out. All personnel should be moved clear of the open end of the slick line.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 31, 2005	June 29, 2004	05	May 2006	J. Carruthers (H&S)

5.39 Portable Grinders

Abrasive wheels can cause severe injury. Proper storage of wheels, proper use of wheels and proper maintenance of wheels must be observed.

1. Familiarize yourself with the grinder operation before commencing work.
2. Ensure proper guards are in place and that safety glasses, face shields, gloves and safety boots are worn when using portable grinders.
3. Never exceed the maximum wheel speed (every wheel is marked). Check the speed marked on the wheel and compare it to the speed on the grinder.
4. When mounting the wheels, check them for cracks and defects, ensure that the mounting flanges are clean and the mounting blotters are used. Do not over tighten the mounting nut.
5. Before grinding, run newly mounted wheels at operating speed to check for vibrations.
6. Do not use grinders near flammable materials.
7. Never use the grinder for jobs for which it is not designed, such as cutting.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 31, 2005	June 29, 2004	02	May 2006	J. Carruthers (H&S)

5.40 Powered Saws

5.40.1 Use of Chain Saws

Chain saws are used for many jobs in construction. Since this tool was primarily meant for use in the logging industry, it can be an unfamiliar tool to some workers. Workers must be trained in its safe use before using a chain saw. This training must include a minimum of the following elements:

1. The proper personal protective equipment to be worn is set out by the manufacturer and Occupational Health & Safety Legislation.
2. Fuelling of the saw must be done in a well-ventilated area and not while the saw is running or hot.
3. An approved safety container must be used to contain the fuel used along with a proper spout or funnel for pouring.
4. The correct methods of starting, holding, carrying, or storage and use of the saw as directed by the manufacturer must be used.
5. Ensure that the chain brake is functioning properly and adequately stops the chain.
6. The chain must be sharp, have the correct tension, and be adequately lubricated.
7. When carrying/transporting a chain saw the bar guard must be in place, the chain bar must be toward the back and the motor must be shut off.

8. The chain saw must not be used for cutting above shoulder height.

5.40.2 Use of Hand-Held Power Circular Saws

This type of power hand tool is one of the most commonly used in construction. Because of this common use there are numerous accidents due to thoughtless acts. The following are the minimum accepted practices to be used with this saw.

1. Approved safety equipment such as safety glasses or face shields are to be worn.
2. Where harmful vapours or dusts are created, approved breathing protection is to be used
3. The proper sharp blade designed for the work to be done must be selected and used.
4. The power supply must be disconnected before making any adjustments to the saw or changing the blade.
5. Before the saw is set down be sure the retracting guard has fully returned to its down position.
6. Both hands must be used to hold the saw while ripping.
7. Maintenance is to be done according to the manufacturer's specifications.
8. Ensure all cords are clear of the cutting area before starting to cut.
9. Before cutting, check the stock for foreign objects or any other obstruction, which could cause the saw to "kick back".
10. When ripping, make sure the stock is held securely in place. Use a wedge to keep the stock from closing and causing the saw to bind.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 31, 2005	June 29, 2004	02	May 2006	J. Carruthers (H&S)

5.41 Propane

Since propane is heavier than air and invisible, it is a special concern when it is used on the job-site.

All installations and use of this product on the job-site must comply with the Government Legislation set out for its safe use. Additional information concerning the handling and storage of propane can be located in the Construction OHSA Regs 42, 43 and 122.

5.41.1 Propane Cylinder Storage &Handling

Propane is non-toxic but can displace air leading to dizziness, weakness and death, when working with propane workers must ensure adequate ventilation. Propane will flow into ditches and settles close to the ground. Propane vapour is 1.5 times heavier than air and propane liquid is about half the weight of water. Propane will only burn at certain mixtures. Combustion will not occur when there is too much or not enough fuel.

When working around propane open flames and cigarettes are NOT allowed.

Procedure

1. Storage of cylinders is to be outdoors away from doorways, confined spaces and building openings or in an approved storage area/cylinder room. Storage areas should be on firm, even ground.
2. Propane storage areas must be identified with proper signage. Proper signage should include "Propane", "No Smoking" or "No source of Ignition within 3 meters".

3. Propane is not to be stored with oxidizing agents, oxygen and chloride cylinders. (As per MSDS)
4. Cylinders must be stored upright/vertically and secured to avoid tipping over. While in use propane bottles are to be securely held in an upright position.
5. Ensure that all valves are tightly closed when being stored or transported.
6. When removing or replacing a cylinder in the storage area, place carefully and do not throw cylinders.
7. Do not drag, roll or drop cylinders as this could cause damage.
8. When lifting cylinders follow proper lifting, carrying and mounting procedures as the cylinders are heavy when full and lifting techniques are to be used to avoid back injuries.
9. Carry only 1 cylinder at a time regardless of whether they are full or empty.
10. When transporting cylinders ensure they are properly secured and that they are transported upright/vertically. Do not transport in the cab of truck or on passenger seat. If cylinder must be transported in a vehicle ensure that it is upright, secure and the vehicle is well ventilated.
11. Never lift a cylinder by using the valve guard or the valve. A proper carrier constructed for the purpose of lifting propane and compressed gas cylinders is the only acceptable means of lifting propane tanks via crane etc.
12. Tank valves and regulators are to be removed from the tank prior to any movement of the tank.
13. Crane hooks shall be equipped with a "safety latch".
14. All trucks, cranes or equipment used to handle propane tanks must be equipped with a fire extinguisher appropriate for the size and type of tank being handled.
15. Except in an emergency, any movement or repositioning of tanks shall be performed by a competent worker.
16. Tanks are not to be heated to increase flow.
17. Tanks are not to be hooked up and used without proper regulators.

5.41.2 Propane Heaters and Torches

Propane must only be used in a well ventilated area and no closer than 3 meters from any source of ignition, when using propane equipment a fire extinguisher must be kept near by.

Location of propane heaters are only allowed in an area of a building that is under construction, where there are only construction people in the area, must be kept away from combustible materials and on a level, solid ground.

Procedure for Connection of Heater Hose to cylinder

1. Wear gloves and eye protection
2. Use Regulator
3. Place heater at least 15ft from the cylinder
4. Face heater away from the cylinder
5. Connect regulator to the cylinder
6. Tighten left
7. Turn the propane on slowly
8. If propane flow can be heard for more than a few seconds, turn off the propane and check all connections and valves

9. Test connection with soap solution
10. If a leak is present turn off propane and retighten
11. Turn on propane and test again
12. If leak cannot be stopped by application of moderate tightening effort, do not use the equipment, return for repairs.

Procedure for Lighting of Heater

1. Have an igniter ready
2. Hold in red button
3. Light
4. Hold red button for about 30 seconds
5. If flame goes out, wait at least 5 minutes before trying to light again

Procedure for Shutting down Heater

1. Turn off the propane at the cylinder
2. Let the flame burn out
3. Disconnect the hose from the Heater.

Procedure for Torch or Burner Lighting and Shutdown

1. Ensure a proper regulator and that the needle valve is closed
2. Connect the propane
3. Turn the propane on slowly and all the way on
4. Check all connections for leaks with soap solution
5. Have igniter ready
6. Open needle valve and light the torch
7. The torch is not to be left unattended unless it is fitted with a flame failure safeguard.
8. To shut down, turn off propane at cylinder first, let the flame burn out and then dis connect hose from torch

5.41.3 Employee Training

All employees, that in the course of their duties, must handle propane for any equipment operation, shall be fully trained and certified in the safe handling and use of propane bottles, hoses, regulators and the implement being powered by propane. Prior to any use of propane powered equipment the employee must pass a Certified Propane training course (ie/ Ontario Propane Association, CSAO etc). Upon successful completion of the course of the employee shall be instructed in house in the proper use, inspection and maintenance of propane equipment in accordance with McNally's program.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
Jan. 10, 05	Feb. 9, 2004	06	January 2006	D. Stanyar (VP)

5.42 Removing Rock from Teeth of Clamshell Bucket

The importance of wearing proper personnel protective equipment and working safely in this work situation cannot be overstated.

1. The foreman will have the crane operator to try to "work" the rock out of the bucket teeth by continuing the normal dredging operation.
2. If the rock does not loosen after a short work period, have the crane operator set the bucket on its side on the dredge deck.
3. Try to remove the rock using a long pry bar.
4. If this is unsuccessful, try using a chain and a come-a-long to dislodge the rock.
5. As a last resort, try to break the rock with a sledgehammer.
6. Use safety glasses or goggles and leg protection (chain saw pants).
7. Try not to use heavy blows with the sledgehammer in order to reduce the risk of flying particles.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 31, 2005	June 29, 2004	04	May 2006	J. Carruthers (H&S)

5.43 Roof Support for Rock Tunnel

This procedure details the method of installing a primary roof support in a rock tunnel. This procedure details the two basic support systems utilized most commonly by McNally. One is rock bolts, resin grout cartridges, wire mesh & shotcrete. The other system consists of rock bolts, resin grout cartridges, rolled channels and wood lagging.

Potential Hazards

1. Loose or overhanging rock can fall.
2. Defective drilling equipment.
3. Water & dust from drilling.
4. Air hose braking causing a whipping action of the hose.
5. Slipping on drilling platform or bottom of tunnel due to water & muck.
6. Shotcrete burns and dust.
7. Injuries from shotcrete rebound.
8. Chemical additives.
9. Injuries from burst hoses and on cleaning of slick line.

Procedures

1. Prior to commencing the drilling cycle, the roof shall be inspected for loose rock & scaled.
2. When a worker is working in a rock tunnel, he should walk as close to the wall as possible to avoid falling rocks.
3. Tunnels & shafts where workers are working must be inspected at least once a shift & scaled & supported as required. The entire tunnel, including roof & walls, must be inspected at least once a day a competent person. Inspection records maintained on the surface. (OHSA Reg.307)
4. Tunnels must be kept reasonably free of water when a worker is required to be in the tunnel (OHSA Reg.308)

5. Install rock bolts as close to face as possible as the tunnelling proceeds. Bolts to be set into drilled holes in rock & fully secured with resin cartridges.
6. Loosely bolt, roll channel rib in place. Install hardwood planks between rib & rock. Snug rock bolt/rib to rock.
7. Install primary roof support in accordance with contract/shop drawings.
8. Where shotcrete is used with wire mesh, secure wire mesh to rock using plates and rock bolts. Where shotcrete is utilized ensure all personnel are aware of the hazards associated with it. Only trained personnel to operate the shotcrete equipment.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 31, 2005	June 29, 2004	04	May 2006	J. Carruthers (H&S)

5.44 Scaffolds

5.44.1 Use of Wood Scaffolds

The construction of wood scaffold is closely regulated by legislation. Materials and material dimensions are specified in detail in the Occupational Health & Safety General Safety Regulations.

Because the construction of these scaffolds can vary greatly as to use, shape, location and the type of job to be done, they sometimes are built in a haphazard manner. To avoid this, the following Safe Work Practices are minimum.

1. Construction, alteration, design and removal of any wood scaffold is to be done by competent workers.
2. The material used to construct these scaffolds should be sound, close grained and finished on all four sides.
3. The scaffold must be capable of supporting 4 times the load that might be imposed on it.
4. All component parts should be tight together and properly fixed to each other.
5. Proper perimeter railing must be set in place: Top rail -intermediate rail -toe board.
6. Scaffold work platforms shall be at least 500 millimetres wide for light duty and 1 meter wide for heavy-duty scaffolds.
7. When used as a scaffold work platform, planks shall be secured from movement by cleats or by being wired in place.
8. Safe access and egress is to be provided to all work platforms by the use of ladders.
9. Scaffold work platforms shall not span more than 3.1 metres on light duty scaffolds or 2.3 metres on heavy-duty scaffolds.

5.44.2 Use of Metal Scaffolds

These are various types of metal scaffolds and they all have a right and wrong way to be erected.

The misuse of scaffolding is the cause of numerous serious injuries. Every worker who designs or constructs a scaffold should be competent and know what the manufacturer's specifications are for that type of scaffold.

The scaffold type that will be best suited for the job and capable of withstanding the loads to be imposed on it must be determined before the job begins.

Ensure that:

1. The scaffold you intend to use is the correct one for the job;
2. The location in which the scaffold is to be constructed is level or is capable of presenting secure footing by use of mudsills or some other device;
3. The scaffold will be erected by a competent worker;
4. Legislative and manufacturer's requirements have been complied with;
5. Safe access and egress to both the scaffold and the general work area has been provided;
6. Levelling adjustment screws have not been over extended;
7. Tower scaffolds have outriggers or are guyed and have all component parts secured in place (i.e. cross braces, pins, lateral braces);
8. Scaffold work platforms have perimeter guardrail
   - Horizontal rail - 0.92 metres to 1.07 metres above the platform;
   - Intermediate rail - Horizontal rail midway between scaffold platform and top rail;
   - Toe board -Horizontal member at platform level no less than 140 mm in height above the platform level;
9. Scaffold planks are of number one grade materials with maximum spans of 3.1 metres on light duty and 2.3 metres on heavy duty with a maximum projection beyond the ledger of no more than 300 mm.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 31, 2005	June 29, 2004	05	May 2006	J. Carruthers (H&S)

5.45 Scows

5.45.1 Operation of Bottom Door Dump Scows

The importance of wearing proper personnel protective equipment and working safely in this work situation cannot be overstated.

1. Always be cautious while working on a dump scow, as the deck is usually wet and therefore slippery.
2. Adverse weather and/or darkness require you to work with extra caution.
3. You should remain inside the scow hut while the scow is undertow.
4. Maintain periodic VHF radio communication with the tugboat captain.
5. Scowmen and dredge personnel should always check that the receptacles, on the power cord used to supply electricity to wind the scow doors, are clean and dry before attempting to connect them together.
6. Always remember that you are working with 3-phase electrical power of 440 Volt or 550 Volt.
7. Never connect or disconnect a power cord while the switch is in the "ON' position.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 31, 2005	June 29, 2004	04	May 2006	J. Carruthers, H&S

5.46 Setting Steel Piles in Driving Frame

Due to the long lengths of material and the heavy equipment required to perform this work, all personnel involved must know what their duties are and work carefully using the required Personal Protective Equipment.

1. Check that the crane is in good working condition.
2. Make sure the crane is setting on a firm and level footing.
3. Make sure all crane cables and sheaves are in good condition.
4. Make sure all slings and hooks are in good condition.
5. Check the pile grip to be sure it is locking and releasing properly.
6. Make sure that the crane hook safety latch is latching properly.
7. Designate a signal person.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 31, 2005	June 29, 2004	02	May 2006	J. Carruthers, H&S

5.47 Shaft Sinking

If the shafts are to be sunk through water-laden ground, consideration must be given to the ground water, which if left unchecked will be allowed to flow into the excavation. Prior to any shaft sinking, a detailed analysis of the specific ground will be made and a dewatering scheme or alternative system will be implemented. A Professional Engineer must design the shafts.

Potential Hazards

1. Worker falling down drill holes for piles.
2. Worker being hit by bucket of backhoe or clam when operator cannot see down shaft.
3. Loose rocks & ground falling down shaft & hitting workers.
4. Falling material when load is being lowered into shaft or being removed form shaft.
5. Ground infiltration when installing liner plate or lagging.
6. Kick back from chain saw when installing lagging.
7. Blow back between liner plates when grouting.

Procedures – Liner Plate

1. Prior to commencement a detailed evaluation of the ground will be carried out and a suitable dewatering scheme or alternative system will be established. This scheme will allow for sufficient draw down time before commencing.
2. Excavation for the shaft will commence with a circular pit, 1.2m to 1.8m deep and larger in diameter than the extrados of the line plate rings. Complete liner plate rings will be pre built on the ground, and then will be installed in this pit such that the top ring lies above ground level. Ribs will be installed inside all the rings to secure them until the collar has been secured.
3. A concrete or grout collar will then be cast around the outside of the rings.
4. Once the concrete has cured excavation will commence and shaft sinking will continue underpinning each liner plate section as sufficient ground is cleared.
5. When 3 full rings have been completed the leading edge will be fluffed up, before fully grouting the rings. A sand/cement grout will be used for this operation. Depending upon the ground it may be possible to construct more than 3 rings before grouting.

6. Shaft sinking will continue in cycles, building each plate before excavating for the next. In ground it may be possible to excavate for a full ring or more before building plates, however as this leaves a large area of ground exposed and must be assessed at the time.
7. Excavation will be carried out, initially using a backhoe from the surface, followed by a clam attached to the shaft crane. If room allows, a mini excavator may be used within the shaft, loading muck to the centre and removing with the shaft crane. Some hand trimming will be required to fit individual plates.
8. On reaching formation, a shaft sump will be formed and a base slab will be poured

Procedures - Soldier Pile and Lagging

1. Prior to excavating lagged shafts. Soldier piles will be placed to a depth below formation. These may be driven piles, or depending on the nature of the ground, consist of bored piles with steel piles concreted in place once drilled. A weak concrete will be used to facilitate the installation of the lagging. .
2. Pile spacing will generally be around 2 1/2m centers, however this is dependant upon the shaft design.
3. As with the liner plate shaft, an evaluation will be made and dewatering scheme will be implemented as deemed necessary.
4. Once all the piles have been completed, excavation will commence using an excavator, initially a pit will be formed to allow the installation of the uppermost waler. At this stage, hand railing will be installed around the periphery of the shaft, tying into the top of the soldier piles.
5. As the excavation proceeds, concrete will be removed from the soldier piles to expose the pile flanges and provide clearance to install the lagging boards. The lagging boards will be sized in accordance with the ground loading expected.
6. Lagging will be installed by hand, trimming boards as required and installing boards as soon as practical after ground is exposed.
7. Excavation will be carried in a series of stages, stopping to allow the installation of walers and struts or tiebacks.
8. Once down to formation level, the structure will be bottomed out and a concrete base slab will be formed. A pump sump will be formed within the base slab.
9. During the course of the project routine inspections of the shaft lagging will be carried out and poor sections of lagging will be reinforced.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 31, 2005	June 29, 2004	04	May 2006	J. Carruthers (H&S)

5.48 Soundings from Deck of Dredge

1. Have foreman stop crane from claming.
2. Lower sounding chain over front of dredge.
3. Be careful that the sounding chain does not get tangled around anyone's feet or any object on the deck.
4. Always make sure that the deck is clean to reduce the possibility of tripping.
5. During winter operations, clean and salt the deck if required.

6. At night, have a deckhand assist you by shining a flashlight on the sounding chain markings.
7. Take soundings at different locations, across front of dredge, being careful not to lean too far out from the edge of the dredge.
8. When soundings are completed, restore the sounding chain in its bucket.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 31, 2005	June 29, 2004	02	May 2006	J. Carruthers, H&S

5.49 Splicing H Piles

Due to the nature of this work many hand, foot and leg injuries can result. Read and observe the Safe Work Practices for Rigging, Hoisting and Hand Grinding Steel.

1. Check the crane and its' cables, sheaves, block, hook, etc. for proper operating condition.
2. Check that each welding machine has sufficient fuel, lube, oil and coolant.
3. Check that all welding leads and ground cables are in good condition.
4. Check that all short stubs and ground clamps are in good condition.
5. Use all appropriate Personal Protective Equipment.
6. Use shields to protect other workers from welding flash.
7. Check that your grinder and grinding disks are in good condition.
8. Inform all workers in your area of the nature of your work.
9. Have a Fire Extinguisher on hand.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 31, 2005	June 29, 2004	02	May 2006	J. Carruthers, H&S

5.50 Tiger Torches

Tiger torches, although valuable to a job-site, are sometimes misused in a manner that can make them dangerous.

Tiger torches are only to be used for preheating of piping etc. prior to welding.

1. When a torch is used, an adequate fire extinguisher must be present.
2. Torches are not to be used for heating of work areas or thawing of lines and equipment, etc., when not in use.
3. Ensure that the propane bottles are properly shut off.
4. Fuel lines are to have regulators.
5. Propane bottles shall be secured in an upright position.
6. Inspect the equipment for wear, tear and loose connections each time before lighting.
7. Do not use tiger torch in an enclosed area.
8. Always ventilate combustible gases from area before lighting torch.

9. Do not heat an object that contains or has contained flammable liquids or vapours.
10. Do not leave an operating torch unattended.
11. Do not leave work area until you make certain there is no smouldering or hot material that could ignite.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 31, 2005	June 29, 2004	02	May 2006	J. Carruthers, H&S

5.51 Towing Scows

1. Captain and deckhand to check that all equipment on tug is working properly before departure.
2. Captain and deckhand to check towline before departure.
3. Captain to check with dredge Foreman for coordinates from point A to point B.
4. Captain to get underway only after receiving "All Clear Signal" from dredge Foreman.
5. Tow Captain and dredge Foreman to remain in contact via VHF radio while tow is underway.
6. While undertow -All deckhands on boats, dump scows and dredges must wear life jackets.
7. If using split scows, make sure systems are operating properly before departure.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 31, 2005	June 29, 2004	02	May 2006	J. Carruthers, H&S

5.52 Track laying

Rail is brought to the TBM via flat car. The lengths are removed from the car and stored in the gantry.

Potential Hazards

1. Worker could be struck by rolling stock as it enters the gantry.
2. Rail could slip from lifting device and strike a worker.
3. Pinch points could trap a worker's hand, fingers or feet while handling the rail.

Procedure

1. Personnel are to keep out of the gantry. No one will enter until the locomotive and cars have stopped and the brakes applied.
2. Once the train has entered the gantry, no one will enter until the locomotive and cars have stopped and the brakes applied.
3. While unloading the rail, car workers will ensure the load is rigged securely.
4. During transfer from flat car to storage racks, no worker will stand under the load. Stand clear to one side.
5. Workers will be alert for pinch points when handling the rail.
6. If impact hammers are used, the air hose must be "snaked" to the hammer with choker cables. Hoses and fittings are to be examined before use and secured.

7. Supervisors will periodically inspect the tools and equipment to ensure that they are in good condition, any defective or improper tool is to be replaced immediately.
8. Clean up the area after job is completed, put away all tools, loose nuts and bolts in an organized manner.
9. Alert the brakeman to inform the Locomotive Operator that a crew is leaving the gantry.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 31, 2005	June 29, 2004	04	May 2006	J. Carruthers (H&S)

5.53 Traffic Control

The following procedures have been adapted from the Construction Safety Association of Ontario's Traffic Control Training Program Manuals.

5.53.1 Requirements for Traffic Control

Qualified personnel must perform all traffic control. Requirements for traffic control are to conform to Federal and Provincial Regulations and the Ministry of Transportation Traffic Control Manual for Roadway Work Operations.

Signallers and flagmen etc must be used in accordance to the Occupational Health and Safety Act. Signallers/Flagmen must be properly trained and receive adequate oral and written instructions. A copy of these instructions must be kept on site. (see Table 17 – "Traffic Control Training") Signallers/Flagmen must wear an approved Safety Vest at all times.

Dump trucks are to have an audible back up alarm.

All precautions as outline in Section 67 of OHSA must be taken for Traffic Control. Along with the required training, Table 17 "Traffic Control Training", must be completed and signed by both the employee and the Supervisor prior to an employee being given Traffic Control duties.

5.53.2 Equipment Required

Personal

1. Hard hat, Canadian Standards Association (CSA) certified, Class B
2. Safety boots, CSA-certified, Grade 1 (green triangular CSA patch outside, green rectangular label inside)
3. Ministry approved safety vest. (OHSA Regulation 62)
4. Eye protection: goggles for windy sites, safety sunglasses for sunny conditions

Stop-Slow Sign (Hand Held)

1. Sign should measure 45 centimetres by 45 centimetres (18 inches by 18 inches) and be made of material having the rigidity of plywood at least six millimetres (one-quarter inch) thick.
2. The pole must be 1.2 metres long (four feet).
3. The STOP side should be reflective fluorescent red-orange with corners coloured black so that the red-orange area forms an eight -sided figure with the word STOP in white letters 15 centimetres (six inches) high in the centre of the sign.
4. The SLOW side should be reflective fluorescent chartreuse with retro-reflective white border and the word SLOW in black letters 15 centimetres (six inches) high in the centre of the sign.

For Traffic Control After Dark

1. Wear a hard hat with reflective tape.
2. Use a flashlight with a red cone attachment as well as the STOP-SLOW sign and carry spare batteries.
3. Place flashing amber lights ahead of your post.
4. Stand in a lighted area under temporary or existing street lighting, or illuminated by lights of a parked vehicle (make sure that you stand fully in the light without creating a silhouette).

5.53.3 Dress for the weather

Hot Days: Hardhat, safety boots, shirt and full-length pants are required; insect repellent may also be required in some locations

Cold Days: warm layered clothing, especially gloves, boots and hard hats with winter liners.

Wet Days: highly visible rainwear - **under** your vest.

5.53.4 Where to Stand

Stand the correct distance from the work area. Refer to the Traffic Control Person Table below.

TABLE: TRAFFIC CONTROL PERSON (TCP)

Posted Speed	60 km/h or less, one lane or reduced to one lane in each direction		70 km/h or greater, one lane or reduced to one lane in each direction	
Traffic Volume	Low	High	Low	High
Distance of TCP from work zone	10-15 m	20-30 m	30-40 m	40-50 m

General Guidelines to follow:

1. Do not stand on the travelled portion of a roadway and always face oncoming traffic.
2. Be alert at all times. Be aware of construction traffic around you and oncoming traffic on the roadway.
3. Stand alone. Do not allow a group to gather around you.
4. Stand at your post. Sitting is hazardous because you visibility is reduced and the ability of a motorist to see you is reduced.
5. Adjust distances to suit road, weather and speed conditions.
6. Traffic must have room to react to your directions to stop (a vehicle can take at least twice the stopping distance on wet and icy roads)
7. Stand where you can see and be seen by approaching traffic for at least 150 metres (500 feet).
8. Avoid the danger of being backed over or hit by your own equipment.

One consideration in selecting where the Traffic Control Person is positioned is to maintain a colour contrast between the Traffic Control Person and the background. The Traffic Control Person must be clearly visible to the approaching motorist at all times.

Hills and curves call for three Traffic Control People or some other means of communication. The job of the Traffic Control Person in the middle is to relay signals between the other two.

Once you have been assigned a traffic control position by your supervisor, look over the area for methods of escape - a place to get to in order to avoid being injured by a vehicle heading you way, if for some reason the driver has disregarded your signals. If this should happen, protect yourself by moving out of the path of the vehicle and then warn the crew.

5.53.5 How to Signal

Use the STOP-SLOW sign and your arms to direct traffic.

Hold your sign firmly in full view of the oncoming traffic.

Be sure to give the motorist plenty of warning. Do not show the STOP sign when the motorist is too close. The average stopping distance for a vehicle travelling at 50 kilometres per hour (30 miles per hour) is 45 metres (150 feet). Higher speeds will require even more stopping distance.

When showing the SLOW sign, avoid bringing the traffic to a complete halt. When motorists have slowed down, signal them to keep moving slowly.

When showing the STOP sign, use firm had signals and indicate where you want traffic to stop. When the first vehicle stops, step into the centre of the road so the second vehicle can see you.

Before moving traffic from a stopped position, make sure the opposing traffic has stopped and that the last opposing vehicle has passed your post. Then turn your sign and step back to the shoulder of the road.

Stay alert, keep your eyes on approaching traffic, and make your hand signals crisp and positive. Co-ordinate your effort with nearby traffic signals to avoid unnecessary delays, tie-ups and confusion. Do not use flags to control traffic.

In some situations, two-way traffic may be allowed through the work zone at reduced speed, with a traffic control person assigned to each direction. Since motorists can be confused or misled by seeing the STOP side of the sign used in the opposite lane, the signs must be modified. The STOP side must be covered to conceal its distinctive shape and command. This should prevent drivers from stopping unexpectedly.

5.53.6 Communication

Do not be distracted by talking to fellow workers or passing pedestrians. If you must talk to motorists, stay at your post and keep the conversation brief.

When using two-way radios to communicate with another traffic control person, take the following precautions:

- Establish clear voice signals for each situation and stick to them.
- Be crisp and positive in your speech. If you do not understand the message as to have it repeated.
- Test the units before starting your shift and carry spare batteries.
- Avoid unnecessary chitchat.
- Do not use two-way radios in blasting zones.

When two traffic control persons are working together they should always be able to see each other in order to co-ordinate the STOP-SLOW sign. Signals between two traffic control persons should be understood (ie/ if a traffic control person changes the sign from stop to slow or vice versa he/she must inform the other traffic control person by signalling with the sign in an up and down or sideways motion. This will ensure that the traffic control persons co-ordinate their activities accordingly. Two-way radios are the best method for proper communication.

When two traffic control persons are not in sight of each other, a third traffic control person should be stationed who can keep both in view.

5.53.7 Encountering Problems

Remember you have an important job to do but you are not a law enforcement officer.

Report motorists who are endangering the safety of the public or construction workers to your supervisor.

Keep a pad and pencil and write down violators' licence numbers.

Ask the supervisor for assistance from police in difficult or unusual traffic situations.

Never restrain a motorist forcibly or take out your anger on any vehicle.

You should always be alert to the needs of emergency vehicles. Ambulances, police and fire vehicles have priority over all other traffic.

5.53.8 Preparing for Each Job

Before starting work make sure that you know the following:

- The type of construction you will be involved with - paving, installing pipe, grading, cut and fill etc.
- The type of equipment to be used, such as scrapers, trucks, compactors, graders etc.
- How the equipment will be operating ie/ crossing the road, moving along the shoulder, in culverts etc
- Whether you will have to protect workers setting up components of the traffic control system such as signs, delineators, cones and barriers
- Any special conditions of the contract governing road use
- How public traffic will flow (ie/ along a two-lane highway, around curves or hills, by detour, on a road narrowed to a single lane)
- Before starting each day ensure that the STOP-SLOW sign is clean, undamaged and meets height and size requirements
- Place the "Traffic Control Person Ahead" sign at an appropriate distance to afford motorists adequate warning
- Remove or cover all traffic control sighs at quitting time or when traffic control is temporarily suspended
- Arrange with the supervisor for meal, coffee and toilet breaks

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 31, 2005	June 29, 2004	05	May 2006	J. Carruthers (H&S)

5.54 Underground Transport/Tramming (Work Procedures)

Underground transport will include the delivery of material to and from the work site. Tramming incorporates the removal of cuttings from the TBM.

Potential Hazards

1. Personnel can be struck or run over by moving cars.

2. Brake failures or other mechanical malfunctions can lead to an uncontrollable runaway.
3. Possibility of excessive build up of dangerous gases from the diesel emissions.(if diesel used)
4. Pinch points occur at all couplings and on trailing gear. Hands, legs or even a whole worker may be trapped.
5. Material may move and create an unstable load.
6. Possibility of fire.
7. Cars may derail due to excessive speed or poor track conditions.

Procedures

1. Procedures have been developed to outline the precautions with respect to rolling stock in the tunnel.
2. A signal light at the portal entrance will warn pedestrians that rolling stock is either in the tunnel or has exited. Signal light controlled by pit bottom man or deck man.

RED - DO NOT ENTER
GREEN - ENTER WITH CAUTION

3. Cautionary lights on the gantry will allow the Segment Hoist Operator to control the movement of the segment cars into the unload area.(if required)

RED - STOP
GREEN - PROCEED WITH CAUTION TOWARDS FACE
AMBER – PROCEED WITH CAUTION AWAY FROM FACE

4. At the beginning of each shift, the locomotive operator will test all braking systems, lights and audible signals. If any deficiencies are noted, the problem(s) will be rectified by the mechanical crew.
5. All personnel will be instructed to recognize the locomotive signals. Workers will be instructed to keep clear of the gantry interior, except when given specific job instruction to work in the gantry.
6. All workers will wear reflective marked clothing or vests when in the vicinity of the rolling stock.
7. Before being left unattended in the tunnel, the operator of the locomotive will:
   - Shut down.
   - Leave controls in NEUTRAL.
   - Apply brakes.
8. A hand held fire extinguisher, minimum 10 lbs ABC will be installed on the locomotive for use in the event of a fire.
9. Specifications for locomotive and ventilation system will be submitted to Department of Labour for approval.(for diesel locomotive only)

Diesel Emissions Level	
Carbon monoxide (at operator cab)	35 ppm
Carbon monoxide (at exhaust)	1500 ppm (max)
Nitrous dioxide	3 ppm

Formaldehyde (every 3 months)	1 ppm

10. All diesel locomotives in tunnel will have a fire suppression system on them (if required).
11. If the track ties interfere with the invert being used as a travel way, then a solid walkway at least 300 mm wide will be provided.
12. Safety platforms will be installed at 60 metre intervals if walkway is at track level.
13. Material will be securely fastened before being moved underground.
14. Personnel are not permitted to ride between any of the cars on the train. In the event of a tunnel emergency, an empty muck car may be used to evacuate personnel. They must sit or kneel in the car.
15. All personnel will be made aware of pinch point locations on the cars.
16. If a worker is required to work between the cars, then the locomotive driver will bring the loco to a complete stop. Upon completion of the job, the worker will stand well clear of the cars before signalling the driver to proceed.
17. Grout and segment cars are secured in place at face by the segment unloading locking device or other method when disconnected from the train.
18. Personnel travelling on foot in the tunnel will turn to face an oncoming train.
19. Inspection of the linkage system and safety cables will be conducted periodically for wearing and damage.

Locomotive Signals	
1 blast	Stop
2 blasts	Start
3 blasts	Back-up

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 30, 2005	June 29, 2004	04	May 2006	J. Carruthers (H&S)

5.55 Unloading of Segments (Work Procedures)

Scope

When unloading segments, ribs and lagging, potential hazards exist.

Potential Hazards

When removing segments with a forklift from flat bed trucks, potential hazards to watch for are:

1. Worker may become trapped between forklift and segments.
2. Segments may become unbalanced.
3. Fingers or toes may get pinched while handling segments.
4. When transporting the load, potential hazards may be:
   - The load may become unbalanced and tip.
   - Worker may be struck by forklift while backing up.

Procedures

1. Clearly defined hand communications must exist between forklift operator and spotter.

2. The spotter is to remove himself once the forks have been positioned. Stand to one side, clear of the load, then signal the forklift operator to test the load for balance.
3. While the load is being lifted, all personnel will stand to one side of the load in
4. Once the load has cleared the flat bed, the load must be lowered to the travelling position before proceeding to the stockpile area.
5. Before starting the forklift, the operator must complete a visual circle check and mechanical check of braking systems and hydraulics. If there are deficiencies that cannot be remedied on the spot, the machine will be shut down until examined by a mechanic. The operator must not run the machine if it does not have the primary and back-up braking systems.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 30, 2005	June 29, 2004	04	May 2006	J. Carruthers (H&S)

5.56 Ventilation

Ventilation to work spaces must be in accordance to the OHSA Regulation 46 which requires that a project is to be adequately ventilated by natural or mechanical means if:

1. a worker may be injured by inhaling a noxious gas, vapour, dust or fume or from a lack of oxygen; or
2. if a gas, vapour, dust or fume may be capable of forming an explosive mixture with the air.

If it is not practical to provide natural or mechanical ventilation in the circumstances described above then respiratory protective equipment suitable for the hazard will be provided to the worker and is to be used by the worker.

Ventilation equipment is to be inspected and maintained on a regular basis as a part of the monthly site inspection.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
April 29, 2005	June 1, 2004	04	April 2006	J. Carruthers (H&S)

5.57 Vibratory Pile Hammer

Due to the heavy equipment being used and the specialization of this work, all personnel must know their duties. Always wear a Life Jacket while working on a pile-driving frame on the water.

1. Check all crane cables and sheaves.
2. Check that the crane hook safety latch is operating properly.
3. Check that the sling on the vibratory hammer is in good condition.
4. Check that the vibratory hammer and all the hydraulic hoses and connections are in good condition.
5. Check the hydraulic oil level in the power pack reservoir.
6. Check that there is sufficient fuel, lubricating oil and coolant in the power pack engine.
7. Before starting work and periodically during the job check that the bolts in the driving frame are tight.
8. Attach (2) two tag lines of sufficient size and length to the vibratory hammer.

5.58 Welding and Cutting

5.58.1 General Procedures

Work involving welding, cutting and burning can increase the fire and breathing hazard on any job, and the following should be considered prior to the start of work.

1. Always ensure that adequate ventilation is supplied.
2. Where other workers may also be exposed to the hazards created by welding, cutting and burning, they must be alerted to the hazards or protected from them by using "screens".
3. Never start work without proper authorization.
4. A fire extinguisher must always be located near any welding, cutting or burning operation.
5. Before starting, check work area for combustible material and possible flammable vapours.
6. A welder should never work alone. A fire or spark watch should be maintained.
7. Check cables and hoses to protect them from slag or sparks.
8. Never weld or cut lines, drums, tanks, etc. that have been in service without making sure that all precautions have been carried out and permits obtained.
9. Never enter, weld or cut in a confined space without following confined space procedures.
10. When working overhead, use fire resistant materials (blankets, tarps) to control or contain slag and sparks.
11. Cutting and welding must not be performed where sparks and cutting slag will fall on cylinders (move all cylinders away to one side).
12. Open all cylinder valves slowly. The wrench used for opening the cylinder valves should always be kept on the valve spindle when the cylinder is in use.

5.58.2 Portable Arc Welders

Portable arc welders are a piece of equipment that has to be treated like a vehicle and can not be operated indoors.

1. Be sure the machine is firmly attached to the transporting unit.
2. Check all fluid levels, water, oil and gas to be sure they are at acceptable levels for operation.
3. When fuelling, DO NOT "top off' the gas tank. Gasoline expands as the outside temperature rises, this may result in seepage and an ensuing fire.
4. Do not fuel the machine while it is running.
5. Do a "walk around" to check for damage and leaks. Be sure the radiator and gas caps are in proper working order and securely attached. Any repairs should be done by qualified mechanics or technicians.
6. Make sure all cables are wound securely when transporting and the side covers are kept closed to protect the machine from any damage from external objects and outside weather, as well as to protect the operator and others from the moving parts of the machine.

5.58.3 Torches

Cutting and welding torches are made of soft metal. Never drag the torch by the hose. Keep torch tips clean of grease, oil and slag. Clogged torch tips should be cleaned with suitable cleaning wires, drills or other devices designed for the purpose.

Store equipment in a safe place, preferably in a box made for torch parts, hoses and regulators.

Always use proper fitting wrenches when making connections. Do not use vice grips or pipe wrenches.

For safety, install a reverse flow check valve to prevent dangerous flashbacks.

Do not locate cylinders where they can become part of an electrical circuit. Do not strike electrodes against a cylinder to strike an arc. All portable welding equipment must be properly grounded.

No welding or cutting shall be done in any area where there may be flammable materials, explosive gases or vapour with out AUTHORIZATION FROM SUPERVISOR.

A fire extinguisher must be close by when welding or cutting.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 30, 2005	June 29, 2004	06	May 2006	J. Carruthers, H&S

5.59 Work boats (Getting on and off)

Personal Protective Equipment required

- Protective Headgear
- Protective Footwear
- Life Jacket

Work boat must be securely tied to a wharf or mooring, preferable at a ladder location.

Acknowledgement from Captain that the boat is ready for boarding or loading.

All hands accounted for by the Captain before leaving dock or dredge and located in a safe area of cabin or on deck.

Avoid all horseplay at all times.

Avoid all unnecessary movement while boat is underway.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 30, 2005	June 29, 2004	03	May 2006	J. Carruthers, H&S

5.60 Working Alone

Ideally, no worker should be working anywhere alone for any reason. This should be avoided if at all possible. Working alone is not allowed in confined spaces for any reason. When a person must enter a confined space than proper confined space procedures found in this safety program must be complied with as per the Occupational Health and Safety Act section 246.

When there is no alternative and a worker is going to be working alone on a jobsite, the supervisor and the employee must set up a means of communication and establish how frequently they will

communicate. At a minimum the supervisor must communicate with the employee once per hour. On jobsites where workers from other companies are present but no other McNally workers are present this is not considered to be working alone. Under these circumstances the supervisor must still check in with the employee 2 to 3 times during the day.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 27, 2005	N/A	00	May 2006	P. McNally, President

5.61 Working over or near Water

Where a person is exposed to the hazard of falling from a work area located over the water, there is a risk of drowning. Personal floatation devices shall comply with Standard Regulations.

A personal floatation device shall be worn whenever an employee is working on any vessel (even when it is docked) and when working near the water within 3m from the waters' edge. Each employee will be issued one workvest-lifejacket from McNally's and it is their responsibility to wear and maintain this jacket at all times. When the lifejacket is no longer safe to wear it can be exchanged for another one.

The following rescue equipment shall be provided:

1. An adequate motorboat to ensure a safe and timely rescue
2. A life buoy with 15 metres of polypropylene rope of at least 10 mm in diameter.
3. A boat hook.
4. An audible alarm system to notify of an accident and to, initiate the rescue procedure.

Persons in such numbers, as are needed in the circumstances, to perform rescue operations safely, shall be available, who are:

1. Designated to perform specific rescue tasks.
2. Properly informed as to the proper rescue procedures.
3. Trained in the use of the rescue equipment.

Where work is being done above water that has a fast current and where practicable, a line shall be placed across the water.

1. Line is to be 10 mm diameter minimum polypropylene rope.
2. Line is to have buoys or some other floatation device attached.

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 30, 2005	July 6, 2004	03	May 2006	J. Carruthers, H&S

6.0 EMERGENCY PROCEDURES

A worker who has a basic understanding of the emergency procedures and remains calm has already increased the probability of survival. Every location must have a map of the work place that shows evacuation routes, head count location, first aid station, and fire extinguishers. A map showing the name, phone No. & route to hospital should also be available. This map should be posted near an exit.

6.1 Chain of Command

6.2 Emergency Telephone Numbers

6.3 Evacuation Procedures

6.4 Explosions

6.5 Fire Procedure

6.6 Gas Lines (Break Procedures)

6.7 Hazardous Materials (Spill Procedures)

6.8 Tunnel Rescue Procedures

- 6.8.1 Rescue Equipment
- 6.8.2 Rescue Teams

6.9 Emergency Procedure for the Rescue of an Underground Worker

6.10 Emergency Procedure for Marine Work

- 6.10.1 Emergency Phone Numbers
- 6.10.2 Rescue Equipment (On Barges & Tugs)
- 6.10.3 Medivac
- 6.10.4 Man-Overboard
- 6.10.5 Fire
- 6.10.6 Abandon Ship
- 6.10.7 Procedures for Fuelling Vessels
- 6.10.8 Hazardous Materials Spills
- 6.10.9 Heavy Weather

6.11 Emergency Procedures for Office and Shop

- 6.11.1 Earthquake
- 6.11.2 Evacuation
- 6.11.3 Flood
- 6.11.4 Power Failure
- 6.11.5 Severe Lightning Storm
- 6.11.6 Tornado
- 6.11.7 After a Major Disaster

6.12 Electricity (Emergency Procedures)

- 6.12.1 Powerline Contact Procedures

6.12.2 Person in Contact with Electricity

6.12.3 Electrical Fires

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
April 18, 2005	July 6, 2004	06	April 2006	J. Carruthers (H&S)

6.1 Chain of Command

In the event of an emergency the following people are to be notified without delay:

Name	Title	Work Phone	Cell Phone	Home Phone

* Chart to be filled in for each applicable job

6.2 Emergency Telephone Numbers

*Chart to be printed and completed for each job and then posted in a prominent location

Contact	Phone No.
Police (Emergency)	911
Fire (Emergency)	911
Ambulance (Emergency)	911
Police Department (Local)	
Fire Department (Local)	
Ambulance (Local)	
Bell (Repair) Locates 1-800-400-2255	611
Cable Locate	677-4344
Hydro	
Consumers Gas Service (24-hour)	
Consumers Gas Cable Locate	1-800-400-2255
Roads, Water, Sewer (24-hour)	
Health Department	
Health Department (After hours)	
Environment Protection Office	
Buildings & Inspections (After hours)	
Road & Traffic Emergency (24 hour)	
Ministry of Labour (Head office)	
Ministry of Labour (Construction branch)	314-5381
Ministry of Environmental (Spills Action Centre)	1-800-268-6060
Oil & Hazardous Chemical Spills	392-8211
Pipelines	

6.3 Evacuation Procedure

1. Circumstances may require a complete evacuation of an area due to instances of hazardous chemical spills, explosions or any other type of disaster. These circumstances are remote but possible and therefore all personnel must be familiar with the procedures.
2. All supervisory personnel will be responsible for head counts and will restrict access into the evacuation area except to emergency crews.
3. If required, the Tunnel Rescue Team will be notified along with outside authorities.
4. The Project Manager- Supervisor will notify personnel at the termination of the evacuation and the safe return to normal procedures.

6.4 Explosions

Explosions may be caused by the ignition of certain gases. Two of the most explosive gases are methane and hydrogen sulphide.

Methane is lighter than air and if ignited within its explosive range will "fireball" across the crown of the tunnel. If this situation is encountered, put on the self-rescuer and drop flat onto the invert of the tunnel; the fire will consume the oxygen in the area. Once the fire has passed overhead, keep low and stay where you are unless the situation dictates that you have to move.

Hydrogen sulphide is heavier than air and tends to accumulate low to the floor of the heading. If ignited, the explosion will again appear as a "rolling fireball" closer to the ground than methane. If there are any indications of hydrogen sulphide or any other explosive gases, be prepared to put on your self-rescuer.

Precautions: The risk of an explosion can be reduced if the worker observes rules pertaining to good fire prevention including the reduction of combustible material and flammable liquids, the observance of the "No Smoking" or "No Open Flame" rules, good work practices during welding and cutting procedures (Hot Work Permit) and the testing of the work place if explosive gases are suspected.

6.5 Fire Procedure

If you discover a fire:

1. Notify everyone in the area of the fire.
2. Consider using a fire extinguisher if you believe you can safely put the fire out, otherwise leave the fire area, closing all doors behind you, (if possible). Always using the nearest safe exit.
3. Go to nearest phone and call "911" or the applicable fire department phone number and then notify a supervisor.
4. For using a fire extinguisher use the correct type. Note: ***Do not use water or foam on an electrical fire.*** Approach the fire with the wind or ventilation at your back. In broad sweeping motions, douse the flames. As you get nearer the fire, narrow down the width of the sweeping motions. Once the flames have been put out retreat facing the fire, have a clear travel way behind you and observe the fire for restarting.
5. Report the incident
6. All personnel not underground will report to the emergency meeting area for Head Count
7. To fight a fire on a Barge or Tug Boat a employee must be trained in Marine Fire Fighting
8. When being requested to evacuate a building or trailer: Stop all work, shut down equipment (if possible) and do not return to pick up your belongings.

6.6 Gas Lines (Break Procedures)

The following has been adapted from an OSWCA bulletin received Spring 2002.

Any strike of a utility line or pipe should be reported to the utility owner. It is not necessary to actually puncture or break the line to be reportable, any significant strike or loss of structural support that weakens or could result in a line failure must be reported.

1. Be specific about the location of the line hit and whether it is a confirmed break or potential line damage and make a note of the time, date when the line hit was reported as well as the telephone number and/or fax number and name of individual and company to whom the strike was reported.

2. If the line had insufficient coverage (ie less than 12") or if the locate was inaccurate, document with photos if possible.
3. The Environmental Protection Act requires the report of any spill of a pollutant (ie natural gas) into the natural environment that is abnormal in quality or quantity, and which is likely to cause an adverse effect to the Ministry of the Environment, the local municipality and the owner of the pollutant (utility).
4. To contact the Ministry of the Environment's Spill Action Hotline – call 1-800-268-6060
5. The Technical Standards & Safety Act requires any size release to be reported to the gas distributor.
6. In determining whether the spill is likely to cause an adverse effect, if gas spill requires an evacuation of residences or other properties, results in closure of roads or facilities or results in a fire or explosion it is likely to or has caused an adverse effect.
7. If in doubt – call.
8. If the utility line hit resulted in injury follow appropriate company procedures. For a critical injury the Ministry of Labour must also be notified immediately and the scene secured.

6.7 Hazardous Materials (Spill Procedures)

A spill is a discharge of a contaminate into the natural environment, from or out of a structure, vehicle or other containers which is abnormal in quality or quantity in light of the circumstances of the discharge.

Spills can be from containers including drums and tanks, motor vehicle accidents, breaks in hydraulic hoses or piping to name a few.

It is the Company's responsibility to prevent spills but if a spill does occur, it is our responsibility to clean it up, notify the appropriate authority and restore the environment to its original state where possible.

All hazardous materials must be stored and contained as per WHMIS, or other Regulations or local agency having jurisdiction. If a spill is detected, it is to be contained immediately in the safest manner possible. The Project Manager – Supervisor is to be immediately notified and call for assistance if required.

If a spill is detected on the water:

1. An absorbent boom shall be placed downstream of the entry point of the spill.
2. Once the boom contains the spill, it can be pumped int0 205 litre (45 gallon) drums or a storage tank.
3. In still or slow moving water, it may be possible to deploy absorbent pads to remove the spilled material.
4. See "Emergency Procedure For Marine Work", Table 7

6.8 Tunnel Rescue Procedure

This procedure details the rescue crews, rescue procedure and training to ensure each team is able to perform their duty. Copies of the tunnel rescue procedures, signed by the Project Supervisor and Tunnel Superintendent, shall be posted in a conspicuous place on the project.

6.8.1 Rescue Equipment

Draeger Oxy K Plus, oxygen self-rescuer. The unit will provide oxygen to the wearer for a period of 60 minutes whilst walking, and up to 3 hours at rest. These units will be used for self-rescue only.

Draeger BG174 self-contained oxygen breathing apparatus. These units combine a chemical removal of $C0_2$, with the addition of pure oxygen. When fully charged to 3000 psi the wearer is provided with complete protection for up to 4 hours.

All equipment will be kept within a well-maintained safety container located on job site. The equipment will be checked every 30 days with a record of checks maintained.

The container will contain all the safety equipment together with a notice board displaying all the procedures. Additionally a list of the rescue crew will be clearly displayed on the notice board. The list will indicate the names of the Captain and all other crewmembers.

Draeger rescue sets will be maintained within the container; each unit will be numbered and will be stored on a corresponding storage shelf. Four units will be supplied; it will therefore be necessary to share the units between the rescue teams, if required. Within a team each member will be allocated a rescue set and the nominated rescuer number will be posted along side the crewmembers name.

Stretchers, first aid kits, and blankets will be maintained at the shaft. (Area, field office).

An outside telephone will be provided at the top of the shaft area, (site office) to enable the emergency services to be called.

6.8.2 Rescue Teams

Consist of 4 persons, trained in the use of Draeger BG174 self-contained breathing apparatus. A team will nominate a captain. Additionally one member will be responsible for first aid, one member for gas monitoring, one for the fire fighting equipment and two for the stretcher. All crews will undertake periodic training to ensure each member is fully aware of the system. A team that enters the tunnel will have no less than 4 persons.

A tunnel rescue team is required to rescue workers when a toxic gas or fire exists underground.

In the event of an emergency below ground, an assessment will be made by the person in charge as to the severity of the incident and the necessity for the rescue team. If any doubt exists about the incident the current rescue team will be mobilized

Following commencement of the tunnel, a trial rescue will be carried out, to familiarize all crewmembers with the procedure. Once tunnelling is underway, a training session will be set aside once per month for each rescue team. The training will include entry into the tunnel (when practical), practice with the stretcher and use of the breathing apparatus.

Procedures

Prior to commencement of the tunnels the rescue crews will be chosen, initial training will be carried out and a list of each crew will be posted on the site notice board. Contact numbers will be provided against each of the crewmembers.

When called the rescue team will assemble in the safety room. The first member to arrive will arrange the rescue sets, fire equipment, first aid kits and rescue equipment such that every item is readily on hand. On arrival of all members, the Captain will take over and will issue the orders to field test the rescue sets. The sets will each be tested by the crewmember allocated to that equipment. On completion of the test the sets will be donned by each member, the units will not be turned on at this stage, face masks will be slung around each persons neck.

The spare rescue set, stretcher, extinguishers, first aid kit and gas monitors will be checked and transported by the crew.

The team will move from the safety container to the shaft. The incident will be reassessed, before making entry into the tunnel. Depending upon the nature of the incident it may be necessary to put on face mask and turn on air prior to entering the shaft, additionally the method of entry into the shaft may vary, with access either by the shaft man-way, or by crane lifted man cage.

A safe area will be established either in the base of the shaft or at the surface, this will be referred to as the fresh air base (FAB). All communications to the rescue team will be handled from the FAB. An incident surface controller will direct operations from the surface. The surface controller will be responsible for directing all operations until such a time as the emergency services arrive and take over. The plan for the rescue will be discussed between the Rescue team and the incident controller, prearranged check-ins will be arranged whereby the team captain is to report back to the incident controller.

On leaving the FAB for the tunnel the rescue team will turn on the breathing apparatus, don the masks and check the equipment. The Captain who will make a note of the checks including each member's cylinder pressures will direct all actions. Throughout the rescue, checks will be made by the captain of each member at 15 minute intervals; again these checks will be recorded. Additionally throughout the tunnel the captain will check back to the surface controller at predetermined locations. Entry will be made by Locomotive and/or gurney car as far as possible, or until smoke is reached. The gurney car may be taken forward through the smoke to the accident scene should conditions allow.

On arrival at the incident scene, the team Captain will make an assessment. Any necessary first aid will be given, fire will be controlled as required to facilitate the rescue. The rescue team will carry out no fire fighting over and above what is required to facilitate the rescue.

All trapped persons within the tunnel will be located. Any able-bodied persons will be asked to don their self-rescuers if they have not already done so. Injured persons will be treated and placed on the stretcher. Should more than one person be injured, multiple trips may be required. The most serious injured will be removed first. No crewmember would be left behind unless conditions were sufficiently severe to warrant this. The whole team will leave the tunnel keeping all other people ahead of the last man in the rescue team. (Alternately, transport of workers may be required by stretcher or locomotive). No persons wearing self rescue sets are to assist in the rescue. They are to rescue themselves only.

Persons will be lifted from the shaft if necessary by means of the stretcher with a lifting bridle fitted to the crane, or by safety basket.

On completion of the rescue, with all members back at the FAB, breathing sets will be removed and the team will return to the rescue container. A report is to be completed by the team Captain while the information is still fresh in the mind.

No further entry into the tunnel is to be made prior to a full assessment by the Project Supervisor.

6.9 Emergency Procedure for the Rescue of an Underground Worker

Procedures

In the event of an emergency below ground, an assessment will be made by the person in charge as to the severity of the injury and the appropriate rescue equipment & procedure.

For an injury below ground the following steps will be taken:

1. A competent person, fully trained in first aid will take charge of the situation.
2. Call for assistance from fellow workers.
3. Assess the hazards at the scene; make the area safe for yourself and others.
4. Identify yourself to the casualty as a first aider and offer assistance.
5. Quickly assess the casualty for life threatening conditions. (ABC)
6. Give first aid for life threatening conditions.
7. Send another person to notify the office on dayshift, or the deck man on night / afternoon shift. Notify them, using the tunnel telephone. Giving the following information.

- Your Name
- Name of injured person
- Location of incident
- What the injuries are to the best of your knowledge
- If 911 services are required
- Any special equipment required, such as stretcher, backboard, splints, additional first aid equipment etc, to be brought into the tunnel.

8. If Paramedics are required at the scene of injury, make arrangements for their transport by Locomotive. Additionally ensure free access to the shaft top is maintained for the emergency services and send a person to the site gate to direct the ambulance to the shaft.
9. If injured person is capable of walking, send another person with the injured worker to assist him out of the tunnel.
10. If the injured person requires a stretcher, gurney or locomotive, send a person ahead to assure the track is clear for free passage to the shaft.
11. If an ambulance is not required make arrangements for a pick up to be available at the shaft top to transport the person to the office, or Hospital, depending on the injury.
12. Should the accident involve a fatality or critical injury, the MOL shall be notified immediately. Additionally the accident scene must not be interfered with or disturbed. Nothing at the scene shall be destroyed, altered or carried away, except that required to assist the casualty, until the MOL Inspector gives permission

6.10 Emergency Procedure for Marine Work

The following Procedures are to be initiated, where appropriate.

6.10.1 EMERGENCY PHONE NUMBERS

911 Fire, Police & Ambulance

M. O. L (416) 235-5330 (Toronto)

Canadian Coast Guard. (Marine Communications & Traffic Services: MCTS)

SARNIA (519) 337-657

PRESCOTT (613) 925-0618

THUNDER BAY (807) 345-4618

DIALING **16** On your Bell Cellular, Cantel or Thunder Bay Cell Telephone.

VHF. MARINE RADIO CHANNELS

Channel 16 Distress, Safety & Calling.

Channel 21B & 83B Weather & Navigation.

HAND HELD PORTABLE RADIOS

Position 1 CH7A 156.35 MHz Marine Construction

Position 2 CH16 156.80 MHz Distress. Safety. Calling

Position 3 CH21B 161.65 MHz Weather – Listen Only.

Position 4 CH83B 161.77.5 MHz Weather – Listen Only

6.10.2 Rescue Equipment: (On Barges & Tugs)

1. Rigid stretcher unit, complete with securing harness, neck brace and lifting attachments.
2. Dedicated Fire Extinguishers, (As required by CCG. Regulations).
3. Dedicated first aid equipment.
4. Blankets.
5. A first aid kit, blankets, fire extinguisher, stretcher & Confined Space Entry Equipment will be maintained on the Working Barge.
6. An outside telephone for calling emergency services will be maintained
7. A suitable boat, equipped with ring buoy attached to fifteen metres of polypropylene rope that is 9.5 millimetres in diameter, a boat hook, a life jacket for every person in the boat. The boat shall be power driven if the water is likely to be rough or swift.
8. An alarm system: boat whistle, bell, horn, or ship to shore radio and an Oil Spill Kit
9. Immersion Suits, Life Jackets, Inflatable Life Raft, Distress Signals (Flares): List depends on vessel size, type & area of operation, as required by CCG. Regulations.

6.10.3 Medivac

In the event of an injured person, an assessment will be made by the person in charge as to the severity of the injury and the necessity for outside assistance, if outside assistance is required, give the following information:

- Your name.
- Name of injured person.
- Location of incident.
- What the injuries are to the best of your knowledge.
- If 911 services are required
- Any special equipment required, such as stretcher, backboard, splints, additional first aid equipment etc. to be brought to the barge.

For an injured worker the following steps will be taken:

1. A competent person, fully trained in first aid will take charge of the situation.
2. Call for assistance from fellow workers.
3. Assess the hazards at the scene; make the area safe for yourself and others.
4. Identify yourself to the casualty as first aid person and offer assistance.
5. Quickly assess the casualty for life threatening conditions. (ABC).
6. Give first aid for life threatening condition.
7. If Paramedics are required at the scene of injury, make arrangements for their transport by boat, and send a person to direct ambulance to the boat.
8. If injured person is capable of walking, send a person with the casualty to assist him to the boat to be taken to shore.
9. If the injured person requires a stretcher, send a person ahead to insure there is a clear space on the boat to place the stretcher.

10. If ambulance is not required, make arrangements for a pick up to be available at the shore to transport the person to the office, or the Hospital, depending on the injury.
11. Should the accident involve a fatality or critical injury, the MOL shall be notified immediately. Additionally, the accident scene must not be interfered with or disturbed. Nothing at the scene shall be destroyed, altered or carried away, except that required to assist the casualty, until the MOL inspector gives permission.

6.10.4 Man-Overboard

In the event of a man- overboard incident, the following process will be initiated:

1. Sound alarm – 3 long blast on Whistle or general alarm Bell.
2. Locate and maintain visual contact with person.
3. Deploy life ring, Buoyant life line and self igniting light
4. Manoeuvre the vessel to permit recovery.
5. Place engines in neutral when next to the person.
6. Effect recovery of person in a safe manner.
7. Administer appropriate first aid. (Follow procedures for MEDIVAC).

6.10.5 Fire

The following should be initiated in the event of a fire onboard:

1. Sound the alarm, continuous ringing of general alarm, horn or whistle.
2. Identify type and location of fire.
3. Contact appropriate shore authorities.
4. If crew cannot put out the fire, remove crew and tow equipment to dock so fire dept can fight fire.

6.10.6 Abandon Ship

The decision to abandon ship is the responsibility of the Captain or senior person onboard, given by verbal command only. The vessel is equipped with life saving equipment applicable to her size and function. The following process should be initiated once abandon ship order has been given:

1. Immersion Suits to be worn when ordered to or life raft is deployed.
2. Personnel to proceed to their abandon ship station.
3. Ensure Raft latches are released.
4. Ensure painter is secured to a strong point.
5. Ensure the water below the raft is clear.
6. Deploy life raft, as boat drill requires.
7. Board raft and manoeuvre clear of vessel.

6.10.7 Procedure for Fuelling Vessels

1. Material Safety Data Sheet to be reviewed by workers handling fuel.
2. The on site storage of bulk fuel is to be restricted to the delivery truck and fuel storage tanks aboard the vessel.

3. Fuelling equipment to be grounded during fuelling operations, Fuel nozzle is grounded to steel vessel that is in the water.
4. Fuel truck to have ABC fire extinguisher.
5. Vessel to be equipped with fire extinguishers.
6. All equipment to be in good working order and free of leaking seals to prevent lubricants from entering the environment.
7. In the event of any chemical spill, immediately notify appropriate authorities.
8. Fuel truck to have hose nozzle with a positive shut-off.
9. Fuelling port on vessel to have a sealed cap.
10. Vessel is equipped with absorbent pads in the event of a minor spill.
11. See Chapter 5 of this Policy and Program for additional instructions on Fuel Handling.

6.10.8 Hazardous Materials Spills

Upon discovery of a hazardous materials spill, personnel will assess the situation to determine the severity, and potential for escalation of the danger. At this point it will be decided whether action can be taken to control the situation using vessel personnel or to request assistance. All spills or suspected spills of hazardous materials, on land or into the water, regardless of size, are to be reported *immediately* to the Supervisor. The Supervisor will in turn *immediately* report the spill to the Project Manager or delegate, who shall ensure notification of the appropriate authorities, the **Spill Action Hotline of the Ministry of the Environment, phone 1-800-268-6060,** unless the spill is classed as non-reportable, according to the criteria below:

1. Non-Reportable Spills

Class VIII Spill: a spill of a fluid petroleum product at a location defined in the Liquid fuels Handling Act as a bulk plant, marina, private outlet or retail outlet, of not more than 100 litres in areas restricted from public access.

Conditions required for a Class VIII spill to be exempt from reporting requirements:

- The spill does not enter and is not likely to enter any waters, directly or through drainage structures;
- The Spill does not cause and is not likely to cause any adverse effects, other than those that are readily remediated through cleanup and restoration of paved, gravelled or sodded surfaces; and
- Arrangements for the remediation referred to in (b) above are made and carried out immediately and
- Records of the spill are maintained.

2. Other Spills

Any spill exceeding 100 litres or which does not meet the conditions for exemption from reporting requirements of the Environmental Protection Act.

Such spills must be reported to the Supervisor, Project Manager and the ap propriate Authorities. The report is to include details of the type of material spilled, the source of the spill and whether the spill has reached the environment (ie through drains, sumps or waterways).

The supervisor on site or other designated person is to take charge of the spill containment and cleanup. Workers are to be assigned to assist with control and remedial measures:

- Stop the leak

- Block off any drains or access to drainage
- If spill has entered or is in danger of entering a waterway, boom-off area to contain spill
- Assess the level of the spill and report as necessary
- Assess the method of cleanup
- In an environmentally sensitive area, get advice from the Ministry of the Environment as to clean-up measures
- Proceed with recovery of spilled chemical and clean-up
- Arrange appropriate disposal of chemical recovered and debris (in landfill site)
- If a government authority sends a representative to monitor the clean-up and to ensure that it is done adequately, cooperate with such representative
- Maintain a record of the spill and cleanup

To facilitate quick response there is to be a record readily available of the spill response equipment on site and its location. The records are to include contact information for sources of spill control, containment and cleanup supplies to augment those on site, if required and names of spill cleanup contractors in the area.

6.10.9 Heavy Weather

The weather conditions will be monitored via the marine weather channel. When heavy weather conditions are predicted the vessels shall make for protected waters or ensure that they are moored in a satisfactory condition to ride out the weather conditions.

The tug designated as the dredge tug shall be assigned the responsibility of safety boat. See Section 27 (3)-(a) of the Occupational Health and Safety Act and Regulations for Construction Projects.

6.11 Emergency Procedures for Office and Shop

The following procedures listed below have been prepared using a combination of similar instructions from Publications concerning Emergency Preparedness published by the Government of Canada and The Canadian Red Cross. These are included within this Policy and Procedure as a guideline for what to do during some specific disasters/emergency situations.

6.11.1 Earthquake

If you are in a building

- Stay inside and keep away from windows
- Get under a heavy desk or table and hang on, if you can not get under something strong, flatten yourself against an interior wall and protect your head and neck

If you are outside

- Go to an open area and move away from buildings and any other structure that could collapse, stay away from power lines and downed electrical wires

If you are in a car

- Stop the car and stay in it avoiding bridges, overpasses or underpasses, buildings or anything that could collapse on you and your car

Post Earthquake Hazards

- **Damaged Buildings** – Stay out of damaged buildings even if they look alright
- **After shocks** – stay put
- **Water gets cut off** – use emergency water from water heater, toilet tank or melted ice cubes
- **Power can go off** – stay out of elevators
- **Loose or dangling electrical wires** – stay away from the wires and advise authorities if you are able to do so
- **Broken sewer and water mains** – advise the authorities if you are able to do so

6.11.2 Evacuation

If you are advised by the authorities to evacuate your workplace, then do so. Ignoring the warning could jeopardize your safety or those that would have to come in to rescue you.

- Before leaving, turn off power, water and gas.
- Should time allow leave a note informing others when you left and where you went, leave in a place that it is likely to be found
- Follow the routes posted by officials, do not take short cuts as they could lead to blocked or dangerous areas, travel carefully and only if absolutely necessary through flooded areas, roads could be washed away or covered in water
- Keep listening to a battery-operated radio for further instructions, emergency crews will be busy helping those who need help, help them by staying out of the way

6.11.3 Flood

- Shut off basement furnaces and any outside gas valves.
- Shut off the electricity. If the area around the fuse box or circuit breaker is wet, stand on a dry board and shut off the power with a dry wooden stick.
- Never try to cross a flood area on foot as the fast water could sweep you away
- Try not to drive through flood waters as the fast water could sweep your car away. However, if you are caught in fast rising waters and your car stalls, leave it and save yourself and your passengers.

Post Flood Hazards

- **Foundation Damage** – check for foundation damage prior to re-entering the building, use a flashlight to check for damage, do not strike a match or use an open flame unless you know for certain that the gas has been turned off
- **Contaminated Drinking Water** - use bottled water or bring water to a rolling boil for 10 minutes minimum
- **Basement full of water** – drain the water in stages, about a third of the volume of water per day (Draining the water to quickly can cause structural damage to the building)
- **Contaminated flood water in the basement** – disinfect every three days if the flood is severe and the building is occupied for an extended period. Will need a minimum of 2 litres of liquid bleach to do this.

- **Mould** – Mould is a health hazard, if mould is present wear a face mask and disposable gloves, anything that stays wet long enough will grow mould, dry everything as quickly as possible to avoid future health problems

6.11.4 Power failure

- Turn the thermostat(s) down to a minimum
- Turn off all electronic equipment and tools to prevent injury, damage to equipment and fire when the power returns, power can be restored more easily when the system is not overloaded
- Emergency lighting should come on, wait in an area lit by the emergency lighting for the power to return
- Should a generator be needed always follow the manufacturer's instructions and operate the generator outdoors in a well-ventilated area away from doors and windows and connect lights et cetra directly to the generator, if an extension cord must be used, ensue that it is properly rated, CSA approved cords.

6.11.5 Severe Lightning Storm

If you are in a building

- Stay inside and away from windows, doors, radiators, stoves, metal pipes, sinks or other electrical charge conductors
- Unplug computers, clocks, photocopiers and other electrical appliances/equipment and do not use the phone or other electrical equipment

If you are outside

- Seek shelter in a building but if you are caught in an open area, crouch down with your feet close together and your head down, do not lie flat, try to minimize your contact with the ground to reduce the risk of being electrocuted by a ground charge
- Keep away from telephone and power lines, fences, trees and hilltops
- If you are on a piece of equipment get off it as quickly as possible unless the equipment has been struck by lightning and then stay in the equipment until emergency crews can come to your aid

If you are in a car

- Stop the car and stay in it, do not stop near trees or power lines that could fall

6.11.6 Tornado

If you are in a building

- Go to the basement immediately
- If there is not a basement, crouch or lie flat (under heavy furniture) in an inner hallway or small inner room or stairwell away from windows
- Stay away from large halls, arenas, shopping malls etc (their roofs could collapse).

If you are outside

- If there is no shelter, lie down in a ditch or ravine, protecting your head.

If you are driving

- Get out and away from the car, it could be blown through the air or roll over on you
- Lie down in a ditch or ravine, protecting your head

6.11.7 After a major disaster

Right after the emergency, you may be confused or disoriented. Stay calm and remember the following procedures:

- Help the injured, make sure that all employees are accounted for, try to find any that are not
- Listen to the radio on a battery-operated radio for instructions
- Do not use the telephone unless absolutely necessary as emergency crews will need all available lines
- Check buildings for damage
- Use a flashlight not matches if electrical lighting is not available
- Check for fires, fire hazards or other hazards
- Sniff for gas leaks starting at the water heater and if you smell gas, turn off the main gas valve opening windows and doors and get everyone outside quickly, Shut off any other damaged utilities
- Clean up spills using protective clothing, for major spills you may need to call in professional help

6.12 Electricity (Emergency Procedures)

6.12.1 Power line Contact Procedures

1. **Stay on the equipment** – Generally it is safe for the operator to stay on equipment in contact with a power line as long as the operator does not touch the equipment and the ground at the same time,
2. **Keep others away** – Warn everyone not to touch the equipment or its load. This includes buckets, load lines, outriggers and any other part of the machine. Warning – Beware of time-delayed relays. Even after line damage trips breakers, relays may still try to restore power up to two or three times – if possible, break contact by moving the equipment clear of the wires
3. **Call Hydro** – Get someone to call the local electrical utility company for help. Unless there is fire or imminent danger, stay on the equipment until the utility shuts down the line and confirms that the power is off or the equipment has been moved clear of contact.
4. **Emergency Exit** – should an *emergency* such as a fire force you to leave the machine, jump clear, if part of your body contacts the ground while another part touches the machine, current will travel through you. To avoid this jump with feet together and shuffle away in small steps. Do not take big steps. With voltage differential across the ground, one foot may be in a higher voltage area than the other and the difference could kill you.
5. **Report** – Report every incident of power line contact so that the utility company can check for damage that could cause the line to fall later.

6.12.2 Person in Contact with Electricity

1. In some electrical accidents, the injured or unconscious person remains in contact with the live wire or equipment. Rescue should only be attempted after power has been turned off.

2. In some cases of low voltage, when power cannot be turned off, break contact if possible using a dry board, rubber hose, or dry polypropylene rope to move either the injured person or the line. An object can sometimes be thrown to separate the injured person from the wire.
3. If you do not know the voltage, treat it as high.
4. Even with dry wood or rubber, touching the injured person can be dangerous. High voltage can jump a considerable gap and objects that are normally insulators may become conductors.
5. Call emergency services and give first aid only after the injured person is free of contact.

6.12.3 Electrical Fires

1. Never put water on fires in live electrical equipment or wiring. Water is a conductor and increases the risk of flash, arc and electrocution.
2. An electrical fire in a contained space can rapidly deplete oxygen and may release toxic fumes, if possible switch the power off, avoid inhaling fumes and vacate the area at once, if necessary breath through a damp cloth and stay close to the floor.
3. Use a Class C or an ABC fire extinguisher fire extinguisher
4. Report Fires to your supervisor immediately

7.0 FIRST AID AND MEDICAL CARE

7.1 First aid and medical care

7.1.1 First aid station

7.1.2 Regulation 1101 (Brief outline of Contents)

7.1.3 First aid logs/records

7.2 First aid training

7.3 Heat Exhaustion

7.4 Skin Irritants and Rashes

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
Jan. 14, 2005	Jan. 10, 2005	05	January 2006	Jennifer Carruthers, H&S

7.1 First aid and medical facilities

7.1.1 First aid station

An adequately supplied First aid station will be maintained at each workplace as per Regulation 1101 or other federal/provincial requirements, whichever requirement is greater. First aid kits, stretchers and fire extinguishers will be located in strategic locations. Any company personnel issued a McNally truck must keep one small first aid box in their truck with the supplies replenished/replaced as required.

In addition to meeting the requirements for Regulation 1101, all McNally jobsites will have the following added to their first aid stations:

- Directions/map to the nearest hospital(s)
- List of emergency contact phone numbers
- McNally accident reporting procedures poster
- 1 copy of the Green Book (Occupational Health and Safety Act and Regulations)
- WHMIS book
- Copy of the company's Policy and Procedures manual

7.1.2 Regulation 1101

Regulation 1101 outlines the first aid requirements for all construction sites. Requirements for the first aid station (as per Regulation 1101) include the following:

- a first aid box,
- a notice board displaying the WSIB poster known as Form 82
- valid first aid certificates of trained workers and
- an inspection card with spaces for recording the date of the most recent inspection of the first aid station.

The first aid station is to be maintained by a qualified first aider working in the vicinity of the station.

This regulation lists the contents required in the first aid box which is determined by the number of employees at a particular site (1-5, 5-15, 15-200 and 200+) For a list of items required in the first aid kit please refer to a copy of this regulation.

7.1.3 First aid logs/records

A separate log for first aid cases shall be maintained by the Health and Safety Co-ordinator. This log shall record all incidents, accidents, near misses, first aid accidents and critical injuries.

All workers are required to report all incidents and accidents immediately to their supervisor and the supervisor will in turn report all incidents and accidents to the Health and Safety Co-ordinator. For medical aid injuries please refer to chapter 10 in this policy entitled "Accidents".

Prior to starting a job, the local ambulance, fire department and police station should be made aware of the job.

Information regarding first aid incidents will be regularly shared with the jobsite Joint Health and Safety Committee or Safety Representative and all first aid injuries/incidents will be reviewed regularly by management as a part of the hazard identification process.

7.2 First aid training

McNally will endeavour to ensure that there is a minimum of one (1) trained first aider is present at each jobsite, office and shop at all times.

Employees with current first aid must submit a copy to the Health and Safety Co-ordinator for filing and posting. At each jobsite valid first aid certificates will be posted near the first aid box or station.

7.3 Heat Exhaustion

Symptoms of heat exhaustion include:

- Pale, clammy skin
- Rapid/weak pulse
- Complaints of weakness
- Headaches and nausea
- Sometimes cramps in abdomen or limbs.

When heat exhaustion occurs, you should:

- Move victim to a cool place, but protect from chill,
- Have victim lie down with head level with or lower than the body
- Give victim salt water to drink (one teaspoon of salt to one litre of water) if conscious
- CALL A DOCTOR.

7.4 Skin Irritants and Rashes

Due to the diversity of materials used (solvents, acides, alkalines, resins etc) it is quite possible for skin irritation to occur. The following precautions could help to limit these irritations:

- Use gloves and protective clothing to avoid skin contact where possible,
- Wash frequently with soap and water, personal hygiene is very important,
- Clean equipment on a regular basis
- Have a change of clothes to change into after work, prior to going home,
- Report all cases of skin irritations and rashes immediately to your supervisor.

8.0 ORIENTATION

8.1 Employee Orientation

8.2 Work Refusal

8.2.1 Informing Employees of their right to refuse work

8.2.2 Valid Work Refusals

8.2.3 Procedures for Work Refusals

8.3 Drug and Alcohol Program

8.4 Subcontractor Requirements

8.5 Visitors

8.6 Protection of the Public

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
April 18, 2005	June 29, 2004	06	April 2006	Jennifer Carruthers, H&S

8.1 Employee Orientation

All newly hired and newly assigned employees will attend the orientation program prior to working on the job site, in the office or in the shop. The employee orientation program will include:

1. General overview of the project including safety rules (Table 3)
2. Location of washrooms, fire extinguishers, first aid boxes, WHMIS book etc.
3. Personal Protective Equipment (Table 2)
4. Refusal to work policy and disciplinary procedures – get worker to read and sign work refusal section of the Health and Safety Policy (Section 8.2)
5. Joint Health and Safety Committee (if applicable), Tool Box Talks and site inspections
6. Procedures for Accident & Incident reporting, the company wide Back to Work policy, use of "Functional Abilities Form" (FAF) Give worker a copy of the FAFto keep in their lunch box in case of accident. Get them to sign the Back to work policy. (Section 10.2)
7. Worker/Supervisor Fines by Ministry of Labour
8. Emergency/Fire procedures and hazard reporting
9. Specialized training as required including :Confined Space, Lock out, Tag In/Out steps, Fall Arrest, Marine work – Table 7 and WHMIS
10. Zero tolerance for working under the influence of drugs and/or alcohol

8.2 Work Refusal

8.2.1 Informing Employees of their Right to Refuse Work

A worker is to be informed of their right to refuse "unsafe" work during their initial orientation. They should be given a copy of this policy at time of orientation, they should read it, sign that they understand the policy and this signed policy should be kept in their employee files in Head Office.

8.2.2 Valid Work Refusals

Should an employee feel that a particular job they are being asked to perform is unsafe they are permitted by the Occupational Health and Safety Act to refuse to perform this duty. Work refusals must be completed in accordance to the Act (Section 43 subsection 3).

A worker has the right to refuse work where there is reason to believe that any equipment, machine, device or thing the worker is to use or operate is likely to endanger himself or another worker or is in contravention with the Act; or that the physical condition of the workplace or the part thereof in which he or she works is to work is likely to endanger the individual is in contravention of the Act.

8.2.3 Procedures for Work Refusals

The procedures of a work refusal, in accordance with the Act, are:

- Worker perceives the task required is unsafe and reports this to their supervisor
- Supervisor investigates the task with the worker and one (1) of the following:
  1. Health and Safety Representative,
  2. Joint Health and Safety Committee member or
  3. Knowledgeable employee
- Until investigation is complete worker is to stay in a safe place at or near his work station
- If the supervisor feels the task is NOT safe – the situation is to be corrected. If, however, the supervisor feels the task is safe he can assign another worker to do the task if the first worker still refuses but the supervisor must inform the second employee that the first employee refused.
- If there is no one willing to complete the task and the worker has reasonable grounds to believe the work endangers health and safety, then a Ministry of Labour inspector must be called in.
- Worker may be reassigned reasonable alternative work.
- Inspector will investigate in the presence of the worker and provide a written decision.
- Employees can not be reprimanded for an legitimate work refusals

8.3 Drug & Alcohol Program

The objectives of the Company and purpose of this policy are:

1. To maintain a workplace which is completely free of the negative effects of drug/alcohol use.
2. To accommodate and assist, as appropriate, employees who are identified as having a drug/alcohol related dependency or disorder and to implement appropriate corrective disciplinary action up to and including discharge where employees violate this policy.
3. Where discharge is inappropriate, to implement corrective measures and rehabilitative services which will assist employees who have violated this policy to eventually return to work, with the Company being properly assured that the employees will in the future be completely free of the negative effects of drug/alcohol use while on duty.

The rules of this program are:

1. Information obtained under this policy will be disclosed only to those who "need to know".
2. All employees must report to work in a physical condition that will enable them to perform their duties in a safe and efficient manner free of the negative effects of drug/alcohol use. Employees who violate any provision of this policy will be subject to corrective disciplinary action up to and including discharge.
3. Employees using prescribed medication which may impair their performance of job duties (impair mental or motor functions) must immediately inform their supervisor of this. For the safety of all employees, the Company will consult with this employee and his/her physician to

determine if a reassignment of duties is necessary. The Company will attempt to accommodate the employee's needs however, if reassignment is not possible, the employee will be placed on temporary medical leave until fit for duty by the prescribing physician.

4. Employees are not to refuse testing, they must immediately report for testing as instructed and shall not take steps which can be seen as obstructing or tainting the accuracy of testing results.

5. When employees receive test results indicating a blood alcohol concentration greater than .02 shall immediately be relieved from duty. They will receive a warning and 24 hour suspension. The second time caught the individual will be again warned and be suspended until counselling has been sought. The third incident will be immediate termination of employment.

Identification and EAP Assistance

Supervisors will monitor employees and will address and report any observations that indicate that an employee is using drugs, alcohol in a manner that violates this policy. Where the Company determines that there is reasonable cause to believe that the employee is in violation of this policy, the employee shall be tested for drugs/alcohol as the next step in identifying the problematic use of drugs/alcohol.

The Company will also encourage its employees to take appropriate action to assist themselves or their fellow employees in identifying and addressing drug/alcohol use which impacts on their ability to perform their duties completely free of the negative effects of drug/alcohol use.

The Company will maintain an Employee Assistance Program (EAP) that provides counselling and rehabilitation services to assist employees in overcoming personal difficulties, including drug/alcohol use, affecting their ability to fulfill their responsibilities at work. Employees are encouraged to contact EAP on their own initiative and all such communications will be kept in strictest confidence.

8.4 Subcontractor Requirements

Prior to commencing work on a job Sub-contractor's must submit the following information to the Project Manager/Superintendent who will in turn provide a copy of this information to Head Office:

- Company Safety Policy and Program
- Current Worker's Compensation Clearance Form
- Ministry of Labours Form 1000 or Notice of Project whichever is applicable (Unless information on the form changes the Form 1000 only has to be submitted once and will cover all work a Sub-contractor completes for McNally International Inc.)
- McNally's Table 4 "Sub-Contractor/Supplier Orientation"

A representative of the subcontractor shall meet with the Workplace Superintendent to discuss plans when operations change. It should be noted that the subcontractor is to review and apply to the job any new amendments to the Occupational Health and Safety Act and regulations.

Clean up of the work site shall be in accordance with the Contract Documents and Subcontractors agreement.

8.5 Visitors

A visitor is anyone not directly employed by McNally, a sub-contractor on the job or an employee of the owner who is directly assigned to the job. Every visitor must first report to the workplace office. This applies to visits to <u>all</u> areas of the job without exception. A visitor safety orientation must be completed that includes a short safety talk identifying hazards. Visitors are required to sign the "Release from Liability Statement" Table 6 and the "Visitor Orientation" Table 5 prior to commencing visit.

All visitors must be escorted by an employee at all times. Visitors are expected to take notice of all instruction given by their sponsor and to follow all site safety rules including the use of required personal protective equipment. (Provided and trained on usage where necessary.)

Emergency procedures and meeting points are to be outlined for the visitor.

For repeat visits an assessment will be made and further instruction given to explain any variance in circumstance. The above process is waived for emergency response personnel.

No photography will be permitted by visitors unless approved by the workplace manager.

8.6 Protection of the Public

Temporary fencing and barricades shall be erected or placed to provide protection to the public and warning signs will be posted. Traffic control measures will be taken as necessary. Controllers will be trained and use required reflective vests and proper signs.

9.0 TRAINING

9.1 Safety Training Program for Employees

9.2 Training Needs Analysis

9.3 Safety Record Cards

9.4 Workplace Weekly Tool Box Talks

9.5 Supervisory Personnel Training

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
April 11, 2005	Jan. 10, 2005	04	April 2006	Jennifer Carruthers, H&S

9.1 Safety Training Program for Employees

The purpose of this program is to provide for safety and related training throughout all levels of the organization.

The Company will arrange for, and employees will participate in, all training that is necessary to minimize the loss of human and physical resources of the company.

The Safety Co-ordinator and/or the supervisory personnel will monitor training requirements on each specific project. They will ensure that employees working in potentially hazardous areas or with specialized equipment have and/or receive the necessary training and proper instruction. Also, the Safety Co-ordinator and/or the supervisory personnel will monitor the legislative training requirements (e.g. number of personnel with various types of training, types of training required, etc.) to ensure each project or location complies with all regulations.

Safety training will include, as required, but not be limited to:

- New hire safety orientations
- Job specific training
- Safety training for supervisors and management
- Task and trade-specific training and certification
- Specialized safety and related training.
- Tunnel Rescue Team
- Fire Fighting for Marine Work
- Emergency Procedures For Marine Work and sign copy of procedure. (Table 7)
- Workplace Hazardous Materials Information System and Certification of workers & management Rep.
- Transportation of Dangerous Goods Training and Certification of workers & management Rep.
- Personal Protective Equipment (PPE)
- Fire Extinguisher Training
- First aid Training
- Power Line Hazards Training
- Traffic Control
- Travel Restraint System.

When hired, the worker is required to produce all pertinent training certificates and licenses. Copies of the certificates will be made and forwarded to the Safety Co-ordinator for inclusion in the Employee Database. If the individual cannot produce a valid certificate, for a particular training listed as being received, it will not be included as part of the individual's training records.

The Safety Co-ordinator is to be informed of any new training that an employee receives and a copy of the certificate should be forwarded to head office for filing in the employees personnel file.

9.2 Training Needs Analysis

Corporate training needs analysis will be done by the Health and Safety Co-ordinator, training will be tracked in spreadsheet form. Facilitating the training needed will be done by the Safety Co-ordinator.

9.3 Safety Record Cards

McNally has a "Card" system for recording employees' safety training. Employees are provided with a Safety Record Card after they have been employed with McNally's for 1 year or more. Cards are updated on a yearly basis and provided to the employee. Employees should keep these cards in a convenient place near where they are working so that they can be easily shown to Senior Management or a Ministry of Labour inspector if requested.

9.4 Workplace Weekly Tool Box Talks

Workplace toolbox talks with the workers will be held weekly for all shifts (as applicable) at all company workplaces to discuss relevant health and safety issues. Discussions/issues detailed at the toolbox talk must be documented on Table 10 and all attending employees must sign this form. A copy of all Tool Box talks Forms (Table 10) must be submitted to Head Office with the original copy remaining on file on the jobsite.

All sub-contractors on a jobsite will be required to either hold their own weekly workplace tool box talks or attend the weekly McNally meeting. If the sub-contractor chooses to hold their own meeting this must be documented each week and a copy submitted to the on site Joint Health and Safety Committee or Health and Safety Representative (which ever is applicable).

9.5 Supervisory Personnel Training

Supervisory training personnel will be provided with all regular training in equivalent to that of their workers (i.e. fall protection, confined space etc.)

In addition to the regular training provided to McNally employees the supervisory personnel will also take part in more in depth training as required and will be provided with Due Diligence Training to aid them in understanding their role with regards to Health and Safety and the Occupational Health and Safety Act and Regulations.

Supervisory Personnel will also be required to attend a bi-annual Health and Safety Meeting which will be prepared for and conducted by the Division Vice-President, the Health and Safety Co-ordinator and other individuals as directed. In these meetings topics relevant to current projects will be introduced and discussed. Job hazards will be discussed and relevant job specific training will be conducted. At the end of each of these meetings there will be time allotted for open discussion where the attendees will be encouraged to bring up any relevant Safety issues that they have.

10.0 ACCIDENTS

10.1 Accidents and Incidents

10.1.1 Accidents

10.1.2 Critical Injuries

10.1.3 Critical Injuries and the Ministry of Labour

10.1.4 Medical Aid Injury

10.1.5 Incident/First aid Only Situation

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Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
April 7, 2005	June 29, 2004	07	April 2006	J. Carruthers (H&S)

10.1 Accidents and Incidents

10.1.1 Accidents

An *accident* is defined as an unplanned event that causes harm to people or damage to property. There are three categories of accidents. The type of accident dictates how the injury is handled. Depending on the category the accident falls into dictates how it is to be dealt with. The categories are as follows:

1. Critical Injury
2. Medical Aid
3. Non-medical Aid (Incident)

The employer and the supervisor have a legal obligation to take reasonable precautions for the protection of the workers. The employer also has an obligation to notify the right parties and investigate the accident.

For all injuries the most qualified person around should do the following:

1. Assess the situation, take charge
2. The injured worker's needs come first, arrange transport to medical facility if required
3. Call Emergency Services, Management, Ministry of Labour, Canadian Coast Guard and Safety Representative as required. If emergency vehicles are called, guide vehicles when they arrive
4. See additional steps below for critical injury.
5. Send WSIB "Functional Abilities Form" with employee to the hospital or doctor. Remind employee of our back to work policy.

10.1.2 Critical Injuries

Definition

The Occupational Health and Safety Act (OSHA) Regulation 834 defines a Critical Injury as "An injury of a serious nature that,

- Places life in jeopardy;
- Produces unconsciousness;
- Results in substantial loss of blood;
- Involves the fracture of a leg or arm but not a finger or toe;
- Involves the amputation of a leg, arm, hand or foot but not a finger or toe;
- Consists of burns to a major portion of the body; or
- Causes the loss of sight in an eye."

Critical Injury Steps

1. **Secure and Manage the Accident Scene.** Investigation begins after the injured worker(s) has received medical attention and the accident scene is safe. The scene must be secured to ensure that no evidence is either removed or disturbed. The only exceptions to this are:
   - for the purpose of saving life or relieving human suffering,
   - maintaining an essential public utility service or public transportation system; or
   - preventing unnecessary damage to equipment or other property.
2. **Notify the Appropriate People**

In the event of a critical injury the following people are to be advised immediately:

- Superintendent/Foreman on duty who in turn should contact his Superior
- McNally Health and Safety Co-ordinator
- Ministry of Labour
- Canadian Coast Guard (only if accident occurred on water)
- Emergency Personnel
- Joint Health and Safety Committee Worker's Rep.

3. **Allow Safety Rep.(s) to do Investigation** and Complete Report (Table 8 – Accident/ Incident/ First aid Investigation Report")

10.1.3 Critical Injury and the Ministry of Labour (MOL)

The following is the company policy to be used when dealing with the MOL after a critical injury.

1. The MOL is to be phoned immediately. A written report will be submitted within 48 hours.
2. Secure the scene until MOL advised otherwise.
3. Prior to answering any questions or being interviewed by the MOL ask for the following *in writing*: Written assurance that no charges will be laid against the company or any individual including you prior to consulting legal advice. If this written assurance will not be given, you should immediately notify your supervisor for assistance before answering any questions.
4. The MOL has the power to lay criminal charges therefore you have the same rights as when being questioned by the police. All reports for accidents involving a critical injury or fatality must be reviewed by Head Office prior to submission. Always remember to be polite and respectful of the Ministry of Labour representative at all times.
5. The MOL inspector has the right to remove any evidence that is in *plain view* and in contravention to the Occupational Health and Safety Act and regulations. When they take *anything* from your site you must be given a receipt.

10.1.4 Medical Aid Injury

Definition

A medical Aid situation is any injury that requires attention of a health care professional.

Medical Aid Procedures

1. Employee reports incident to supervisor
2. Supervisor documents report in daily diary, pursues the immediate possibility of Light Duties. (See Back to Work/ Duties Policy Section 1.11)
3. Immediately after noting incident in personal diary the supervisor fills out Table 8 and forwards Table to the Safety Co-ordinator.
4. The Safety Coordinator will use the Table 8 to complete the WSIB Form 7. This form can only be signed by the President, Secretary-Treasurer or a Vice-President.
5. If a person has a sudden illness/injury (i.e. /heart attack, stroke, seizure, appendicitis, loss of consciousness etc) that occurs at the workplace, emergency medical aid is to be obtained. The incident with details on what happened is to be recorded in the foreman's journal and the Health and Safety Co-ordinator is to be contacted immediately.

10.1.5 Incident (First aid only)

Definition

An Incident is any situation that does not require immediate attention from a health care professional. This also includes any complaint that an individual may have due to a work related task (i.e. / back pain due to a slip or from lifting an item).

Incident Procedures

1. Employee reports incident or complaint to the supervisor
2. Supervisor documents this report in daily diary
3. When talking to the employee about the complaint or injury, the foreman must discuss our company "Back to Work Policy" and stress that should medical attention be sought concerning this issue that we require a Functional Abilities Form to be filled out by the doctor. (Foreman should make sure the employee has a form)
4. Supervisor is then to contact the Safety Coordinator with details of the report.

10.2 Back to Work/Light Duty Policy

McNally will make every reasonable effort to rehabilitate and maintain the injured worker's income by providing an alternate comparable job, or suitable employment. An injured employee will be offered Light Duty work according to his/her abilities until the employee is completely capable to perform his/her original duties.

10.2.1 Program Principles

1. Effective management of a worker's rehabilitation through a knowledgeable co-operative approach.
2. Ensure that a worker receives prompt, effective, timely access to services required to enhance and facilitate their rehabilitation.
3. Employees must be continually reminded of our back to work program. If they have an injury we will arrange for Light Duty work using their doctor's guidelines as listed on the Functional Abilities.

4. Each supervisor will be responsible for accommodating the employee who is unable to perform his/her regular duties.
5. Where a supervisor is unable to provide suitable work, an attempt will be made to place the employee within some other division of the company. (Contact Safety Coordinator)

10.2.2 Functional Abilities Form

As part of the workplace return to work Policy and Program, the "Functional Abilities Form # 2647A" published by the WSIB will be used along with a cover letter from the company. Employees must be instructed of the company wide back to work policy during Employee Orientation. These forms must be kept readily available at all workplaces. Employees must be aware of these forms and the need to have them completed should they seek medical attention for a work related injury.

10.2.3 McNally Injured at Work Poster

Management at McNally has created an "Injured at work" poster (See Table 20). This poster was created to give an extra reminder of our back to work policy. It is expected that these posters will be posted around the workplace in several prominent locations. These forms can be obtained from the Safety Co-ordinator at head office. A few copies will be included in the Supervisors – job set up kit as well.

10.2.4 Absences while on Light Duty Work

Injury Related Absences

Employees performing light duty tasks will be excused from work for doctors appointments related to the injury. Employees will be paid full wages for the time missed due to these doctors appointments. It is expected that employees will inform the supervisor in advance of such appointments.

Where graduated hours are required as a part of the light duty McNally will pay a full days wages as long as the worker attends work for the required graduated hours.

Non-injury Related Absences

Once the injured worker has accepted Light Duty work it is their responsibility to attend work as outlined in the Light Duty agreement. Should the employee be sick or require to be absent for a reason that is non-injury related they must notify their immediate supervisor. Whatever rules were utilized for absences prior to the workers injury will be applicable for absences while on light duty work unless other arrangements have been made. Head Office will need a letter from the employee indicating that their absence was NOT injury related.

Should an employee sign a Light Duty offer indicating that he/she agrees to the terms of the offer and then misses three (3) days of work without notifying the supervisor and following the above procedures, McNally will take these absences as notification that the employee has quit our employment. The Record of Employment will be completed indicating the employee has quit.

11.0 INSPECTIONS AND HAZARD ASSESSMENTS

11.1 Job Hazard Analysis

11.1.1 Steps in Conducting a Job Hazard Analysis

11.2 Weekly Supervisory Inspections

11.3 Monthly Safety Inspections

11.2.1 McNally Inspection Requirements

11.2.2 Posting/Copies

11.2.3 Procedures for Conducting a Site Inspection

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
March 01, 2005	Feb 25/04	04	March 2006	Jennifer Carruthers (H&S)

11.1 Job Hazard Analysis

The purpose of a Job Hazard Analysis is to identify, in each step of operations, hazards or potential causes of accidents and to develop solutions to eliminate, if possible, or control the identified hazards.

McNally Construction will conduct a Hazard Assessment of all work sites prior to starting work. This assessment will be completed by the Safety Co-ordinator and job Superintendent or Project Manager. The methods to address the identified hazards will be reviewed with all those employees affected by the hazard.

Tables 14 and 15 will be used for completing the Pre-job Hazard Assessment and Table 15 will be used for completing monthly inspections by the Safety Co-ordinator. The Safety Co-ordinator's inspections do not replace job site inspections in any way.

11.1.1 Steps in Conducting a Pre-Job Hazard Analysis

1. Define the job to be analyzed
2. Break the job into steps
3. Identify hazards or potential accidents
4. Identify high risk workers and tasks
5. Develop solutions
6. Establish a plan to implement solutions, train and educate workers as necessary

Suggested sources of information on potential hazards are:

1. Reported industry accidents
2. Near miss data
3. Compliance and legislative requirements
4. Behavioural based observations of work
5. Suggestions from the Joint Health and Safety Committee, the Health and Safety Representative and/or the Worker Trades Committee

Methods of Conducting a Job Hazard Analysis are Discussion, Observation and Reviewing past work experience.

11.2 Weekly Supervisory Inspections

The OHSA Construction Regulations in section 14 subsections (3) and (4) requires that a weekly inspection be completed by the project supervisor or a competent individual that is appointed for this task by the supervisor. This inspection is to include: "all machinery and equipment, including fire extinguishing equipment, magazines, electrical installations, communication systems, sanitation and medical facilities, buildings and other structures, temporary supports and means of access and egress at the project to ensure that they do not endanger any worker."

Table 12: "Supervisor's Weekly Jobsite Inspection Checklist" is provided to aid this weekly jobsite walk around and is a good tool for showing the supervisor's Due Diligence on site. Copies of this report should be kept on the jobsite and sent to the Safety Co-ordinator for filing with the project records in Head Office.

11.3 Monthly Safety Inspections

The OHSA Construction Regulations require that a monthly inspection be completed on each jobsite by the Health and Safety Representative or Joint Health and Safety Committee. (Section 8(6))

11.3.1 McNally Inspection Requirements

Monthly workplace safety inspections will be completed at all McNally workplaces using Table 11.

Site inspections are to be completed by a minimum of two employees. These people should be either two members of JHSC (one worker and one supervisor) or the H&S Representative with a supervisor. If absolutely necessary competent substitutions can be made for these inspections.

All occupational health and safety concerns raised during the physical inspection will be recorded on the inspection reports and sent monthly to the Health and Safety Co-ordinator.

11.3.2 Posting/Copies

This site inspection is to be photocopied and posted/distributed as follows:

- The original is to be filed on site
- One copy is to be posted in a prominent location
- One copy is to be sent to the Safety Co-ordinator for filing and inclusion in the Monthly Management Meetings
- A copy should be given to each member of the Joint Health and Safety Committee (if applicable) and any person who needs follow-up on a concern raised by this inspection

Concerns raised during this inspection that require prompt action must be addressed and acted upon immediately.

11.3.3 Procedures for Conducting a Site Inspection

1. Review previous inspection records and note any previous reported hazards.
2. Familiarize yourself with the type of workplace and unique hazards
3. Use all of your physical senses (sight, hearing, smell etc) to identify actual or potential problems.
4. Use the tables provided to make comments and check off the various areas you inspect.
5. When unsafe conditions are noted requiring immediate attention, correct the situation immediately.

6. Look for basic causes of sub-standard conditions, practices and procedures.
7. Distribute copies as detailed above.
8. Review items at the Joint Health and Safety Committee meetings, Workers Trade Committee meetings, Management Health and Safety Meetings and Tool Box Safety Talks.
9. Remember that these inspections are supposed to be a helpful tool in identify and rectifying existing and potential hazardous situations.

12.0 HEALTH AND SAFETY REPRESENTATIVES

Information on Health and Safety Representatives can be located in the Construction Occupational Health and Safety Act in Section 8. The Policy below is in accordance with the Act.

12.1 When is a Representative Required?

12.2 Selection of the Health and Safety Representative

12.3 Health and Safety Representative Rights and Responsibilities

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 31, 2005	Jan. 12, 2004	03	May 2006	Jennifer Carruthers (H&S)

12.1 When is a Representative Required?

A Health and Safety representative is required at any site where the typical number of employees at that site will be between 5-19 people and for construction projects the job will last more than 3 months.

12.2 Selection of the Health and Safety Representative

The representative will be a worker who is working at the site and does not exercise managerial functions. This worker is to be chosen by the other workers at the site. In a safety tool box meeting, employees will nominate their representatives and a small vote will take place by each worker writing on a piece of paper their choice for representative. The Foremen will privately review the ballots and inform the group who their representative will be. Should the chosen individual prefer not to be the representative, the second in line will take the position. The Foremen will destroy the ballots and inform head office who the Representative will be for that site. The Health and Safety Co-ordinator will contact the Representative to discuss duties and responsibilities and any training necessary.

12.3 Health and Safety Representative Rights and Responsibilities

The following are the rights and responsibilities for Health and Safety Representatives:

1. Obtain information from a constructor or employer regarding the testing of equipment, materials and/or chemicals in the workplace.
2. Inspect the workplace at least once a month.
3. Ask for and obtain information regarding existing or potential hazards at the workplace.
4. Make health and safety recommendations to a constructor or employer regarding existing and or potential hazards on site.
5. Investigate accidents as required.

13.0 JOINT HEALTH AND SAFETY COMMITTEES

Every Office/Shop and Job Site is to have either a Joint Health and Safety Committee or a Health and Safety Representative as required by the Occupational Health and Safety Act and applicable regulations.

13.1 Requirements for Offices and Shops

13.2 Joint Health and Safety Committee Composition for Offices and Shops

13.3 Health and Safety Representatives for Offices and Shops

13.4 Joint Health and Safety Committees for Job Sites

13.5 Health and Safety Representatives for Job Sites

13.6 Joint Health and Safety Committee Rights and Responsibilities

13.7 Worker Trades Committee

13.7.1 Worker Trades Committee Responsibilities

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
Jan. 10, 2005	Feb. 24, 2004	05	January 2006	Jennifer Carruthers (H&S)

13.1 Requirements for Offices and Shops

McNally's offices and shops are governed by the Industrial Regulations. Under these regulations a Joint Health and Safety Committee is required on a site where there are twenty (20) or more workers employed. A Health and Safety Representative is required (in place of a Joint Health and Safety Committee) where there are more than five (5) workers employed but less than twenty (20) workers.

13.2 Joint Health and Safety Committee Composition for Offices and Shops

This committee must consist of at least two persons for a workplace where fewer than fifty workers are regularly employed and at least four persons for a workplace where greater than fifty workers are regularly employed. At least half of this committee must be workers employed at the workplace who do not exercise managerial functions. The worker representative(s) must be elected by fellow workers and the management representative is to be chosen by the employer. At least one worker representative and one management representative are to be certified. (OHSA Sec. 9)

13.3 Health and Safety Representative for Offices and Shops

The Health and Safety Representative must be elected by the workers and be an employee that does not exercise any managerial functions. (OHSA Sec. 8) See Chapter 12 "Health and Safety Representatives" in this Safety Program for additional information.

13.4 Joint Health and Safety Committees for Job Sites

Where there are 20-49 workers and the job will last for 3 months or longer a Joint Health and Safety Committee must be established for a project. This committee must consist of a minimum of two (2) members with at least one non-management worker at the project and one management representative (from the worksite if possible).

Where the project has 50 workers or more and the project is to last longer than 3 months there must be a minimum of four (4) members on this committee. Half of the committee must be non-management workers from the workplace with at least one member being certified. Half of the committee is to be management representatives from the project if possible and at least one of these members must be certified.

13.5 Health and Safety Representatives for Job Sites

For jobs that have less than 5 employees no health and safety representative will be required on site. This location will be covered by the nearest Office/Shop location. When a job has 6-19 workers and will last more than 3 months, a Health and Safety Representative is required on the Job Site. For additional information on Health and Safety Representatives please refer to chapter 12 in this Safety Program.

13.6 Joint Health & Safety Committee (JHSC) Rights and Responsibilities

Joint Health and Safety Committees are the prime party to ensure the workers right to participate, right to know, and the right to refuse unsafe work are being met. They are instrumental in identifying and eliminating hazards in the workplace.

Through the course of performing JHSC duties members may be privy to confidential company and employee information. It is a legal responsibility that members of the JHSC keep this information private.

Meetings of the Joint Health and Safety Committee must be held at least every three (3) months or more frequently if deemed necessary. For projects located in the province of Nova Scotia these meetings must be held once every month for the duration of the project. Meetings will be held during normal working hours and minutes received from contractors' and subcontractors' safety meetings shall be discussed. Minutes of all regular meetings and special meetings shall be recorded

One copy of the minutes shall be kept on file with the committee and one copy shall be posted in the work place. The names of the committee members will also be posted in a prominent location at the work place (typically in the project office head office, shop and in the warehouse or lunchroom area).

The employer and worker members of a committee shall elect a co-chairman from their respective groups. The Term of position for each person on the Committee will be for the duration of employment at McNally's unless management or the Committee Member feels that this position is no longer serving the benefit of the Committee and/or the company in general.

Duties of the Joint Health and Safety Committee will include the following:

1. Identify aspects of the workplace that may be unhealthy or unsafe;
2. Make recommendations to principal contractors, employers, workers, self-employed persons and the Director or an officer for the enforcement of standards to protect the health, safety and welfare of workers at the workplace;
3. Receive complaints from workers as to their concerns about the health and safety of the workplace and their welfare;
4. Establish and promote health and safety educational programs for workers;
5. Maintain records as to the receipt and disposition of complaints received from workers;
6. Co-operate with the Director or an officer who is exercising his duties under the Act.
7. Obtain information from a constructor or employer regarding the testing of equipment, materials and/or chemicals in the workplace,
8. Ask for or obtain information regarding existing or potential hazards at the workplace
9. Establish a Worker Trades Committee (if required)
10. Investigate Accidents and Incidents
11. Complete regular monthly site inspections and insure follow-up on hazards identified
12. Rights and Responsibilities of the Certified Members of the Joint Health and Safety Committee will be as outlined in the Occupational Health and Safety Act.

13. At all Committee meetings a minimum of (51%) of the members must be present and for all decisions all members present must agree. The number of management members can not be higher than the number of worker members on the committee.

14. A meeting agenda must be prepared by the committee chairperson a minimum of two (2) days prior to the meeting and distributed to each member for review, the agenda must be agreed upon by all members prior to the meeting commencing.

15. Items unresolved by the Joint Committee after two (2) regular schedule meetings will be referred to a committee of Senior Management appointed by the employer and the committee chairperson(s) to attempt to resolve the outstanding issue. A written response will be given to the Committee prior to the next scheduled meeting.

13.7 Worker Trades Committee

When a project has fifty (50) or more workers and is expected to last three (3) months or longer the Joint Health and Safety Committee for that project are required to create a "Worker Trades Committee". This committee must have at least one (1) worker representative from each trade.

13.7.1 Worker Trades Committee Responsibilities

The Worker Trades Committee is required to advise the joint health and safety committee of the health and safety concerns of the workers in the trades at the workplace.

14.0 HAZARDOUS MATERIALS AND WASTE

14.1 Hazardous Materials and Waste

14.1.1 Storage of Hazardous Materials

14.1.2 Waste/Disposal

14.2 WHMIS

14.2.1 What is WHMIS?

14.2.2 Training

14.2.3 Location of WHMIS information

14.2.4 Responsibilities

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
April 7, 2005	June 7, 2004	04	April 2006	Jennifer Carruthers (H&S)

14.1 Hazardous Materials and Waste

In keeping with OHSA McNally's will keep and maintain records of the handling, use and disposal of all chemical materials. Training on the handling, use and storage of these materials will be a part of the WHMIS program. The WHMIS program is explained in detail further in this chapter.

Prior to the start of any construction project it will be determined whether or not any designated substances will be utilized on that particular job and a list will be created if there are some to be used. In depth training of employees will take place prior to the handling and use of this designated substance.

14.1.1 Storage of hazardous materials

A site plan will be made of every yard and jobsite with the locations of hazardous materials clearly identified. The storage methods will follow Regulation guidelines. Storage areas will be maintained and double checked by the Safety Rep. or committee on their monthly walk around inspections.

14.1.2 Waste/Disposal

Law abiding disposal methods will be used to dispose of chemical waste material. A certified chemical waste company will be utilized for the disposal of liquid chemical waste.

14.2 WHMIS

More detailed information on WHMIS and the handling and storage of hazardous materials can be located in the Construction Occupational Health and Safety Act in Sections 36-42. The policy as outlined below is in accordance with the Act.

14.2.1 What is WHMIS?

Workplace Hazardous Materials Information Systems (WHMIS) is a material labelling system that addresses the worker's "Right to know".

WHMIS is a Canada-wide system designed to protect the health and safety of working Canadians through the provisions of information about the hazardous materials they work with on the job.

The Ontario Health and Safety Act requires that every worker receive WHMIS training. It will be the responsibility of the company to ensure that each worker has job specific WHMIS training.

The company shall make available hazard information on controlled products received from suppliers concerning the use, storage and handling of these products and inform workers at Tool Box Talks.

14.2.2 Training

The company will ensure that the worker has received WHMIS training as soon as practical which includes:

- Education in the content, purpose and significance of information on labels and Material Safety Data Sheets (MSDS).
- Education in the use of types of identification.
- Training in the procedures for the safe storage, handling, use and disposal of controlled products.
- Training in emergency procedures involving controlled products.

The joint health and safety committee or the health and safety representative may be consulted during the development, implementation and review of the job specific WHMIS training program. The company will ensure, as far as reasonably practical, that this WHMIS training program results in the worker being able to apply the information as needed.

14.2.3 Location of WHMIS Information

The location of the WHMIS book containing the Material Safety Data Sheets will be in the First aid Room when there is such a room on site or close by the primary first aid box at each location.

14.2.4 Responsibilities

The Company

Responsibilities for the company will include:

- All controlled products in containers have supplier labels.
- Workplace labels are provided.
- Material Safety Data Sheet (MSDS) are readily available in the workplace.
- A current MSDS is obtained on or before the date of the first shipment of every controlled product.
- The MSDS are kept updated, every 3 years.

The Worker

Responsibilities for the Worker will include:

- Learn the information on controlled products which the employer is required to provide.
- Inform the employer when information about a controlled product is not adequate to ensure the worker's health and safety.

*Both the Company and workers are responsible to work together to ensure that no product that requires a Material Safety Data Sheet is permitted on the site unless the MSDS is readily available.

15.0 TABLES PACKAGE

Date of this Update	Supersedes	Revision #	Next Review	Update Authorized By:
May 27, 2005	June 29, 2004	04	May 2006	J. Carruthers (H&S)

Health & Safety Program

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Dufferin Construction Company

June 2005

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FORWARD

Safety is a key concern in all operations conducted by Dufferin Construction Company. No employee is required to perform a task that he or she considers unsafe, nor is any employee to knowingly commit an unsafe act. If you are in doubt as to the safety of a given task, discuss it with your management or with the Health & Safety Department before performing the task.

Dufferin Construction Company's objective is to maximize safety by reducing risks. An optimum safe work environment can be achieved most effectively by early identification and understanding of safety issues; close interaction among managers, employees, and safety specialists; and adherence to the policy, requirements, and guidance in this Manual.

To ensure that the risks of Dufferin Construction activities are held to an acceptable level, employees must

- Understand the tasks they perform.
- Recognize and analyze the hazards.
- Develop and implement safety controls.
- Do work safely.
- Periodically assess and improve the performance of controls.

This Manual provides the policy and guidance necessary to meet these requirements.

As Dufferin Construction moves into new areas to meet national and global challenges, it must always be alert to new safety hazards that will be generated. New problem areas can be anticipated and eliminated only by careful work planning. There can be no substitute for complete understanding, clear thinking, careful preparation, and responsible action during the conduct of our activities. Our success is measured by our accomplishments. These must include the safety of every Dufferin Construction Company operation along with our operational results.

Jim LaFontaine B.Tech., CRSP
Health, Safety and Environment Manager

HEALTH & SAFETY RESPONSIBILITIES

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1.0 Introduction
2.0 Health & Safety Responsibilities

- **Appendix A** ***"Dufferin Construction Company - Health and Safety Policy"***

1.0 INTRODUCTION

This chapter identifies health and safety responsibilities of employees and all levels of management of Dufferin Construction Company (DCC). It also outlines the responsibilities and functions of Health & Safety Departmental personnel and describes their interactions with regulatory agencies.

1.1 Health & Safety Objectives

To implement health & safety policies, DCC has established the following objectives:

- Define health & safety responsibilities for all employees.
- Provide safe workplaces.
- Conduct work in a safe manner.
- Develop and maintain manuals to implement health & safety regulations.
- Interact with the general public with openness and integrity.
- Maintain effective internal oversight and cooperate with external oversight agencies.
- Hold managers and staff accountable for the implementation of health & safety policies.

2.0 HEALTH & SAFETY RESPONSIBILITIES

It is the responsibility of each employee to perform work safely and in accordance with the company's health & safety policy (Appendix A). Employees are accountable for their own safety and the safety of others who could be impacted by their activities. Certain personnel have specific responsibilities for carrying out health & safety -related activities. Employees who perform management functions have increased health & safety obligations. Managers may delegate health & safety authority to others; however, the accountability for health & safety performance and assurance is not transferable.

2.1 EMPLOYEES

All employees are responsible for:

- Knowing and understanding the health & safety requirements of their assignments and the potential hazards in the work area.
- Participating in all required training, personnel assurance (see Supplements 1.14 and 1.15), and health monitoring programs.
- Performing work assignments in full compliance with applicable health & safety requirements defined in manuals, guidelines, and established safety procedures.
- Immediately correcting or informing the responsible manager of any health & safety -related problems.
- Warning fellow employees and visitors of hazards and defective equipment.
- Knowing emergency plans and procedures for the work area.
- Request that work be stopped if they observe others performing an operation (or are in a situation) that is perceived to be imminently dangerous to health, safety, or the environment.
- Reporting all work-related injuries and illnesses to their supervisor.

To ensure compliance with these requirements, employees should consult their supervisors for guidance as necessary.

HEALTH & SAFETY RESPONSIBILITIES

2.2 SUPERVISORS

As it relates to health & safety, the term "supervisor" means anyone (e.g., Manager, Superintendent, Field Engineer and Foreman) who directs or supervises, operations, activities, or personnel.

Supervisors are responsible where applicable and to the extent of their authority for:

- Knowing the company's health & safety policies, and making sure applicable health & safety laws and regulations are appropriately implemented within their areas of responsibility.
- Understanding applicable health & safety responsibilities.
- Informing employees of all health and safety hazards and requirements in workplaces they manage, and providing training on how to work with identified hazards.
- Performing a health & safety evaluation when planning a new project activity or changing an existing one (see Chapter 2 for details).
- Making sure employees have the necessary hardware (equipment, materials, and facilities) to carry out specified tasks.
- Are trained, qualified, and fit for duty.
- Report all work-related injuries and illnesses.
- Ensuring employees' job descriptions reflect the work requirements.
- Training and certification records are maintained for all employees.
- Safety procedures, work procedures, maintenance plans, material safety data sheets (MSDSs), and permits are prepared or obtained prior to starting an activity.
- "Project Specific Safety Plans" and emergency response procedures are prepared for projects, operations and facilities assigned.
- Providing an adequate level of supervision to visitors, guests and vendors who perform health & safety - related activities.
- Implementing a self-assessment program in accordance with their General Manager's plans and procedures, and seeing that the necessary corrective actions are carried out.
- Notifying the cognizant senior manager of occurrences and incidents in accordance with notification and reporting requirements, and taking appropriate action to correct the situation and prevent a recurrence.

2.3 HEALTH & SAFETY MANAGEMENT

Health and Safety Management is responsible for:

- Assisting the General Manager by overseeing health & safety for all business, administrative, and operational activities.
- Verifying the satisfactory achievement of performance measurement goals.
- Approving Divisional health & safety policies.
- Assuring that health & safety concerns and priorities are communicated as a core value in interactions with government, management, and individual employees.
- Managing or coordinating DCC's responses to any audits related to the Workplace Safety and Insurance Board or Corporate insurance programs.
- Providing technical support and consultation to DCC personnel.
- Critically and independently performing health & safety surveillance of planned and ongoing operations, facilities, equipment, and procedures; and recommending corrective actions to the cognizant management. In critical situations, the Health & Safety Manager

will request that management suspend operations until the problems are resolved.

- Bringing to the attention any concerns that have not been satisfactorily resolved by line management.
- Providing health & safety support during emergencies.
- Assisting line personnel in identifying and analyzing health and safety hazards and environmental compliance in their operations.
- Advising line personnel of appropriate controls to eliminate or minimize identified hazards and concerns and of applicable health & safety codes, standards, regulations, and orders in a manner consistent with policy.
- Assisting line personnel in meeting mandatory requirements.
- Monitoring the work environment to ensure compliance with the requirements outlined the Divisional Loss Control Manual, Environmental Compliance Manual, and environmental guidelines; and applicable safety procedures, codes, standards, regulations, and orders. (The teams will advise management on noncompliances.)
- Taking appropriate steps to ensure that any activity that presents an imminent, uncontrolled high-risk threat to human health, safety, and the environment is immediately stopped.
- Providing guidance to line management in the development and review of safety-related procedures and documents.
- Conducting independent accident and incident evaluations and assisting management in formal incident analyses.

2.4 GENERAL MANAGER

The General Manager is responsible for

- Making the environment, safety, and health a priority.
- Making sure that implementation and the overall effectiveness of the Divisional Loss Control Program comply with applicable health & safety laws and regulations.
- Fostering open communication health & safety matters with DCC personnel, the public, and external agencies.
- The General Manager may delegate health & safety authority to senior managers, and other DCC employees.

2.5 CONTRACTORS

Contractors are not relieved of any legal obligations with regard to health & safety. Contractors may augment DCC's health & safety policies with those of their company, but must follow DCC's policies as a minimum.

2.6 CONSTRUCTION SUBCONTRACTORS

All construction subcontracts shall contain the requirements and guidance necessary to extend DCC's health & safety policy to subcontractors. Before any contract or purchase order can be issued, DCC Contract Administration must:

- Have the Health & Safety Department evaluate the potential for injury or damage that may result from the subcontractor's operation.
- Inform the subcontractor, through the appropriate contract administrator, of any unique hazards of the work environment and any special protective measures specified by DCC that is required for work.
- Include in the contract or purchase order a reference to DCC's prescribed safety standards and applicable requirements.
- Additional requirements for construction subcontractors performing work for DCC can be found in Chapter 14 of this Manual.

Appendix A

DUFFERIN CONSTRUCTION COMPANY
HEALTH AND SAFETY POLICY

Dufferin Construction Company is committed to the protection from accidental injury and loss to its employees and property.

In fulfilling this commitment, we will provide and maintain a safe work environment and we will strive to eliminate hazards which may result in injury and property damage.

Accidental injury and loss can be controlled through good management in combination with active employee involvement.

Supervision and Management will take all necessary action to eliminate or control hazardous working conditions and work in compliance with laws pertaining to occupational health and safety.

All employees are responsible for their own personal safety and that of their co-workers. They are expected to use the safest work methods to carry out their job and point out sources of danger and suggest means to remedy them.

I trust that each of you will join me in a personal commitment to enforce this Health and Safety Policy as a way of life.

January 1, 2005

Lloyd Ferguson
General Manager

HEALTH, SAFETY AND ENVIRONMENT DEPARTMENT

Objective

The objective of the Department is to provide support in all aspects of health and safety relating to field and administrative operations. The Department is committed, in support of Dufferin Construction, to ensuring the health and well being of the public, the environment and all Dufferin's employees, subcontractors and suppliers.

Health, Safety and Environment Manager

The Health, Safety and Environment Department is managed by Jim LaFontaine, B.Tech.,CRSP. A copy of Mr. LaFontaine's CV and a job description summary of the Health, Safety and Environment Manager is included in **Appendix 2**. Mr. LaFontaine is responsible for the management of divisional health and safety departmental personnel; and to ensure the effective implementation of processes, programs, policies, people development and team integration with respect to health and safety.

Mr. LaFontaine has been instrumental in developing and implementing health and safety processes, programs, policies, procedures, and training packages for Dufferin Construction. He is continually updating such programs, policies, procedures, and training packages commensurate with changes in industry practices, Regulations, and laws.

Mr. LaFontaine is an active and respected member of numerous Associations and Labour-Management boards and committees for the province of Ontario. Mr. LaFontaine has been successful in initiating positive health and safety changes in the construction sector.

Health, Safety and Environment Coordinator

The position of Health, Safety and Environment Coordinator is held by Scott Winger. A copy of Mr. Winger's CV, job description and a summary of the job responsibilities of the Health, Safety and Environment Coordinator is included in **Appendix 2**. Mr. Winger was reassigned to Dufferin Construction in June of 2004 after managing HR and Safety for St. Lawrence Cement's Cayuga Construction and Materials Division for the past 12 years.

Safety Advisor(s)

The Safety Advisor program has been in effect at Dufferin Construction, since 1991. This one year rotating program immerses a Project Engineer from the Operations Department in all aspects of health and safety. At the end of the program, the Project Engineer returns to field operations with acquired skills in health and safety laws and regulations, how to manage and conduct work in a safe and productive manner, and develop and implement a health and safety program. The job description is included in **Appendix 2**. Mr. LaFontaine manages the activities of each Safety Advisor.

Claims Management & Administration

The Health, Safety and Environment Department is responsible for claims management and Workplace Safety & Insurance Board reporting and administration. Mrs. Denise Roach has been in the position of Safety and Claims Administrator since 1994.

SAFETY PROGRAM AND PLANNING ELEMENTS

Pre-Job Planning:

Prior to commencing a project, Dufferin management, the project team, and the Health and Safety Department personnel conduct a pre-job planning session. The pre-job planning meeting is intended to increase the communication between departments within Dufferin Construction. The meeting allows for the formal assignment of tasks required to start a project with the highest level of understanding and efficiency as possible for the members involved.

With regards to health and safety, the pre-job planning meeting identifies potential safety hazards, special requirements for compliance to regulations and training requirements for site personnel. From the meeting, a plan to mitigating risk and exposure to hazards is initiated.

Project Health and Safety Audits and Assessments

The Health Safety Department conducts two types of project health and safety audits; informal project safety assessment and formal project safety assessment.

Formal Project Safety Assessments:

Formal Project Safety Assessments are conducted by Health & Safety Department personnel. A copy of the Formal Assessment Evaluation Form is located in **Appendix 3.** The formal assessment is a tool used to measure the performance of the Project Superintendent with respect to health and safety. The Superintendent's projects are evaluated with regards to compliance to Dufferin Policy and legislated regulations. The scores given on the Formal Assessment are calculated with consideration for risk and complexity factors to objectively evaluate Superintendents with respect to each other regardless of job market.

Informal Project Safety Assessments (IPSA):

Informal Project Safety Assessments are conducted by Health & Safety Department personnel. The objective of the informal assessment is to review the project activities for compliance to Dufferin Construction policy and/or regulations. Records are kept on the number of employees working on site, the activities being undertaken, and any issues regarding health and safety that need to be addressed with site management on the particular day of the assessment. A copy of the IPSA report is included in **Appendix 3**. Informal project safety assessments are scheduled on a monthly basis within the Department and cover the entire range of projects Dufferin Construction is contracted to. Informal assessments are scheduled more frequently depending on the complexity and duration of the project.

New Employee Orientation

The Superintendent of a Project is responsible to orient all new and reassigned workers with Dufferin Project personnel, safety issues, health issues and accident response and reporting procedures. It is imperative that all workers understand Dufferin Policies, the worker's responsibilities regarding health and safety and that Dufferin Construction is committed to their well being. A copy of the New Employee Orientation Review Sheet and Policy is included in **Appendix 4.**

Employee Health and Safety Policy and Reference Manual

As a part of the New Employee Orientation, the worker receives a Dufferin Construction Company Employee Health and Safety Policy and Reference Manual. The document is included in **Appendix 4**. The policy is written in various languages to increase understanding among employees of which English is a second language. The document outlines Dufferin's health and safety policies and procedures as well as worker rights and responsibilities with respect to the Occupational Health and Safety Act.

Health and Safety Policy and Reference Manual for Subcontractors

Included in **Appendix 4** is the Health and Safety Policy and Reference Manual for Subcontractors. This document is included with all subcontract agreement forms sent out by Dufferin Construction. The manual is included in **Appendix 4**. The Manual is an extensive and comprehensive document covering all aspects of Dufferin Construction policies and other pertinent information respecting the Occupational Health and Safety Act and applicable Regulations.

Subcontractor Health and Safety Compliance Checklist

Prior to having a subcontractor commence work, the Project Superintendent schedules a meeting with the subcontractor to complete a Subcontractor Health and Safety Compliance Checklist. The checklist is included in **Appendix 4**. This checklist is site specific and identifies the subcontractor's supervisory personnel, health and safety representatives, contact numbers, the subcontractor's knowledge of health and safety regulations and laws, and programs and policies it has in place. From this checklist, Dufferin Construction can implement action to ensure the subcontractor works within industry accepted standards and in compliance to the Occupational Health and Safety Act and applicable Regulations.

Tailgate Safety Meetings

Included in **Appendix 5** is a copy of Dufferin Construction's Policy on Weekly Tailgate Training Sessions. The Tailgate training sessions are conducted weekly by the various Foremen on site under the supervision of the Project Superintendent. The foremen conducts the session with his/her own crew and the topic relates to work the specific crew undertakes. A copy of the topic titles of all Dufferin Tailgate sessions is included in **Appendix 5**. All subcontractors with work having a duration of more than one week must also participate in the Tailgate program as included in the Subcontractor Health and Safety Manual. Tailgate training is not intended to replace formal training programs or take the place of proper work practices. An overview of the Policy and the objectives of the sessions is included in **Appendix 5**.

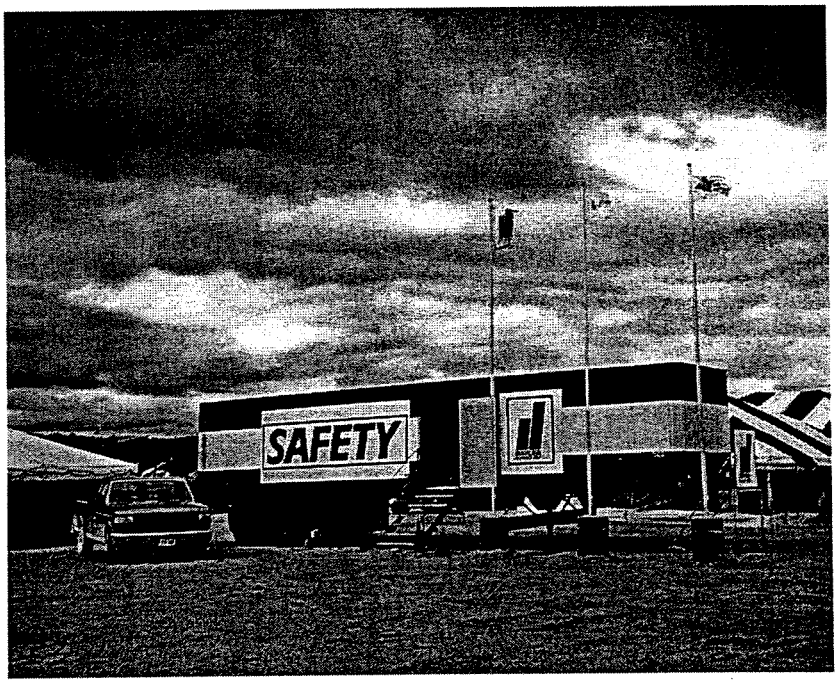
Training Programs

The Health and Safety Department oversees all training in health and safety for the company. The Department identifies areas not well covered by industry training programs and develops training programs in-house. The Department has developed and implemented various training programs including Back-Up Hazard Awareness, Fall Protection, and Traffic Control, etc. The outlines and objectives of these programs are included in **Appendix 5.**

Other programs Dufferin Construction trains its personnel in are (incl. in **Appendix 5**):

- Guidelines for training traffic control persons
- WHMIS in Construction
- Trench Safety
- etc.

Where more permanent facilities do not exist, Dufferin Construction transports its Training Trailer to the construction site to ensure the trainees have a proper facility and atmosphere in which to learn (see photo below). The trailer can accommodate up to 20 workers comfortably and is powered by an on-board generator.



Other Divisional Health and Safety Policies (not otherwise attached)

The remainder of the Divisional Health and Safety Policies are included in **Appendix 6.** These Policies include:

- Health & Safety Responsibilities
- Divisional & Project Specific Joint Health and Safety Committees
- Work Refusal Policy
- Project & Workplace Hazard Analysis
- Occupational Hygiene Testing & Monitoring

- Employee Discipline - Health and Safety Non-Compliance
- Working in Confined Spaces
    - Working in Confined Spaces - "Special Conditions", Low Hazard Confined Spaces
- Lockout and Tag Program
- Personal Protective Equipment (PPE)
- Designated Substances
- Performing Open Flame Operations
- Heavy equipment Maintenance
- Fleet Safety Requirements of Independent Operators
- Material Handling
    - Facilitated Return to Work
- Environmental Spill & site Remediation Management
    - Emergency Evacuation Procedures

Accident and Incident Reporting

Dufferin Construction has produced an Accident/Incident/Occurrence Response Flow Chart which outlines the activities the Project Personnel are to follow in the case of an accident or incident. A copy of the Chart is included in **Appendix 7**. The Health and Safety Department is notified of all occurrences. During notification, all pertinent information is recorded on an Accident/Occurrence/Incident Questionnaire. A copy of the Form is included in **Appendix 7**.

An Accident and Incident Report form is included in **Appendix 7**. Upon notification of an accident or incident or near miss, Dufferin supervisors will initiate an investigation into the occurrence and document their findings and analysis of the occurrence on the said report form. The Health and Safety Department receives the document within three days of the occurrence and evaluates the report for its content, clarity, analysis of causes and the prevention plan. A copy of the Evaluation of Investigation Reports is included in **Appendix 7**. The Project Superintendent is given a score for the report as part of his/her performance evaluation.

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TITLE: HEALTH, SAFETY AND ENVIRONMENT MANAGER

UNIT: Dufferin Construction Company

DIVISION: Ontario - Construction

REPORTS TO: Divisional - General Manager

DATE: September 1, 2004

SUMMARY OF RESPONSIBILITIES

The *Health, Safety and Environment Manager* is accountable to the Divisional - General Manager. He ensures that health, safety and environmental activities are directed in accordance with established objectives and within company plans and policies. He is responsible to supervise subordinate staff; as well as foster the promotion of good health, safety and environmental practices.

OBJECTIVES

1. Monitor the effectiveness of company accident and loss control programs.
2. Identify and appraise all accident and/or loss producing circumstances that are found within the company's operations.
3. Systematically study the various elements of the work environment to ensure acceptable levels of employee exposure.
4. Analyze and interpret accident statistics and communicate this information to the various levels of supervision.
5. Provide resource assistance to all employees in respect to applicable statutes, regulations, standards and codes of good practice.
6. Develop internal policies and standards for a safe and efficient operation.
7. Develop accident prevention programs and loss control measures and procedures; and effectively communicate them to the various levels of supervision.
8. Participate in industry and professional associations to further the company's goals and enhance its image.
9. Keep abreast of technical developments.
10. Be an active member of the Divisional Joint Health and Safety Committee.
11. Liaise with the Ministry of Labour, Ministry of Environment and Energy, Ministry of Transportation, Workplace Safety and Insurance Board and applicable health and safety delivery organizations.
12. Oversee the development of specialized education and training programs aimed at the upgrading of skills at all employee levels.
13. Provide advice and council employees on subjects relating to occupational health, safety and environmental matters.
14. Maintain professional competency through ongoing education and training.

CURRICULUM VITAE

JAMES LAFONTAINE, B. TECH., CRSP
Health, Safety and Environmental Manager

Education:

1981-1985 Ryerson Polytechnical Institute Toronto, ON

- Bachelor of Technology Survey Engineering

2001 University of Toronto – Rotman School of Management – SLC Development Program

Professional Experience: Dufferin Construction Company 1986 - present

Responsible for all functions relating to loss control, accident prevention, risk management, environmental compliance and quality programs for divisional operations. Specific areas of competency and accountability included:

- Health, safety and environmental program development and implementation addressing all construction, and fixed facility operations located throughout Ontario, Quebec, Nova Scotia, BC and Alberta;
- Conduct, review, analyze and report loss producing circumstances;
- Conduct and/or review safety and health audits;
- Administration of risk management services, including Workers' Compensation, general liability and general risk insurance;
- Staff development and training;
- Responsible for the implementation and maintenance of ISO 9001:2000 registration
- Previous responsibilities within the Company: Health and Safety Coordinator 1998-1999, Project Engineer 1996-1998, Safety Advisor 1995-1996, Operations Specialist 1986-1995.

Professional Membership:

Association for Canadian Registered Safety Professionals 2000

American Society of Safety Engineers (ASSE)	1999
International Society for Fall Protection	1998
Canadian Society of Safety Engineering	1999

Industry Associations:

Chairman - Provincial Labour-Management Health and Safety Committee - 1999
Chairman – Ontario Road Builders' Association, Health and Safety Committee
Management Representative – Hamilton Regional Labour-Management Health and Safety Committee
Member of the Technical Advisory Committee – Manual for Uniform Traffic Control Book 7 and Training Advisory Committee
Member of the Civil Safety Group Steering Committee- Ontario Road Builders Association and Ontario Sewer and Watermain Contractor's Association

Industry Recognition

- Winner of the Canadian Construction Association's "Achievements in Safety – 2000"
- Winner of the Construction Safety Association Gil Sampson Award honoring the Hamilton Regional Health and Safety Committee

Agency Certification: Certified Member - Completed Construction Sector Specifics Certification Program requirements of the Workplace Safety and Insurance Board under Section 9 (12) of the *Occupational Health and Safety Act* of Ontario.

Related Certificates: Certified Worksite Traffic Supervisor, ATSSA 1996; Certificate in Safety Management, ASSE 2003
CSA Fall Protection Program;
CSAO Train the Trainer-Propane; Advanced Health and Safety Rep program; Certificate Practical Loss Control Leadership; Confined Space; WHMIS Facilitator; 10 I.A.P.A. programs Internal Auditor ISO 9001; QMS Lead Auditor Training (RAB Accredited)

TITLE: HEALTH, SAFETY AND ENVIRONMENT COORDINATOR

UNIT: Dufferin Construction Company

DIVISION: Ontario - Construction

REPORTS TO: Health, Safety and Environmental Manager

DATE: June 1, 2005

SUMMARY OF RESPONSIBILITIES

The *Health, Safety and Environment Coordinator* is accountable to the Health, Safety and Environmental Manager. He/she ensures that health, safety and environmental activities are implemented in accordance with established laws, objectives and within company plans and policies. He/she is responsible to supervise subordinate staff; as well as foster the promotion of good health, safety and environmental practices. Additionally, he/she assists with the development, implementation and periodic assessment of the Company's Better Cost Management (BCM) and ISO 9001:2000 objectives.

OBJECTIVES

1. As directed, assess the effectiveness of company loss control, Better Cost Management and ISO 9001:2000 initiatives.
2. Identify and appraise all loss producing circumstances that are found within the company's operations.
3. Identify and appraise all elements of the work environment to ensure acceptable levels of employee exposure.
4. Assess loss control, Better Cost Management and ISO 9001:2000 statistics and communicate this information to the various levels of supervision.
5. Advise employees in respect to applicable statutes, regulations, standards and codes of good practice and Company policy and procedures.
6. As directed, develop internal policies, standards and procedures to ensure the effective implementation of company loss control, Better Cost Management and ISO 9001:2000 initiatives.
7. As directed, participate in industry and professional associations to further the company's goals and enhance its image.
8. Keep abreast of technical developments.
9. Participate; coordinate and/or facilitate Divisional and Project Specific Joint Health and Safety Committee(s) meetings, Better Cost Management and ISO 9001:2000 forums and other required activities.
10. As directed, liaise with the Ministry of Labour, Ministry of Environment and Energy, Ministry of Transportation, Workplace Safety and Insurance Board and applicable health and safety delivery organizations.
11. Coordinate the development and facilitation of specialized education and training programs aimed at the upgrading of skills at all employee levels.
12. Provide advice and council employees on subjects relating to occupational health, safety and environmental matters.
13. Maintain professional competency through ongoing education and training.

Scott A. Winger

39 Kennedy Road
Simcoe, Ontario
N3Y 5B5
(519) 426 - 9573

Objective

To obtain a position in the Human Resources / Health & Safety field which allows me to apply my educational background and work related experiences and utilize my exceptional people skills.

Experience

Dufferin Construction Company – Oakville, ON **2004 – Present**
Health Safety & Environment Coordinator

Reporting to the Health Safety & Environment Manager.

- Responsible for the day to day health and safety of various projects throughout Ontario.
- Provide advice to site supervisors and staff relating to Occupational Health & Safety.
- Participate in the Joint Health & Safety Committee meetings as a co-chair and advisory member.
- Facilitate and develop staff training regarding Occupational Health & Safety.
- Responsible for and ensure compliance with various environmental programs.

Cayuga Materials & Construction Co. Limited – Cayuga, ON **1992 – Present**
Human Resources Generalist / Health Safety & Environment Coordinator

Reporting to the President of Cayuga Materials.

- Develop, review, revise, and implement, health and safety policies and procedures.
- Provide advice to management on health and safety and human resource matters.
- Responsible for day-to-day health and safety and human resource issues of the business units.
- Developed industry specific training programs and facilitated staff training sessions relating to Occupational Health & Safety and Environment.
- Administration of all Workplace Safety & Insurance Board issues and claims.
- Active participation in Workplace Safety & Insurance Board's Safety Group program.
- Improved existing pension program and group benefit program for all employees.
- Act as a company liaison with various government agencies such as Ministry of Labour, Ministry of Environment and Ministry of Natural Resources.

Borg Warner Automotive Canada Limited – Simcoe, ON **1990 – 1992**
Quality Assurance Met Lab Technician

Reported to the Quality Assurance Manager and Metallurgist,

- Responsible for the metallurgical testing of incoming steel shipments and Statistical process control

Continues. /2

Lake Erie Steel Company Ltd (Stelco) – Nanticoke, ON **1985 – 1990**
Industrial Mechanic Assistant – Summer Student

Reported to and worked directly with Industrial mechanics on specified assignments.

- Responsible for assisting industrial mechanics and millwrights with mechanical repairs throughout the Blast Furnace and Coke Ovens areas.

Education

Industrial Labour Relations Certificate Program **2000 – Present**
Mohawk College, Hamilton, Ontario.

Human Resources Management Certificate Program **1994 – 1996**
(Approved by the Human Resources Professional Association of Ontario)
Mohawk College, Hamilton, Ontario.

Industrial Engineering Quality Assurance Technicians Program **1989 – 1991**
Mohawk College, Hamilton, Ontario.

Training and Development

- Certified Health and Safety Representative – Level 1 & 2.
- Duly Diligent Supervisor training – Mines & Aggregates Safety & Health Association.
- Health and Safety training – Level 2 – Mines & Aggregates Safety & Health Association.
- Successful completion of a 40-hour risk, responsibility & liability, Health & Safety Training, course, presented by Mr. Norman Keith, LLB (Gowlings, Lafleur & Henderson).
- Principles of Adult Learning – Train the Trainer program.
- St. Johns ambulance First Aid and CPR certified.

Professional Memberships & Volunteer Activities

- Member of the Human Resources Professionals Association of Ontario.
- Past Member of the Ontario Provincial Police Auxiliary Constable program.

Interests & Hobbies

- Woodworking,
- Skiing.

References

Available Upon Request

JOB DESCRIPTION

Job Title: **Safety Advisor** **Date: January 14, 2004**

Job Function: Immersion Training Program

Period of Employment: Twelve consecutive months

Department: Health, Safety and Environment

Supervisor(s): **Health, Safety and Environment Manager**

Job Grade: Varied

Typical Duties:

- Attend personal training programs as directed;
- Assist with the development of loss control programs;
- Monitor loss control initiatives;
- Recommend appropriate work practices;
- Promote loss control initiatives to all employees;
- Support line personnel in their duties with regard to loss control initiatives;
- Develop and facilitate training programs;
- Complete at least one major project;
- Other tasks may include one or more of the following:
  - Assist with the development of Better Cost Management and ISO 9001:2000 programs;
  - Monitor Better Cost Management and ISO 9001:2000 initiatives;
  - Promote Better Cost Management and ISO 9001:2000 initiatives to all employees;
  - Support line personnel in their duties with regard to Better Cost Management and ISO 9001:2000 initiatives;

Skill Factors:

Education: Civil Engineering Technology Diploma. Civil Engineering Degree preferred.

Experience: At least two years relevant construction experience in a staff or line function, preferably while employed by Dufferin Construction Company.

Communication: Oral and written skills should be at an advanced level. Fluency in a relevant second language (Italian, Portuguese, French) would be an asset.

Effort Factors:

Physical Demands: Varied physical demands, including extended sitting, standing, walking, climbing. This position requires the candidate to possess full and unrestricted physical mobility.

Mental Demands: Extended visual and cognitive attention is needed to observe project activities. Initiative and ingenuity are mandatory since the job receives only general supervision. Judgment must be frequently exercised in performing staff advisory function. Decision making discretion is frequently required.

Working Conditions: Vehicle travel is frequent and occasionally extensive. Travel to projects and facilities is required. Observing, collecting data and interacting with workers, supervisors and peers is required. The incumbent must work in office as well as outdoor settings.

Important Note: **All employees are encouraged to apply. Employees who do not possess formal qualifications will be assessed on their personal merit.**

Lindsay Buhler

590 Taylor Crescent
Burlington, Ontario L7L 6G3
(905)637-5924
lbuhler@stlawrencecement.com

Education

Bachelor of Applied Science *(1998 - 2002)*
Civil Engineering, University of Ottawa

- Graduated with Cum Laude honours
- Focused studies on structural design and construction management aspects of civil engineering

Scholarships and Awards

- University of Ottawa Admission Scholarship
- Faculty of Engineering Entrance Award

Work Experience

Safety Advisor *(April 2005 – Present)*
Dufferin Construction Company, Oakville, Ontario

- Support line personnel in their duties with regard to theoretical and practical applications of loss control, productivity improvement and quality assurance
- Attend extensive training programs on Heath, Safety, Law and Labour Relations
- Develop and facilitate safety training courses for internal and external personnel
- Develop personal confidence and professional credibility when dealing with the public, governmental agencies, managers, supervisors and peers
- Gain exposure to the full compliment of construction activities performed by the company and the associated cost, productivity, quality and safety challenges

Project Engineer *(March 2003 – April 2005)*
Dufferin Construction Company, Hamilton, Ontario
Commercial, Industrial and Land Development Markets

- Plan, coordinate and supervise construction activities including labour crews and equipment
- Maintain plans, specifications, cost, material estimates, subcontracts and reports
- Expedite progress payment certificates and extra work orders
- Maintain accurate cost control plans and calculated all productivity and material yields
- Maintain duties related to Occupational Health & Safety Act and Regulations for construction projects, including accident investigation and reporting

Project Engineer *(May 2002 – December 2002)*
Dufferin Construction Company, Laurier Bridge Reconstruction, Ottawa, ,Ontario

- Coordinated proper procurement of construction materials ensuring timely delivery and accuracy of purchase orders
- Worked in conjunction with clients, consulting engineers and project superintendent to effectively progress the construction schedule while documenting all correspondence
- Interpreted contract drawings to ensure proper material purchasing and to provide direction to project affiliates
- Continuously updated material, labour and equipment units to accurately portray the project status using a jobsite management software program

Lindsay Buhler

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Environmental Specialist *(Fall 2000 – Spring 2002)*
AMEC Earth & Environmental Limited, Ottawa, Ontario

- Performed Phase I Environmental Site Assessments of various commercial, industrial and residential properties throughout Canada
- Responsibilities included site visits and evaluations, technical report writing, historical and regulatory reviews, geographical evaluations

Laboratory / Field Technician *(Summer 2000)*
AGRA Earth & Environmental Limited, St. Catharines, Ontario

- Responsible for performance of laboratory and construction site field tests on soils, asphalt and concrete in accordance with CSA regulations
- Worked independently in the field and in producing test results for client reports

Professional Skills

Interpersonal Skills

- Excellent communication skills in dealing with public relations and client liaison and strong creativity and problem-solving skills
- Ability to work both independently and in a collegial team environment

Technical Skills

- Skills include project management, technical report writing, construction materials testing and surveying
- Excellent knowledge of Microsoft Office Suite, Lotus Notes and in-house project management software
- Working knowledge of Autocad, C++ and Primavera

Additional Information

Training

- Successfully Completed Practical Loss Control Program
- Fall Protection, Confined Space, Lockout and Tag, Traffic Control, Hoisting and Rigging, Scaffold Erection, Hazard Analysis Training
- Participated in CAID documentation and internal audit
- Completed Surveying, Geotechnical and Water Resources Field Schools

Certification

- ISO 9001:2000 Internal Quality Systems Auditor
- Certified Joint Health and Safety Committee Member
- CSA Certified Concrete Testing Technician
- Workplace Hazardous Materials Information System Training
- First Aid and C.P.R.
- EIT Member, Professional Engineers of Ontario

Languages

- Able to work and communicate in French

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PROJECT & WORKPLACE HAZARD ANALYSIS

CONTENTS

1.0 Purpose
2.0 Assessment of Safety

- **Appendix A - "*International Safety Rating System*" (NA), ILCI**
- **Appendix B - "*Health and Safety Profile*" (Na), CSAO**
- **Appendix C - "*Safety & Health Program Audit*" (Na), IAPA**
- **Appendix D – DCC, Formal Safety Assessment Forms:**
  - **Project Health and Safety Administration.**
  - **Excavating and Trenching.**
  - **Blasting Operations**
  - **Work in Traffic/Traffic Control**
  - **Basic Personal Protective Equipment**
  - **Work Conducted at Heights**
  - **Work Conducted Over Water**
  - **Confined Space Work**
  - **Utilities**
  - **Cranes, Boomtrucks and Other Lifting Devices**
  - **Tunnels and Shafts**
  - **Security**
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  - **Portable Concrete and Asphalt Plant Hazard Analysis**
- **Appendix F – Yards and Plants Monthly Shop Safety Inspection Form:**
- **Appendix G – Monthly Job Site Inspection Form:**

- **(Na)** - Document not attached due to copyright restrictions and/or limits of space

1. PURPOSE

This section of the Divisional Loss Control Manual is provided in order to establish the structure of a project/workplace hazard analysis program.

The goals of a hazard analysis program are to establish that :

- Workers are protected form injury from accidents or from gradual harm as a result of long term, adverse working conditions;
- Workers are protected from acute and chronic health hazards; and
- The project/workplace and company are in compliance with all statutory and regulatory requirements.

2.0 ASSESSMENT OF SAFETY

2.1 COMPREHENSIVE DIVISIONAL HEALTH, SAFETY & ENVIRONMENTAL AUDITS

2.1.1 Purpose

The purpose of performing audits of DCC's health, safety and environmental systems are to determine the status of the system and whether it is being maintained.

2.1.2 Scope

All health, safety and environmental systems procedures and all applicable supporting procedures shall be audited.

2.1.3 Responsibility

The Health, Safety and Environment Manager is responsible for coordinating health, safety and environmental systems audits and the audits of the supporting procedures. The Health, Safety and Environment Manager may conduct audits of the procedures for which he is not responsible and assign other members of the staff to audit the remaining procedures therefore maintaining independence (optional at this time).

2.1.4 Method

Audits are conducted and documented using Checklists (see Appendix A through D) appropriate for each system. The checklists are retained as a quality record. Audits are performed to a schedule that covers the complete quality system every 2 years, by individuals assigned by the Health, Safety and Environment Manager. These individuals are trained by an accredited training organization (IAPA, ILCI, etc.)(optional at this time). Staff members will not be assigned procedures or activities for which they are responsible. Audits are scheduled on the basis of status and importance of the audit subject (optional at this time).

Deficiencies that are found during an audit are recorded on the Audit Checklist. The results of the audit will be brought to the attention of the managers of the activity audited.

The Health, Safety and Environment Manager together with the audit team analyses the results of the audit to complete Corrective Action Reports (if required). The Corrective Action Reports are issued to the responsible individuals for corrective action.

The results of Corrective Action Requests are verified by a follow-up audit conducted by the originator of the Corrective Action.

The results of internal audits are used as input to the Management Review process.

2.2 PLANT & SHOP HEALTH AND SAFETY ASSESSMENTS

All plant facilities shall be subject to a safety audit semi-annually.

Plant Safety Audits shall consider :

1. Health & Safety Administration
2. Physical Hazards
   * Noise
   * Vibration
   * Heat and Cold Stress
   * Electrical shock
   * etc.

3. Chemical Hazards:
   * Particulate
   * Vapour, Gas
   * Liquid
4. Ergonomic Hazards
5. Environmental Hazards
6. Fall Hazards
7. Machine guarding

- Audits shall be conducted by senior Health and Safety Department personnel. Audit findings shall be evaluated in respect to recommendations and time table for corrective action.
- Plants and Equipment Department personnel shall be responsible for ensuring that remedial action is consistent with proposed recommendations and the implementation timetable.

2.3 PROJECT - FORMAL SAFETY ASSESSMENT

Formal Safety Assessments will be conducted at least tri-monthly.

Assessments will be conducted during three phases of project progression.

1. Estimating Stage - An assessment shall be conducted in order to establish and delineate hazard potential associated with a project. This will aid in establishing proactive safety standards prior to bidding on a project.
2. Pre-Job Stage - Employing information gathered during the initial stage, project supervision will re-evaluate project hazard potential and scheduling variations prior to commencing work. Upon completion of the second evaluation, project supervision will address all outstanding hazard conditions prior to commencing work.
3. Interim Stage - Supervisors will advise all employees and subcontractors about anticipated hazards and prescribed corrective measures throughout the progression of a project.

Formal project safety assessments shall be conducted by health and safety department personnel in conjunction with project supervision.

- Assessment forms covering the following general hazards areas shall be completed by the health and safety department personnel and confirmed by the Project superintendent.
- The Project Superintendent is responsible coordinating meetings with other project personnel, including:

  ⇒ **Pre-Assessment Meeting**: The Superintendent will hold a meeting at least 1 week prior to the formal assessment.
  Personnel in attendance shall include:

  * Assistant Superintendents
  * Estimator Co-Ordinators
  * Field Engineers
  * Foremen
  * Lead Hands
  * Other Supervisors
  * Worker Health & Safety Representative(s)

  The pre-assessment meeting will be used as an opportunity to reflect on current and anticipated operational practices with regard to safety. The intent of the meeting is to foster "brain storming" by all project personnel for the purpose of recognizing, evaluating, and controlling anticipated project hazards. An action plan will be developed and implemented.

⇒ **Post-Assessment Meeting**: The Superintendent will hold a meeting at the conclusion of the formal assessment.
Personnel in attendance shall include:

* Safety Department Personnel
* Assistant Superintendents
* Estimator Co-Ordinators
* Field Engineers
* Foremen
* Lead Hands
* Other Supervisors
* Worker Health & Safety Representative(s)
* Workers (Optional)

The post-assessment meeting will be used as an opportunity to reflect on the operational practices observed during the assessment. The intent of the meeting is to communicate the results of the assessment, stressing positive observations and items requiring improvement and other opportunities. An action plan to resolve observed non-conformances will be developed and implemented and implemented by the Project Superintendent.

- Project supervision shall be responsible for acknowledging noted deficiencies and providing remedial action and a timetable for implementation of corrective measures.
- Project supervision shall be provided with a copy of each page of the project formal assessment.

- Generalized hazard assessments shall address the following operations:

1. Project health and safety administration.
2. Excavating and trenching.
3. Blasting Operations
4. Work in Traffic/Traffic Control
5. Basic Personal Protective Equipment
6. Work Conducted at Heights
7. Work Conducted Over Water
8. Confined Space Work
9. Utilities
10. Cranes, Boomtrucks and Other Lifting Devices
11. Tunnels and Shafts
12. Security
13. Environmental Concerns

2.4 INFORMAL SAFETY INSPECTIONS and MONTHLY JOB SITE INSPECTIONS

- Informal safety inspections shall be conducted at least weekly. Inspections conducted on an informal basis shall constitute the foundation for delineating and defining project safety status.
- Additionally, informal safety inspections shall be employed to confirm corrective actions developed in response to non-conformances identified during prior formal project safety assessments.
- Monthly job site inspections shall be completed by the Health and Safety Representative in conjunction with the Management representative using the standard form noted in Appendix G. Copies of the inspection are to be provided to the health and safey committee, the health and safey representative and posted on the job site health and safety bulletin board.

Health and Safety Profile Report and Recommendations

Prepared for

Dufferin Construction Company

CONFIDENTIAL

Construction Safety Association of Ontario
21 Voyager Court South
Etobicoke, Ontario M9W 5M7

Health and Safety Profile Executive Summary

EXECUTIVE SUMMARY	Score Possible	Score Achieved	%	Prev. %
SECTIONS 1-11 TOTAL CORPORATE OFFICE EVALUATION	226	226	100.0%	
OVERALL PHYSICAL SITE(S) EVALUATION	75	69	91.0%	
COMBINED SCORES TOTAL PROFILE EVALUATION	301	295	97.8%	
CORPORATE HEALTH AND SAFETY PROFILE SCORE (Limited)			97.8%	

Health and Safety Profile Evaluation Summary

SECTION	HEALTH SAFETY PROFILE EVALUATION SUMMARY	Score Possible	Score Achieved	%
Section 1.	Health and Safety Policy Statement	8	8	100.0%
Section 2.	Responsibilities and Control	18	18	100.0%
Section 3.	Documents, Procedures and Reports	21	21	100.0%
Section 4.	Project/Site Planning Documents	18	18	100.0%
Section 5.	Health and Safety Training	24	24	100.0%
Section 5A.	Hazard Analysis	32	32	100.0%
Section 6.	Safety Representative/Committee	10	10	100.0%
Section 7.	Site Inspections and Reports	23	23	100.0%
Section 8.	Tools, Equipmemt and Vehicle Maintenance	14	14	100.0%
Section 9.	Accident/Incident Investigation and Reporting	24	24	100.0%
Section 10.	First Aid Requirements	13	13	100.0%
Section 11.	Health and Safety Program Promotion and Communication	21	21	100.0%
	CORPORATE OFFICE TOTAL	226	226	100.0%
		Score Possible	Score Achieved	%
	PHYSICAL SITE(S) TOTAL	200	182	91.0%

Physical Site(s) Evaluations

No.	Site Name	No. Checked O.K.	No. Substandard	Total No. Checked	Performance %
1	Redhill Expressway	89	8	97	91.8%
2	New Highway 6 and Asphalt Plant	93	10	103	90.3%
3				0	#DIV/0!
4				0	#DIV/0!
5				0	#DIV/0!
	PHYSICAL SITE(S) TOTAL	**182**	**18**	**200**	**91.0%**
		No. Checked O.K.	**No. Substandard**	**Total No. Checked**	**Performance %**

Health and Safety Profile Section Summaries and Recommendations

SECTION 1 Health and Safety Policy Statement

Comments/Recommendations

Comments:

Dufferin Construction Company is to be commended on its effort in creating and maintaining a safe and healthy workplace. The Health and Safety Policy Statement clearly expresses the corporate commitment to safety and health. It is signed by senior management, dated and posted in each workplace. All employees are given copies of the policy and program as part of their orientation.

Recommendations:

To ensure that the policy is current and relevant, continue with your annual review of the policy and make amendments as may be required under the Occupational Health and Safety Act. Consider using information available through the Ministry of Labour and the Construction Safety Association of Ontario when reviewing your policy and program.

SECTION 2 Responsibilities/Control

Comments/Recommendations

Comments:

The Occupational Health and Safety Act and Regulations for Construction Projects rely on the "Internal Responsibility System" to achieve positive health and safety results. The Ministry of Labour's primary goal is to have workplace parties within the construction industry understand and accept the following principles: self-reliance; the use of best practices; and continuous improvement.

Dufferin assigns specific health and safety responsibilities and duties to all workplace parties, and ensures that these responsibilities are understood and carried out at all times. These are stated in its policy and program which is provided to all employees on the first day on the job. The company has a designated health and safety coordinator who reports directly to the General Manager. Disciplinary procedures are followed and subsequently reviewed by the Joint Health and Safety Committee.

Recommendations:

Continue using small group training opportunities such as job box talks to remind employees of their health and safety responsibilities. Ensure that new workers are aware of their hazard reporting duties.

SECTION 3 Documents, Procedures and Reports

Comments/Recommendations

Comments:

The Occupational Health and Safety Act, Regulations for Construction Projects, and Workplace Safety and Insurance Act require that certain documents be posted in the workplace. As part of the corporate appraisal system, Dufferin uses key performance indicators such as tracking manhours, Lost Time Injuries and Medaids and comparing them with the industry average. Dufferin's goal is to achieve a 50% better result than the industry benchmark.

Recommendations:

Review documents annually or as changes occur to ensure that they are current with legislative requirements.

SECTION 4: Project/Site Planning Documents

Comments/Recommendations

Comments:

The company develops and provides planning documentation to their constructor and/or general contractor so that a comprehensive site plan may be implemented. Each set of documents is site specific, showing locations of facilities, material storage areas, parking areas etc. Dufferin employees are informed of these details when they arrive on the site. The company has a general housekeeping policy but site specific modifications are introduced if required. Dufferin utilizes a customized pre-startup inspection checklist to determine these requirements. A similar check is used at project close.

Recommendation:

Ensure that the site plan is implemented and followed by all employees, including sub-contractors. Inform employees and sub-contractors of any revisions to the plan in a timely fashion. Inspections by site management will ensure that corrections (if necessary) to the site plan are made in a timely fashion.

SECTION 5: Health and Safety Training

Comments/Recommendations

Comments:

Dufferin has a comprehensive program in place to: review training requirements for their employees; implement training; and provide re-training when and where required by the applicable Acts and Regulations. Supervisors' performance is monitored to ensure that orientation for new workers is taking place. Joint Health and Safety Committee members, both divisional and site specific are trained in their health and safety responsibilities. Management also participates in safety training through the HHCA and its Safety Group. A number of employees have undergone certification training as required under The Workplace Safety and Insurance Act. To determine appropriate topics for safety talks, the work is discussed, hazards identified and a relevant topic selected.

Recommendations:

Encourage more worker participation in training sessions. Appoint a competent worker demonstrate safe work practice. Make use of other training opportunities such as CSAO's mobile classroom on larger sites.

SECTION 5A: Hazard Analysis

Comments/Recommendations

Comments:

Dufferin Construction Company initially identifies hazards, both common to construction and also site specific, as part of their pre-startup check. In this manner, they are able to determine controls to potential hazards. In the workplace, hazards are minimized by: inspections; training of workers; timely reporting of existing hazards; incident and accident reporting and investigation; and by enforcing proper safety practice by following discipline procedures for non-compliance.

Recommendations:

Continue use of project hazard reporting procedures to observe trends at particular sites or within specific trades or tasks. Implement appropriate controls to eliminate the hazards. Evaluate the controls frequently and conduct a detailed hazard analysis if the controls are not effective.

SECTION 6: Health and Safety Representative/Joint Health and Safety Committee

Comments/Recommendations

Comments:

The company has an active, effective Joint Health and Safety Committee in compliance with the requirements set out by the Occupational Health and Safety Act. Meetings are held monthly with recommendations being sent out to and promptly acted upon by management. Dufferin has a Divisional committee, as well as site specific committees.

Recommendations:

Ensure that the Joint Health and Safety Committee continues its participation in determining, implementing and evaluating worker training programs and health and safety issues. Ensure that the committees are actively involved in accident and incident investigations.

SECTION 7: *Corporate Site Inspections and Reports*

Comments/Recommendations

Comments:

The company has a comprehensive inspection program which includes: planned and unplanned inspection by management; monthly or more frequent inspections by the Joint Health and Safety Committee; trained, competent workers inspecting their tools and equipment as required. To ensure consistency, checklists are provided for many types of inspection. The frequency and the scope of the various inspections comply with or exceed the requirements of the Occupational Health and Safety Act and applicable regulations and standards.

Recommendations:

Continue to train workers in thorough inspection procedures, possibly through toolbox talks. Communicate results of inspections to workers.

SECTION 8: Tools, Equipment, and Vehicle Maintenance

Comments/Recommendations

Comments:

Dufferin has a inspection program in which tools, equipment and vehicles are inspected regularly. Defective tools and equipment are tagged and removed from use. Workers are instructed in this procedure as part of their orientation. Vehicles and heavy equipment are maintained and repaired at the company shop by competent mechanics. Equipment operators are required to put details of their inspections on their daily time card.

Recommendations:

Continue to review with workers the types of equipment that require inspection, that proper methods of inspection for tools, equipment and personal protective equipment are used, and ensure that inspections are documented as required. Remind workers to tag faulty equipment and ensure that each site has an area for gathering equipment for repair.

SECTION 9: Accident/Incident Investigation and Reporting

Comments/Recommendations

Comments:

Dufferin requires that all accidents be reported within one hour of occurrence.The company and Joint Health and Safety Committee reviews all incidents. Supervisors communicate the outcomes of these meetings to the workers on site. Workers, as well as management are solicited for their input on controls of hazards to ensure that safe work practices and appropriate controls are implemented. Outside agencies, such as HHCA, CSAO or the Hamilton Safety Group may be called upon to provide alternate solutions in hazard control and accident prevention. The regional safety co-ordinators for Dufferin personally investigate all accidents within their jurisdictions. Accident summary reports are used as topics for safety talks. Safety alerts and shop bulletins are provided as supplemental safety talks.

Recommendations:

Train workers, in addition to management, in accident investigation techniques. Ensure that workers are well informed on proper procedures to follow in the event of an emergency.

SECTION 10: First Aid Requirements

Comments/Recommendations

Comments:

The company exceeds its obligations under the Workplace Safety and Insurance Act to have available properly trained first aid providers in the workplace. All superintendents undergo training yearly. First aid kits are in appropriate locations in the workplace. A personal injury flowchart provides details on emergency response and is available on all sites.

Recommendations:

No recommendations at this time.

SECTION 11: Health and Safety Program Promotion and Communication

Comments/Recommendations

Comments:

Senior management actively promotes, communicates and demonstrates the need for an effective safety program in the workplace. This is reflected by acknowledging positive safety behaviour, as well as, dealing with poor health and safety performance promptly. Employees are made aware of poor performance through the publishing of accident and incident summaries and safety alerts. The CEO personally participates in the corporate accident prevention programs. Safety is included as a performance item in management performance reviews. Management meetings are held every month with safety being the first item on the agenda. Dufferin Construction Company participates in several Health and Safety audits yearly in order to maintain its high standard for health and safety. Workers are encouraged to participate in wellness programs initiated within the company.

Recommendations:

Continue development and managing your program. Acknowledge and encourage every employee's participation in your company health and safety program.

Sites Evaluation:

Comments:

All sites visited were generally clean, well organized and properly set up. Workers were wearing and using proper safety equipment that was also well maintained and clean. Job boxes and trailers were tidy, and contained necessary documentation. Containers were properly stored and labeled. Workers generally used safe work practice while performing their jobs.

Recommendations:

Ensure workers follow safe work practice at all times and report any hazards in a timely fashion. This includes reporting hazards created by other companies on site. Evaluate sites through more frequent spot inspections to ensure a safe environment for workers. Pay particular attention to fall prevention and electrical hazards. A review of inspection procedures for electrical tools and extension cords is recommended. Consideration should be given to a coding system to recognize that a monthly inspection of tools, cords etc. has been completed. Provide follow-up inspections to check for compliance. Review unsafe work practice immediately with workers and their supervisors.

Assessment Form Sequence # 000542

ST.LAWRENCE CEMENT

Formal - Project Safety Assessment

Attended by: _____ Date of Assessment: _____

Job # _____ Description of Project: _____

Applicable satellite projects; D.C.C. Job No(s).: _____/_____/_____/_____/_____/_____/

☐ Primary - office assessment

☐ Common office assessment; see Assessment Form Sequence # -- -- -- --

Project Activity Classification: [A] Active Status, at time of assessment.

[P] Potential or Anticipated Status, which may or will occur.

☐ Project Activity: Site / Project / Satellite Office and Affiliated Structures

Status of Project Activity at the time of assessment.

Project in compliance with OHSA & Regs. and / or D.C.C. Policy

In Compliance? Yes	No	Project Activity Elements	Comments
☐	☐	- Notice of Project(s) (posted)	
☐	☐	- Supplemental Notice of Project	
☐	☐	- Registration of Constructors & Employers Form	
☐	☐	- OHSA & Regs. for Const. Projs. (posted)	
☐	☐	- MoL: Project Inspection Report (posted)	
☐	☐	- WHMIS Compliance (MSDS's)	
☐	☐	- D.C.C. Health, Safety & Environmental Policy Manual	
☐	☐	- Accident/Incident Procedure Flowchart	
☐	☐	- Fire Emergency Procedure Flowchart	
☐	☐	- Environmental Emergency Procedure Flowchart	
☐	☐	- Emergency Procedures (posted)	
☐	☐	- Sub-Contractor Checklist(s) on File	
☐	☐	- Health & Safety Committee Minutes (posted)	
☐	☐	- Monthly Inspections Completed & on File	
☐	☐	- First Aid Kit (wall mounted)	
☐	☐	- Injury Treatment Record (posted)	
		- Notice of Blasting	
☐	☐	- Drill & Load Letter (posted)	
☐	☐	- Letter of 'Competent Person' (posted)	
		- Notice of Shaft & Tunneling Operations	
☐	☐	- Fire Alarm Signal Procedures (posted)	
☐	☐	- Summary of Rescue Procedures (signed & posted)	
☐	☐	- Absence of a Fire Hazard (approved & posted)	
		- Engineer's Drawing(s)	
		[S] - Submitted to the MoL prior to commencement	
		[A] - Available for review at project	
☐	☐	- Scaffolding (height > 15m.) [A]	
☐	☐	- Forms & Falsework [A]	
☐	☐	- Shaft Design (depth > 6m.) [S] [A]	
☐	☐	- Trench Design (D > 7.5m. or W > 3.5m.) [S] [A]	
☐	☐	- Trench Box [S] [A]	
☐	☐	- Other	
☐	☐	- Fire Extinguisher: 20ABC (wall mounted)	
☐	☐	- Telephone (accessible)	
☐	☐	- Washroom(s) (project)	
☐	☐	- Water (project)	
☐	☐	- Poster: In all cases of injury (posted)	
☐	☐	- Poster: Health and Safety Rep. (posted)	
☐	☐	- Housekeeping	

☐☐ _____ (PI) X 0.3

There are _____ assessment form sheets(s) attached, and included in this assessment report.

Superintendent: _____ Safety Supervisor: _____

This assessment form sheet corresponds to Assessment Form Sequence # _____

Project Activity Classification: [A] Active Status, at time of assessment.

[P] Potential or Anticipated Status, which may or will occur.

☐ **Project Activity: Utilities, Overhead (OH) & Below grade (BG)**

Type of Utility

OH	BG	
☐	☐	Electrical (< 750v.)
☐	☐	Electrical (> 750v.)
☐	☐	Natural Gas
☐	☐	Telephone
☐	☐	T.V.

Comments

Status of Project Activity at the time of assessment.

Project in compliance with OHSA & Regs. and / or D.C.C. policy

In Compliance? Yes	No	Project Activity Elements
☐	☐	- Utility Contacted to Obtain Locates
☐	☐	- Utility - Hand Exposed
☐	☐	- Work Conducted at Prescribed Distances
☐	☐	- Signalman Employed When in Close Proximity
☐	☐	- "Extreme Hazard": Utility Notified, Asked to Supervise
☐	☐	- Sign(s): Danger Due to ("Type of Utility Hazard")

Comments

☐☐ _____ (PI) X 1.0

Project Activity Classification: [A] Active Status, at time of assessment.

[P] Potential or Anticipated Status, which may or will occur.

☐ **Project Activity: Crane, Boomtruck and Other Lifting Devices**

Status of Project Activity at the time of assessment.

Project in compliance with OHSA & Regs. and / or D.C.C. policy

In Compliance? Yes	No	Project Activity Elements
☐	☐	- Mobile Crane Log
☐	☐	- Competent Person
☐	☐	- Webs, Chains, Slings, Hooks, Lifting Pins
☐	☐	- Crane/Lifting Device Operation Procedures
☐	☐	- Material Handling
☐	☐	- Proximity to O/H Power Lines and other hazards
☐	☐	- Signal Man Employed

Comments

☐☐ _____ (PI) X 0.75

This assessment form sheet corresponds to Assessment Form Sequence # _____

Project Activity Classification: [A] Active Status, at time of assessment.

[P] Potential or Anticipated Status, which may or will occur.

☐ **Project Activity: Work in Traffic / Traffic Control**

Status of Project Activity at the time of assessment. Project in compliance with OHSA & Regs. and / or D.C.C. Policy

In Compliance? Yes	No	Project Activity Elements	Comments
☐	☐	- New Jersey Barriers	
☐	☐	- Delineator Placement	
☐	☐	- Flashing Lights/Flares	
☐	☐	- Crash Barrel Truck	
☐	☐	- Ontario Traffic Manual Book 7 Guidelines (adherence)	
☐	☐	- Traffic Protection Plan on File	
☐	☐	- Traffic Control Person(s) (competent & rec'd training)	
☐	☐	- Construction Zone Warning Signs	
☐	☐	- Sign Boards (truck mounted)	
☐	☐	- Flashing Amber Lamps (vehicular)	
☐	☐	- Back-up Signalman for Vehicles	
☐	☐	- Drive thru Operation (planned & organized)	
☐	☐	- Danger Signs Advising of Back-up Hazard (posted)	
☐	☐	- Functioning Back-up Beepers on all Dump Trucks and Equipment	
☐	☐	- Material Storage	
☐	☐	- Reflective Vest/Shirt	
☐	☐	- Tear away Feature on Reflective Vests (side enhancing visibility for night work)	
☐	☐	- Work Procedures	
☐	☐	- Housekeeping	

☐☐ _____ (PI) X 0.7

Project Activity Classification: [A] Active Status, at time of assessment.

[P] Potential or Anticipated Status, which may or will occur.

☐ **Project Activity: Basic Personal Protective Equipment**

Status of Project Activity at the time of assessment. Project in compliance with OHSA & Regs. and / or D.C.C. Policy

In Compliance? Yes	No	Project Activity Elements	Comments
☐	☐	- Head Protection	
☐	☐	- Foot Protection	
☐	☐	- Hearing Protection	
☐	☐	- Eye Protection	
☐	☐	- Respiratory Protection	
☐	☐	- Clothing (appropriate)	
☐	☐	- Skin Protection	

☐☐ _____ (PI) X 0.5

This assessment form sheet corresponds to Assessment Form Sequence # __ __ __ __

Project Activity Classification: [A] Active Status, at time of assessment.

[P] Potential or Anticipated Status, which may or will occur.

[ ] Project Activity: Trenching and Excavating

Status of Project Activity at the time of assessment. Project in compliance with OHSA & Regs. and/or D.C.C. policy.

In Compliance? Yes	No	Project Activity Elements	Comments
[ ]	[ ]	- Access & Egress	
[ ]	[ ]	- Slope	
[ ]	[ ]	- Vertical Height	
[ ]	[ ]	- Top Edge Clear (.6m)	
[ ]	[ ]	- Condition of Rock Wall	
[ ]	[ ]	- Base of Excavation (water)	
[ ]	[ ]	- Support System	
[ ]	[ ]	- Trench Box	
[ ]	[ ]	- Shoring & Timbering/Jacks	
[ ]	[ ]	- Inspection Frequency	
[ ]	[ ]	- Engineer's Drawings	
[ ]	[ ]	- Progress of Adjacent Activity (vehicle/const. equipment)	
[ ]	[ ]	- Shoring to Protect Adjacent Structures	
[ ]	[ ]	- Dust/Fumes/Smoke	
[ ]	[ ]	- Material Storage	
[ ]	[ ]	- Public-Way Protection	
[ ]	[ ]	- Sign: Danger Deep Excavation	
[ ]	[ ]	- Housekeeping	
[ ]	[ ]	- Misc.	

[ ] _____ (PI) X 0.9

Project Activity Classification: [A] Active Status, at time of assessment.

[P] Potential or Anticipated Status, which may or will occur.

[ ] Project Activity: Blasting Operations

Status of Project Activity at the time of assessment. Project in compliance with OHSA & Regs. and/or D.C.C. policy.

In Compliance? Yes	No	Project Activity Elements	Comments
[ ]	[ ]	- Letter of 'Competent Person' (magazine)	
[ ]	[ ]	- Inspection Frequency (>2/wk.)	
[ ]	[ ]	- Adherence to Blasting Procedures	
[ ]	[ ]	- OZA Inspections	
[ ]	[ ]	- Blasting Mats	
[ ]	[ ]	- Explosive Storage/Handling Procedures	
[ ]	[ ]	- Access & Egress	
[ ]	[ ]	- Sign: Danger Due to Blasting	
[ ]	[ ]	- Sign: Danger Turn Off 2-Way Radios/Cell. Phones	
[ ]	[ ]	- Housekeeping	

[ ] _____ (PI) X 0.9

This assessment form sheet corresponds to Assessment Form Sequence # _____

Project Activity Classification: [A] Active Status, at time of assessment.

[P] Potential or Anticipated Status, which may or will occur.

☐ Project Activity: Work Conducted at Heights

Status of Project Activity at the time of assessment. Project in compliance with OHSA & Regs. and / or D.C.C. Policy

In Compliance? Yes	No	Project Activity Elements	Comments
☐	☐	- Guardrailing (top, mid, toe board)	
☐	☐	- Flooring	
☐	☐	- Ladders	
☐	☐	- Ramps/Runways	
☐	☐	- Scaffolds & Working Platforms	
☐	☐	- Engineer's Drawings (>15m.)	
☐	☐	- Suspended Scaffold or Boatswain's Chair	
☐	☐	- Safety Net	
☐	☐	- Life Line	
☐	☐	- Fall Arrest Equipment: Safety Harness/Belt	
☐	☐	- Rescue Procedures after Fall Arrest	
☐	☐	- Written Proof of Training on File for all Workers using Fall Protection	
☐	☐	- Tie-off Points	
☐	☐	- Static Line	
☐	☐	- Tie-off Procedures	
☐	☐	- Access & Egress	
☐	☐	- Public-Way Protection	
☐	☐	- Sign: Danger Fall Hazard	
☐	☐	- Sign: Danger Work Overhead	
☐	☐	- Housekeeping	

☐☐ _____ (PI) X 1.0

Project Activity Classification: [A] Active Status, at time of assessment.

[P] Potential or Anticipated Status, which may or will occur.

☐ Project Activity: Work Conducted Over Water

Status of Project Activity at the time of assessment. Project in compliance with OHSA & Regs. and / or D.C.C. Policy

In Compliance? Yes	No	Project Activity Elements	Comments
☐	☐	- Signalman	
☐	☐	- Signal Alarm	
☐	☐	- Seaworthy Boat	
☐	☐	- Outboard Motor	
☐	☐	- Boathook	
☐	☐	- Ring Buoy & Poly Rope (15m. x 9.5 mm.)	
☐	☐	- Life Jackets (available for rescuers, 2 min.)	
☐	☐	- Line & Floats Across Current	
☐	☐	- Life Jacket (worn by worker while over water)	
☐	☐	- Sign: Danger Drowning Hazard	

☐☐ _____ (PI) X 0.95

This assessment form sheet corresponds to Assessment Form Sequence # _____

Project Activity Classification: [A] Active Status, at time of assessment.

[P] Potential or Anticipated Status, which may or will occur.

☐ **Project Activity: Tunnels & Shafts** Form 1 of 2

Status of Project Activity at the time of assessment. Project in compliance with OHSA & Regs. and / or D.C.C. policy

In Compliance? Yes	No	Project Activity Elements	Comments
		- Fire Protection	
☐	☐	- Fire Extinguisher - > 10ABC (top & bottom)	
☐	☐	- Fire Extinguisher (in tunnel within 30m of face)	
☐	☐	- Fire Standpipe, Line, Hose & Adequate Water Pressure (tunnel diam.> 1.5m)	
☐	☐	- Flammable Liquid/Gas Storage	
☐	☐	- Welding Cable/Hose Proper Casing/Jacket (Marked)	
		- First Aid Requirements	
☐	☐	- First Aid Kit (immediate vicinity of shaft)	
☐	☐	- Wire Basket Stretcher (vicinity of shaft)	
☐	☐	- Competent Person Appointed For First Aid	
		- Rescue of Worker Provisions	
☐	☐	- Workers Trained in Rescue Procedures (min. 4)	
☐	☐	- SCBA (min. 4 when tunnel & shaft distance > 45m)	
☐	☐	- Inspect SCBA (min. 1/wk)	
☐	☐	- Training of Rescue Workers (30 days)	
		- Communications	
☐	☐	- Telephone (adjacent to entrance to shaft) (within 30m. of working face of tunnel)	
☐	☐	- Other Means Of Communicating (shaft > 6m.)	
☐	☐	- Notice of Telephone Procedures	
☐	☐	- Electrical Services (Insulated & Grounded)	
☐	☐	- Flashlights (top & bottom of shaft, & working face)	

Continued on next form page ...

Project Activity Classification: [A] Active Status, at time of assessment.

[P] Potential or Anticipated Status, which may or will occur.

[ ] Project Activity: Tunnels & Shafts

Status of Project Activity at the time of assessment.

Project in compliance with OHSA & Regs. and / or D.C.C. policy

In Compliance? Yes	In Compliance? No	Project Activity Elements	Comments
		- Shafts	
☐	☐	- Access & Egress	
☐	☐	- Landings/Offset (shaft > 6m.)	
☐	☐	- Separate Conveyance (shaft > 6m.)	
☐	☐	- Clear Passage, (min.: 2.4m.-cyl.; 1.5m.-NonCyl.)	
☐	☐	- Guardrail Around Shaft (> 1.07m. high)	
☐	☐	- Gate (closed & latched)	
☐	☐	- Ground Sloped Away From Edge of Barrier	
☐	☐	- Hoistway Gate (hoistway > 6m.)	
☐	☐	- Red Light	
☐	☐	- Shoring & Bracing	
☐	☐	- Engineer's Drawings (shaft > 6m.)	
☐	☐	- Wire Mesh, Rock Bolts, or Other Device	
☐	☐	- Sheathing, Wales, Struts (D<6m.; L<3m.)	
		- Hoisting (see crane, boomtruck & other lifting device)	
☐	☐	- Operating Procedures	
☐	☐	- Sign(s): Danger Due to Deep Excavation	
☐	☐	- Public Way Protection	
☐	☐	- Housekeeping	
		- Tunnels	
☐	☐	- Tunnel Access (min. diam. or least dimension > 76cm.)	
☐	☐	- Access between wall and haulage equip. > 45cm.	
☐	☐	- Safety Platform (60m. intervals)	
☐	☐	- Timbers, Ribs, or Beams	
☐	☐	- Tunnel Liner	
☐	☐	- Rock Bolts/Wire Mesh	
☐	☐	- Inspected Daily	
☐	☐	- Spalling Rock Removed	
☐	☐	- Engineer's Drawings (tunnels > 12m. long)	
		- Tunnel Equipment	
☐	☐	- Haulage Equipment Operation	
☐	☐	- Housekeeping	
☐	☐	- Ventilation	

☐☐ _____ (PI) X 0.9

This assessment form sheet corresponds to Assessment Form Sequence # _____

Project Activity Classification: [A] Active Status, at time of assessment.

[P] Potential or Anticipated Status, which may or will occur.

☐ **Project Activity: Confined Space Work**

Status of Project Activity at the time of assessment. Project in compliance with OHSA & Regs. and / or D.C.C. policy

In Compliance? Yes	No	Project Activity Elements	Comments
☐	☐	- Access & Egress	
☐	☐	- Atmosphere Monitored	
☐	☐	- Atmospheric Certification	
☐	☐	- 'Competent Person' in Charge	
☐	☐	- Confined Space Personal Protective Equipment	
☐	☐	- SCBA / Escape Air-Pack	
☐	☐	- Tri-gas, Atmospheric Monitor	
☐	☐	- Fall Arrest/Retrieval Harness & Hardware	
☐	☐	- Sanitary, Protective Clothing	
☐	☐	- Respiratory Protection	
☐	☐	- Confined Space, General/Local Ventilation	
☐	☐	- Acceptable Confined Space Entry Procedures	

☐☐ _____ (PI) X 1.0

JUFFERIN CONSTRUCTION

This assessment form sheet corresponds to Assessment Form Sequence # _____

Project Activity Classification:

[A] Active Status, at time of assessment:

[P] Potential or Anticipated Status, which may or will occur:

☐ **Project Activity: Portable Plants, Safety Inspection Form**

Status of Project Activity at the time of assessment.

Project in compliance with the OHSA & Regs and/or D.C.C. policy

In Compliance? Yes	No	Project Activity Elements	Comments
		Material Handling	
☐	☐	- PPE Used as per MSDS	
☐	☐	- Transport vehicles in good repair	
☐	☐	- Proper stacking of materials	
☐	☐	- Proper storage of materials	
☐	☐	- Pallets & skids, correct type & size	
☐	☐	- WHMIS labels used and visible	
☐	☐	- Dangerous goods transportation	
		Equipment Hazards	
☐	☐	- Machine guarding in place where required	
☐	☐	- Pinch points protected	
☐	☐	- Lock-out, tag-out used	
☐	☐	- Start up warning functional	
☐	☐	- Auto Shut-off cables functional	
☐	☐	- Emergency Stop buttons operational	
☐	☐	- Exhaust gases vented	
☐	☐	- Operators manuals available	
☐	☐	- Ergonomically designed	
☐	☐	- 1st aid kit & fire extinguisher within unit when applicable	
☐	☐	- Warning signs posted	
☐	☐	- Screening on cold feed bins	
		Fire Protection	
☐	☐	- Fire Extinguishers	
☐	☐	- Yearly Certification	
☐	☐	- Combustibles present in abundance	
☐	☐	- Flammable liquids present	
		Administration	
☐	☐	- OSHA and industrial Regulations	
☐	☐	- DCC Health & Safety Policy	
☐	☐	- Emergency Procedures and Phone #'s	
☐	☐	- Tailgated & S.I.P.'s	
☐	☐	- Monthly Summaries	
☐	☐	- Divisional H&S Committee Minutes	
☐	☐	- Health & Safety Reps	
☐	☐	- Ministry of Labor Inspection reports	

A Active Status, at time of assessment:

P Potential or Anticipated Status, which may or will occur:

☐ **Project Activity: Portable Plants, Safety Inspection Form**

Status of Project Activity at the time of assessment.

Project in compliance with the OHSA & Regs and/or D.C.C. policy

In Compliance? Yes	No	Project Activity Elements	Comments
		Electrical Power Systems	
☐	☐	-High Voltage areas labeled and secured	
☐	☐	- Control panels labeled and secured	
☐	☐	- Lock-out procedures performed	
☐	☐	- GFCI's in place	
☐	☐	- Extension cords in good state of repair	
☐	☐	- Competent person	
		Fall Hazards	
☐	☐	- Vertical ladder fall protection, (caged)	
☐	☐	- Ladder access signed & secured	
☐	☐	- Ladder clean and in good repair	
☐	☐	- Elevated catwalks and ramps	
☐	☐	- P.P.E. used when required	
☐	☐	- Trained personnel (record of training)	
		Hoisting	
☐	☐	- Chains & slings, labeled and rated	
☐	☐	- Chains and slings, in good repair and storage	
☐	☐	- Safety latches on hooks	
☐	☐	- Logs & manuals, updated and available	
☐	☐	- Singal person used	
☐	☐	- Competent singal person	
		Housekeeping	
☐	☐	- Overall - clean & orderly	
☐	☐	- Spilled materials present	
☐	☐	- Lighting adequate	
☐	☐	- Washrooms sanitary	
		Aggregate Piles	
☐	☐	- Unprotected exposed cliff faces	
☐	☐	- Angle of repose adequate	
☐	☐	- Access for additional material placement	
☐	☐	- Back-up and turn around facilities	
☐	☐	- Environmental protection for run-off	

☐☐ _____ (PI) X 0.9

DUFFERIN CONSTRUCTION COMPANY
690 Dorval Drive, Suite 200
Oakville, On. - Canada

- ◉ EAST
- ○ CENTRAL
- ○ WEST

IPS ASSESSMENT REPORT

DATE OF VISIT - _____

DUFFERIN JOB I.D.# - _____

SUPERINTENDENT _____

H&S WORKER REP. - _____

SUPERVISORY SITE STAFF - _____

_____

_____

SCOPE OF WORK :

- ☐ TRENCHING & EXCAVATING
- ☐ WORK IN/AROUND TRAFFIC
- ☐ WORK ADJACENT TO UTILITIES
- ☐ CONFINED SPACES
- ☐ WORK NEAR/OVER WATER
- ☐ HOISTING & RIGGING
- ☐ TUNNELS/SHAFTS/CAISSONS/COFFERDAM
- ☐ BLASTING PROCEDURES
- ☐ PLANT OPERATIONS
- ☐ OTHER (SPECIFY) _____

_____

_____

_____

ADMINISTRATIVE REQUIREMENTS:

- ☐ TAILGATE TRAINING
- ☐ SHORT INTERVAL PLANS
- ☐ FIRST AID REGS/SUPPLIES
- ☐ OHSA & REGULATIONS
- ☐ EMERGENCY
- ☐ TRAFFIC CONTROL PLAN
- ☐ FALL RESCUE PLAN
- ☐ EMERGENCY NUMBERS & POSTERS

*** A CHECKMARK (✓) INDICATES 100% COMPLIANCE.**

IDENTIFICATION OF PROBLEMS & CORRECTIVE ACTION:

#1. :

SOL'N:

#2. :

SOL'N:

#3. :

SOL'N:

COMMENTS & NOTES:

Appendix G

Monthly Worker rep. Jobsite Safety Inspection Form

Date of Inspection _____
Performed By: _____
- with _____

Copies to:
Foreman _____
Superintendent _____
H & S Dept. _____

Item	N/A	Comply Yes	No	Action / Notes	Responsibility of:	Due Date
Administration (postings)						
OSHA / Construction Reg. (Green Book)						
Notice of Project						
Extract from OSHA poster						
In Case of All Injuries poster						
DCC Health & Safety Policy						
Health & Safety Reps.						
Emergency Procedures and Phone #'s						
Ministry of Labour Inspection Report(s)						
Divisional H&S Committee. Minutes						
Monthly Summaries						
First Aid						
Kit(s) stocked as required						
Treatment Record						
"First aid giver" certificates posted						
Eye Wash stations						
Stretcher						
Housekeeping & General Environment						
Overall - clean and orderly.						
Lighting adequate throughout site						
Washrooms - sanitary / adequate #						
Authorized entry only signs						
Fire Protection adequate						
Environmental protection / barriers						

Please forward a copy of this form to the H S Department following completion of the inspection

Monthly Worker rep. Jobsite Safety Inspection Form

Material Handling						
Proper Lifting techniques Used						
P.P.E. Used where required						
Proper stacking of materials / blocking						
Proper storage of materials						
WHMIS labels Used and visible						
Dangerous goods transportation						
Fall Hazards						
P.P.E. Used where required						
Signage - fall hazard / work overhead						
Guardrails						
Static Lines as per drawings						
Life lines						
Vertical Ladders - fall protection						
Work Platforms & Scaffolding						
Access / Egress						
Trenching and Excavating						
Soil Type Classification > please enter within comment area						
Sloping and vertical excavation as per classification						
Trench box or support system						
Access / Egress						
Clear distance along surface						
Non-use security measures						
Below grade utilities - located appropriately						
Traffic Control						
MTO Guidelines followed (MUTCD adhearance)						
Trained personnel performing set-up / maitenance / removal						
Traffic control persons appointed & Used						
P.P.E. used where required						
Traffic merging techniques for construction and public						
Hoisting						
Chains & slings, labeled and rated						
Chains & slings -good repair and storage						
Safety latches on hooks						

Please forward a copy of this form to the H S Department following completion of the inspection

Crane Logs and manuals, updated & available						
Signal person appointed & Used						
Competent Signaler						
Personal Protective Equipment						
Boots						
Head protection						
Eye protection						
Hearing protection						
Gloves						
Respiratory protection						
Equipment Hazards						
Machine guarding in place where required						
Pinch points protected						
Lock-out, tag-out Used						
Operators manuals available						
1st aid kit and Fire extinguisher within unit where applicable						
Moving / Back-up Hazards						
Personnel trained within area						
Optimum direction of travel Used						
Signal person appointed & Used						
Warning alarms In good repair						
Mirrors provided (In good repair)						
Working Over/Around Water						
Signage - drowning hazard						
Life jackets						
Rescue operations - rescue boat						
Diving operations						
Confined Space						
Confined space area signed & secured from unauthorized entry						
Confined space permit issued and requirements for entry followed						
Ventilation adequate						
Gas monitor - continuous						
Lock-out / Tag-out, system de-energized prior to entry						

Additional Notes:

Appendix G

Monthly Worker rep. Jobsite Safety Inspection Form

Please forward a copy of this form to the H S Department following completion of the inspection

4

NEW & REASSIGNED EMPLOYEE ORIENTATION

CONTENTS

1.0 Purpose
2.0 Policy

- **Appendix A** ***"Dufferin Construction Company - New Employee Orientation Review Sheet"***

1.0 PURPOSE

To provide direction for the provision of safety orientation to all new employees in order to ensure that workers have a basic understanding of the project management structure, the nature of the work, hazards and preventive measures.

2.0 POLICY

Superintendents are responsible for ensuring that their respective new employees are familiarized with:

- Project management structure
- Other project personnel
- Project hazards
- Preventive safe work procedures
- Personal protective equipment requirements
- Workplace Hazardous Materials Information System (WHMIS) procedures
- Hazard and accident reporting procedures

Furthermore, superintendents are responsible to ensure that each new employee receives a copy of an "***Employee Health & Safety Policy and Reference Manual***" Additionally, each employee shall read and sign the tear-out sheet acknowledging they have received and agree to abide by the policies and procedures contained in the manual.

2.1 Responsibilities

Superintendents shall utilize and fully complete a Dufferin Construction Company - New Employee Orientation Review Sheet as prescribed by the directions contained on the sheet.

NEW & REASSIGNED EMPLOYEE ORIENTATION

Appendix A

DUFFERIN CONSTRUCTION COMPANY

New Employee Orientation Review Sheet

Items to be reviewed with each new employee by Superintendent or designated competent supervisor. Where the new employee is incapable of understanding the orientation due to a language difficulty, seek assistance. Fill in or check off items as applicable as they discussed with the new employee. Provide the new employee with a copy of this orientation review sheet.

Employee Name:_____ Date:_____

Position: _____

Project Personnel

Identify and/or introduce the following personnel:

1. The Project Superintendent is:_____
2. The Assistant Superintendent is:_____
3. The Project Engineer is:_____
4. The Foreman to whom I report is:_____
5. The person responsible for distributing the paycheck is:_____
6. The person responsible for the co-ordination of MSDS at the project level is:_____
7. The Worker Representative or Committee Member of the Project Joint Health and Safety Committee is:_____
8. Dufferin Construction Company's Head Office phone number is:_____

Safety

1. Identify previous worker training including dates, who conducted the training and evidence of participation in the training:

_____

_____

_____

2. Review applicable general hazards and safe work procedures associated with the project:

Work at heights	Lifting devices	Trenching and excavating
Work near water	Work in traffic	Tunnel/Shafts/Caissons/Cofferdams
Work adjacent to utilities	Blasting	Confined spaces
Lockout/tagout		

The worker has been given applicable personal protective equipment and received a review on their use. _____

The worker has received a copy of the "Employee Health & Safety Manual". _____

The worker has been requested to read and apply the information in the manual. _____

The worker has been requested to complete, sign, and submit the acknowledgement sheet. _____

The worker has been given a review on the WHMIS program and how to obtain MSDS's. _____

Health

1. The location of the first aid kit and eyewash station is:_____
2. The certified first aider on site is:_____
3. The location(s) of the fire extinguisher(s) is/are:_____
4. The location of the emergency contact list is:_____

Accident Response and Reporting

The worker has been informed to advise his Foreman immediately in the event of an injury.

Accident/Incident reporting procedures have been reviewed.

Definition of Critical Injury and preservation of site has been reviewed.

Employee and Project Superintendent (or assigned Competent Supervisor) agree that this orientation has been carried out completely.

_____ _____

(Supervisor's Signature) (Date)

_____ _____

(Employee's Signature) (Date)

COMPLETE THIS FORM AND SUBMIT TO PAYROLL WITH OTHER DOCUMENT

DUFFERIN CONSTRUCTION COMPANY
A DIVISION OF ST. LAWRENCE CEMENT INC.

EMPLOYEE
HEALTH & SAFETY POLICY
AND REFERENCE MANUAL

MANUEL DES EMPLOYES
REFERENCES ET REGLES DE SECURITE
ET DE PROTECTION DE LA SANTE

MANUALE SULLA SANITA', SICUREZZA
E DI RIFERIMENTO
POR GLI' IMPIEGATI

MANUAL DE REFERÊNCIA PARA OS
ESTATUTOS DE SAÚDE E SEGURANÇA
DOS EMPREGADOS

Revision: 7, January 2005

DUFFERIN CONSTRUCTION COMPANY
HEALTH AND SAFETY POLICY

Dufferin Construction Company is committed to the protection from accidental injury and loss to its employees and property.

In fulfilling this commitment, we will provide and maintain a safe work environment and we will strive to eliminate hazards which may result in injury and property damage.

Accidental injury and loss can be controlled through good management in combination with active employee involvement.

Supervision and Management will take all necessary action to eliminate or control hazardous working conditions and work in compliance with laws pertaining to occupational health and safety.

All employees are responsible for their own personal safety and that of their co-workers. They are expected to use the safest work methods to carry out their job and point out sources of danger and suggest means to remedy them.

I trust that each of you will join me in a personal commitment to enforce this Health and Safety Policy as a way of life.

Lloyd Ferguson
General Manager

uINTRODUCTION

This manual is intended to be a general overview of safety policies and procedures which should be followed by all employees and subcontractors of Dufferin Construction Company. Employees and subcontractors should not rely on this manual exclusively. Reference must be made to the Occupational Health and Safety Act and the Regulations passed pursuant thereto for Construction Projects and Industrial Establishments, as well as to Dufferin Construction Company's - Divisional Health and Safety Policy and Reference Manual in order to ensure compliance.

The information contained in this manual is designed to provide assistance to all employees of Dufferin Construction Company in maintaining a safe working environment.

In addition, each and every employee should be aware of his or her responsibilities, as required by the Occupational Health and Safety Act, Section 28:

1. Work in compliance with the provisions of this Act and all health and safety regulations.
2. Use or wear the equipment, protective devices or clothing required by the employer.
3. Report to the Company defective or dangerous equipment and hazards.
4. Do not remove any protective devices.
5. Do not operate equipment or machinery in a dangerous manner.
6. Do not engage in any horseplay or pranks in the workplace.
7. Report all accidents immediately.

At the back of this manual is a 'tear-off' slip which you will be required to sign as acknowledgement that you have received the Company's Health & Safety Policy and Reference Manual and agree to abide by the rules and policies contained therein.

This record will be retained on file at our Head Office.

WORKER RIGHTS

The Occupational Health and Safety Act includes three fundamental rights of workers:

0. the right to know about workplace health and safety hazards;
0. the right to participate in health and safety recommendations, through their representation on the joint health and safety committee(s);
0. the right to refuse work if it endangers health or safety.

RESPONSIBILITIES

It is the responsibility of every Manager, Supervisor and Foreman to ensure:

1. The implementation of the requirements of all applicable Federal and Provincial Health & Safety Acts, together with any associated regulations.
2. The implementation of the Company's - Divisional Health and Safety Policy and Reference Manual.
3. Suitable and adequate safety equipment is available and used.
4. The operations under their control are, so far as is reasonably practicable, conducted without detriment to the health and safety of employees or others who may be affected by their activities.

It is the responsibility of each and every employee to cooperate in implementing the requirements of all health and safety legislation and related regulations; to refrain from doing anything which constitutes a danger to themselves or others; and to bring to the attention of management any situation or practice that may lead to injury or ill-health.

YOUR WELFARE AT WORK

Dufferin Construction Company is vitally concerned with accident prevention and for your overall welfare and safety. We need your help in preventing accidents that may result in personal injury or damage to property and equipment. All injuries must be reported immediately to your Supervisor or Foreman, as failure to do so can result in the delay of proper first-aid or medical treatment and any potential compensation benefits.

All defective tools and equipment must be brought to the attention of your Supervisor or Foreman for immediate correction.

Any accident that occurs while carrying out the company's business will be regarded as a serious matter and will be thoroughly investigated and acted on to prevent recurrence.

Site management is responsible for immediately contacting and notifying Health and Safety Department personnel in the event of an accident or loss.

Site management is also responsible for completing an internal accident investigation report form in all cases of accident, incident or loss. Completed reports must be forwarded to the Health and Safety Department at the Head Office immediately.

In addition and where appropriate, the information required under Sections 51, 52 & 53 of the Act (see Sections 8 through 12 of the Regulations for Construction Projects) must also be forwarded to Head Office.

FIRST-AID

First-Aid kits are provided on all project sites and in many company vehicles. Know where the closest first-aid kit is located in the event of an emergency.
All employees are encouraged to take first-aid training. In all cases of injury, take necessary action to obtain prompt first-aid and prevent further complications. Report all accidents and injuries to your supervisor immediately.

ALCOHOL/UNAUTHORISED DRUGS

Consumption of alcohol and unauthorised drugs are prohibited on Dufferin Construction Company property and work sites.
Any person under the influence of alcohol or illegal drugs will be refused entry or removed from the premises or project.
Personnel using a medically prescribed drug which may impair performance or judgement must inform their supervisor.

PERSONAL PROTECTIVE EQUIPMENT

It is a condition of employment that all employees provide their own safety boots. All other personal protective equipment will be supplied and must be worn as required without exception.
Hard hats and safety boots must be worn at all times on all work sites by all employees. This includes drivers when they leave their vehicles and visitors to the job site.
Hard hats must be approved by the Company and footwear must be CSA Certified Grade 1 with heavy duty toe and sole protection.
Personal protective equipment must be worn as your job requires, such as:

a) Suitable eye protection when cutting, grinding or hammering; or when working in areas where material may fall or blow into your eyes; or where dust particles are whipped up by the wind.
b) Hearing protection (earmuffs, plugs) when working with or near noisy tools or equipment. (audio headsets such as portable radios are not permitted while working on the job site.)
c) Reflective fluorescent vests when controlling traffic or working on a project where workers are exposed to the hazards of vehicular traffic.
d) Appropriate protective gloves when handling hazardous products and sharp or abrasive materials.
e) Respirators when working in conditions that may cause inhalation of particles, vapour, mist or gas.
f) Short sleeve shirts and long pants as a minimum are mandatory.

g) Life jackets must be worn by workers exposed to the danger of drowning in water deep enough for the life jacket to be effective.

In addition to the above, specially designed protective clothing must be worn under certain hazardous working conditions.

FALL PROTECTION MEASURES

A worker at risk of falling more than 2.4 meters (8 feet) must be protected by a guardrail, travel restraint system or fall-arrest system.

GUARDRAILS

Guardrails are required to protect workers from:

- open edges of scaffolds, platforms and ramps;
- edges of bridge surfaces;
- edges of slab formwork;- openings in floors, roofs and other working surfaces not otherwise covered or protected;
- locations where a worker may fall into water, onto operating machinery or hazardous substances or objects.

Guardrails should have a top rail between 3 and 3.5 feet above surface level, in addition to a mid-rail and toeboard secured to vertical posts situated no more than 8 feet apart.

TRAVEL-RESTRAINT AND FALL-ARREST SYSTEMS

A travel-restraint or fall-arrest system must be employed when a worker is exposed to any of the previously noted hazards and a guardrail or other suitable means of protection are not present. Travel-restraint and fall-arrest systems consist of the following components:

- a full body harness;
- a lanyard including shock absorber;
- a locking snap hook;

a suitable anchorage; including a lifeline and suitable hardware when appropriate.

Only Company approved components are permitted as part of a travel-restraint or fall-arrest system.

100% fall protection is required at all times.

EQUIPMENT OPERATION

Only authorised personnel are permitted to operate, adjust and repair Dufferin Construction Company vehicles and equipment.

When operating a company vehicle, you are required to be the holder of a valid driving license; to know and obey all traffic regulations and to observe all the rules of safe driving. Become familiar with the operation of any vehicle assigned

to you. Keep your vehicle properly serviced and report unsafe conditions and be sure to have them corrected at once.

All vehicle and equipment operators are responsible for circling their vehicle or equipment before starting to ensure that there are no obstructions in the direction of travel. When starting up, sound warning.

All operators must ensure that their path is clear before backing up the vehicle or equipment. A signal person must be used when the view is obstructed and when the equipment is driven in an area where the operator or other persons may be endangered.

Always be alert when operating equipment around overhead hydro lines. Before mounting equipment, ensure that boot soles are clean to avoid slips and falls. Climb up and down equipment maintaining a 3 point contact at all times (two hands one foot, or two feet one hand).

All mounting facilities (ladders, platforms) must be maintained in a safe and clean condition. It is the responsibility of all operators to ensure that their equipment is in safe working order at all times and that all problems are reported and acted on immediately.

MACHINE GUARDS

Machine guards must be installed and maintained at all times to prevent hands, arms, or any other part of a worker's body from making contact with dangerous moving parts. Guards and devices must be made of appropriate durable material (including woven wire, perforated or expanded metal) that will withstand the conditions of normal use. They must be secured to the machine.

Replacement guards or modified guards should be designed by an engineer. Where machine guards, safeguard devices or safety controls are not present, barriers, and warning signs must be established to prevent access to the hazard area.

LOCKOUT AND TAGOUT PROCEDURES

When maintenance and servicing are required on equipment and machines, the energy sources must be isolated and lockout/tagout procedures implemented. Only personnel trained in lockout/tagout procedures should perform maintenance and servicing of equipment and machines. Strict adherence to the Company's - Divisional Health and Safety Policy and Reference Manual is necessary to comply with lockout/tagout procedural requirements.

SERVICING MOBILE EQUIPMENT

Disengage power, stop the engine and remove and retain the ignition key before servicing equipment.

Never oil or grease machinery while it is running. Dozer and grader blades, backhoe and loader buckets and scraper pans must be lowered to the ground when the machine is stopped. Follow all recommendations in operating, service and maintenance manuals which have been provided to you.
Service personnel must notify a supervisor of their locations at all times and mechanics are not to work in the field alone without notifying a supervisor of their location.

ELECTRICAL

All work activities and material must be kept at a safe distance from any electrical power source in order to prevent contact or arcing.
A ground fault circuit interrupter (GFCI) must be installed at the receptacle of a generator or other power source when portable electrical tools are used outdoors or in wet locations.

TRENCHES AND EXCAVATIONS

Where personnel are required to enter a trench or excavation, it must be properly sloped or a trench support system used where required.
A ladder or ramp must be provided to enable access or egress from the work area.
Excavated materials should be kept well away from the trench edge in all cases.
Be extremely cautious when working to expose underground utilities such as gas, hydro, watermains, etc. Be certain that all necessary precautions have been taken before commencing work. All underground utilities must be hand located prior to commencing mechanical excavation.
All equipment must be kept a safe distance from overhead power lines. All activities adjacent to existing utilities must conform to the provisions of the Occupational Health and Safety Act and Regulations for Construction Projects.

CONFINED SPACE ENTRY

Entering a tank, vessel or manhole for any purpose is not permitted unless the interior conditions have been tested by a qualified person and the necessary safe work permit issued. All confined space entries must be made in accordance with Regulations for Construction Projects.

MATERIAL HANDLING & GENERAL HOUSEKEEPING

Whenever practical, heavy lifts should be done with mechanical lifting devices.
When manual handling is required, lift correctly, bending at the knees and moving your feet when turning, rather than swinging at the waist. GET HELP WITH HEAVY LOADS.

When working on sewer and watermain installation, keep fingers and hands clear when joining pipes, fitting manholes, etc. Use care in connecting lifting cables and avoid trapping fingers. Watch out for 'pinch' points. Never permit any portion of your body to get into a position where 'jamming' could occur. Guard against getting in an off-balance position when pushing or prying.

Keep work areas free of loose material and debris, particularly lumber and timbers with nails. Watch your footing to avoid slips and falls. Never leave tools or materials at locations where they can be knocked off and fall on someone working below.

FIRE PROTECTION

Precautions must be taken to prevent the outbreak of fire, especially where welding or cutting operations are being carried out.

Fire extinguishers must be readily accessible, properly maintained, regularly inspected and promptly refilled after use.

Be familiar with the location of all fire fighting equipment on site.

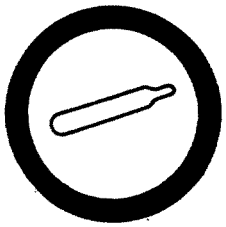
WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS)

All hazardous materials found in the workplace must be identified in accordance with the Workplace Hazardous Materials Information System (WHMIS) requirements of the Occupational Health & Safety Act.

Material Safety Data Sheets will be provided and maintained in each site office trailer for reference, to assist all employees in how to handle, store and dispose of these materials.

All employees who work with or in close proximity to hazardous materials must have had formal training under the WHMIS regulation.

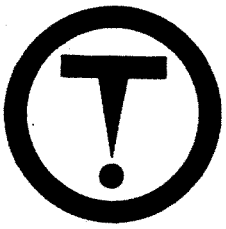
The WHMIS hazard symbols are shown below for your information.



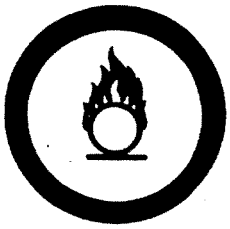
Class A
Compressed Gas

Class D
Division 1
Poisonous and infectious material: immediate & serious toxic effects

Class B
Combustible andflammable material

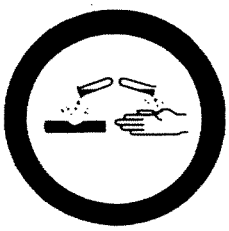


Class D
Division 2
Poisonous and infectious material: other toxic effects



Class C
Oxidising material

Class D
Division 3
Poisonous and infectious material: biohazardous infectious material



Class E
Corrosive material

Class F
Dangerously reactive material

CHEMICAL SPILLS

The release or discharge of a chemical which may pose a hazard to people or the environment is prohibited.

In the event of a spill:

1. Find and identify the substance and source.
2. Ensure safety of self and others.
3. If possible, stop the process or shut off the source.
4. Inform the Ministry of Environment, and the applicable Municipality and local Conservation Authority (spills must be reported forthwith). If local Ministry office is not open, Spills Hotline: 1-(800) 268-6060.
5. Contain the spill.
6. Notify Management.
7. Carry out clean-up activities

IMPORTANT

This Health & Safety Policy and Reference Manual has been prepared to inform you of the basic requirements expected of you as an employee of Dufferin Construction Company. It is your responsibility to read this manual and abide by all specified policies.

It is the responsibility of your Foreman or the office staff at the site office where you were hired, to provide you with this manual and to ensure that you complete and sign the declaration below along with your Foreman or the person issuing you this manual.

I hereby declare that I have received a copy of Dufferin Construction Company's Health & Safety Policy and Reference Manual and agree to abide by the rules and policies contained therein.

Employee Name (Print)	Employee Signature
Social Insurance Number (Print)	Date Received
Foreman/Staff Name (Print)	Foreman/Staff Signature

DUFFERIN CONSTRUCTION COMPANY
RÈGLES DE SÉCURITÉ ET DE PROTECTION DE LA SANTÉ

Dufferin Construction Company a pris des engagements à l'égard de la protection de ses employés et de leurs biens contre les blessures et les pertes par accident.

Pour remplir ces engagements, nous fournirons et maintiendrons un environnement de travail sûr, et nous travaillerons à l'élimination des risques susceptibles de provoquer des dommages corporels ou matériels.

Il est possible de minimiser les accidents provoquant des dommages corporels et matériels au moyen d'une saine gestion, en conjonction avec la participation active des employés.

Les personnels de supervision et de direction prendront toutes les mesures nécessaires pour l'élimination ou le contrôle des conditions de travail dangereuses, et agiront en conformité avec les lois relatives à la sécurité et la protection de la santé au travail.

Chaque employé est responsable de sa propre sécurité et de celle de ses collègues. On attend d'eux qu'ils utilisent les méthodes de travail les plus sûres pour exécuter leurs tâches, qu'ils signalent les sources de danger qu'ils remarquent et qu'ils suggèrent des moyens d'y remédier.

Je veux croire que chacun d'entre vous s'engagera personnellement avec moi à adopter ces règles de sécurité et de protection de la santé pour en faire un mode de vie.

Lloyd Ferguson
Directeur général

INTRODUCTION

Ce manuel a pour objet de présenter les grandes lignes des politiques et mesures de sécurité que doivent observer les employés et sous-traitants de Dufferin Construction Company. Les employés et sous-traitants ne doivent cependant pas se fier exclusivement à l'information de ce manuel. Pour garantir le respect de toutes les prescriptions en vigueur, on doit également tenir compte de la Loi sur la santé et la sécurité au travail et des règlements connexes adoptés en vertu de cette loi pour les projets de construction et établissements industriels, ainsi que du manuel de références et règles de sécurité/protection de la santé de la division concernée de Dufferin Construction Company.

L'information présentée dans ce manuel a pour but d'aider tous les employés de Dufferin Construction Company à maintenir un environnement de travail sûr. De plus, chacun des employés doit être parfaitement conscient de ses propres responsabilités, comme l'exige la section 28 de la Loi sur la santé et la sécurité au travail:

1. Travailler en conformité avec les prescriptions de cette loi et de tous les règlements concernant la sécurité et la protection de la santé.
2. Utiliser ou porter l'équipement ou les accessoires de protection exigés par l'employeur.
3. Signaler à la compagnie les situations de risque et équipements dangereux ou défectueux.
4. N'enlever aucun équipement de protection.
5. Ne pas faire fonctionner un équipement ou une machine d'une manière dangereuse.
6. Ne jamais participer à des chahuts ou blagues sur les lieux de travail.
7. Signaler immédiatement tout accident qui survient.

On trouve à la fin de ce manuel une carte détachable que l'on vous demandera de signer pour attester de la remise de ce manuel de Références et règles de sécurité et de protection de la santé; en la signant, vous vous engagez également à respecter les règles et politiques présentées dans cette brochure.

Ce document sera conservé en dossier à notre siège social.

LES DROITS DES TRAVAILLEURS

La Loi sur la santé et la sécurité au travail définit trois droits fondamentaux des travailleurs:

- le droit d'avoir connaissance des risques pour la sécurité et la santé qui existent sur les lieux de travail;
- le droit de participer à la formulation des recommandations de protection de la sécurité et de la santé, par représentation au(x) comité(s) mixte(s) santé/sécurité;

- le droit de refuser toute tâche mettant en danger leur santé ou leur sécurité.

RESPONSABILITÉS

Chaque cadre, superviseur et contremaître se voit imposer la responsabilité de :

1. L'application et le respect des exigences de toutes les lois fédérales et provinciales applicables sur la santé et la sécurité au travail, et de tout règlement connexe.
2. La mise en oeuvre des dispositions du manuel de références et règles de sécurité/protection de la santé de la division concernée de la compagnie.
3. La disponibilité et l'utilisation des équipements de sécurité appropriés.
4. L'exécution des opérations placées sous leur contrôle, autant que c'est raisonnablement possible, sans effet néfaste sur la sécurité ou la santé des employés ou d'autres personnes susceptibles d'être affectées par ces activités.

Chaque employé se voit imposer la responsabilité:

- de coopérer dans la mise en oeuvre et le respect des prescriptions de toute législation santé/sécurité et des règlements connexes;
- d'éviter toute action constituant un danger pour lui-même ou pour d'autres, et
- de signaler à la direction toute situation ou pratique susceptible de provoquer des blessures ou une dégradation de la santé.

VOTRE BIEN-ÊTRE AU TRAVAIL

Chez Dufferin Construction Company, la prévention des accidents et la protection de votre sécurité et de votre bien-être général constituent une priorité fondamentale. Nous avons besoin de votre aide pour la prévention des accidents susceptibles de provoquer des blessures ou la destruction de biens ou équipements. Toute blessure doit être immédiatement signalée au superviseur ou contremaître; toute négligence à cet effet peut susciter un retard dans l'administration des premiers soins ou d'un traitement médical, et un refus d'indemnisation par les organismes concernés.

Toute défectuosité d'un outil ou d'un équipement doit être signalée au superviseur ou contremaître, pour correction immédiate.

Tout accident survenant dans le cadre des activités de la compagnie sera considéré comme une question sérieuse, et fera l'objet d'une enquête approfondie et d'initiatives destinées à en empêcher la répétition.

La direction de chantier a pour responsabilité de contacter et aviser immédiatement le personnel du département santé/sécurité à l'occasion d'un accident ou d'une perte matérielle. La direction de chantier a également pour responsabilité de remplir un rapport d'enquête sur accident, sur le formulaire interne, à l'occasion de tout accident, incident ou perte matérielle. Les rapports remplis doivent être envoyés immédiatement au département santé/sécurité du siège social.

De plus, lorsque c'est approprié, l'information exigée en vertu des sections 51, 52 et 53 de la loi (voir les sections 8 à 12 des règlements concernant les projets de construction) doit être également communiquée au siège social.

PREMIERS SOINS

On trouve des trousses de premiers soins sur tous les chantiers, et dans de nombreux véhicules de la compagnie. Chacun doit prendre connaissance de l'endroit le plus proche où se trouve une trousse de premiers soins, pour pouvoir l'utiliser en cas d'urgence.

Nous incitons chaque employé à recevoir une formation aux premiers soins. Dans tous les cas de blessures, agir selon le besoin pour obtenir sans retard les premiers soins appropriés, et pour éviter toute complication. Faire immédiatement rapport de chaque accident et blessure au superviseur.

ALCOOL ET DROGUES ILLICITES

La consommation d'alcool et de drogues illicites est prohibée sur les propriétés et chantiers de Dufferin Construction Company. Toute personne qui se trouve sous l'influence de l'alcool ou de drogues illicites se verra refuser l'accès aux lieux de travail ou au site du projet, ou en sera expulsée. Les personnes utilisant sur prescription médicale des médicaments susceptibles d'affecter leur performance ou leur jugement doivent en aviser leur superviseur.

ÉQUIPEMENT DE PROTECTION INDIVIDUELLE

Chaque employé doit posséder ses propres chaussures de sécurité; il s'agit d'une condition d'emploi. Tous les autres équipements de protection individuelle seront fournis; ils doivent être portés/utilisés conformément aux exigences, sans exception.

Sur un chantier, toute personne doit porter un casque et des chaussures de sécurité. Les conducteurs qui quittent leur véhicule et les visiteurs du chantier sont également assujettis à cette règle.

Les casques utilisés doivent être approuvés par la compagnie; les chaussures utilisées doivent comporter l'homologation CSA Catégorie 1 pour service rigoureux, avec protection de la semelle et des orteils.

Des équipements de protection individuelle doivent être portés selon le besoin, comme par exemple :

a) Accessoires appropriés de protection des yeux : pour les opérations de coupe, meulage ou martelage; lors des activités en un lieu où des matériaux peuvent tomber ou être projetés vers les yeux; ou lorsque le vent peut projeter des particules de poussière.
b) Protection de l'ouïe (serre-tête antibruit ou bouchons d'oreille): lors des travaux avec ou au voisinage d'équipements ou outils bruyants (l'utilisation d'appareils

audio à écouteurs, comme radio portative, n'est pas permise pendant les activités sur les lieux de travail).

c) Gilets réflecteurs fluorescents: lors du contrôle de la circulation ou des activités sur un projet où les employés travaillent au voisinage de la circulation de véhicules.

d) Gants de protection appropriés : pour la manipulation de produits dangereux et de matériaux acérés ou abrasifs.

e) Appareils respiratoires : lors des activités dans un environnement favorisant l'inhalation de particules, vapeur, brouillard ou gaz. La tenue vestimentaire obligatoire comprend au moins chemise à manches courtes et pantalon long.

f) Les gilets de sauvetage doivent être portés par tous les travailleurs travaillant au voisinage d'une masse d'eau suffisamment profonde pour provoquer une noyade.

En plus des exemples ci-dessus, des vêtements de protection de conception spéciale devront être portés pour certaines activités de travail dangereuses.

PROTECTION CONTRE LES CHUTES

Tout employé exposé à un risque de chute d'une hauteur de plus de 2,4 mètres (8 pieds) doit être protégé par un garde-corps, un système de restriction des déplacements, ou un système d'arrêt de chute.

GARDE-CORPS

L'emploi de garde-corps est exigé pour la protection des travailleurs dans les situations suivantes:

- à la limite des échafaudages, plates-formes et plans inclinés;
- à la limite des surfaces d'un pont;
- aux limites des dalles : - ouvertures dans les planchers, toitures et autres surfaces de travail qui ne sont pas autrement couvertes ou protégées;
- aux endroits où un travailleur pourrait tomber dans de l'eau, dans une machine en fonctionnement, ou sur des objets ou substances dangereux.

Un garde-corps doit comporter une traverse supérieure située à 3 - 3,5 pieds au-dessus de la surface horizontale, en plus d'une traverse intermédiaire et d'une planche de plinthe, fixées à des poteaux verticaux placés à intervalles ne dépassant pas 8 pieds.

SYSTÈMES DE RESTRICTION DES DÉPLACEMENTS ET D'ARRÊT DE CHUTE

On doit utiliser un système de restriction des déplacements ou d'arrêt de chute lorsqu'un travailleur est exposé à l'un des dangers déjà signalés, lorsqu'aucun garde-corps ou autre moyen de protection approprié n'est installé. Les systèmes de

restriction de déplacement et d'arrêt de chute doivent comporter les composants suivants:

- harnais complet fixé au corps;
- filin de sécurité, avec amortisseur de choc;
- mousqueton verrouillable;
- ancrage approprié; et également filin de sécurité et organes de fixation appropriés, selon le besoin.

Les systèmes de restriction de déplacement et d'arrêt de chute utilisés ne doivent comporter que des composants approuvés par la compagnie.

Une protection à 100 % contre les chutes est exigée en tout temps.

UTILISATION DES ÉQUIPEMENTS

Seules les personnes habilitées sont autorisées à faire fonctionner, régler ou réparer des véhicules ou équipements de Dufferin Construction Company.

Lors de l'utilisation d'un véhicule de la compagnie, les conducteurs doivent être détenteurs d'un permis de conduire valide; le conducteur doit connaître et respecter tous les règlements régissant la circulation, et respecter toutes les règles de conduite en sécurité. Chaque conducteur doit se familiariser avec le fonctionnement de tout véhicule qui lui est affecté. Veiller à ce que le véhicule reçoive l'entretien approprié, signaler toute situation affectant la sécurité, et veiller à l'application des mesures correctives appropriées.

Chaque conducteur de véhicule ou d'équipement doit effectuer avant la mise en marche une inspection périphérique de son véhicule ou équipement, pour vérifier l'absence de toute obstruction dans la direction de déplacement. Lors de la mise en marche, émettre un signal avec l'avertisseur.

Tout conducteur doit vérifier que la voie est totalement libre avant de faire reculer son véhicule ou équipement. Lorsque le champ de vision est restreint ou lorsque l'équipement est utilisé dans une zone où le conducteur ou toute autre personne pourrait être exposé à un danger, on doit faire intervenir une autre personne responsable de la signalisation. Veiller à demeurer toujours alerte lors de l'utilisation d'un équipement au voisinage de lignes électriques.

Avant de grimper sur un équipement, vérifier la propreté des semelles des chaussures afin d'éviter tout risque de glissade et chute. Pour grimper sur un équipement ou en descendre, maintenir en tout temps un contact sur 3 points (deux mains et un pied, ou deux pieds et une main).

Veiller à l'entretien de la propreté et de la sécurité des accessoires d'escalade (échelles, plates-formes etc.). Les conducteurs et opérateurs doivent veiller à ce que leur équipement soit toujours en parfait état de sécurité, et signaler et faire corriger immédiatement toute anomalie.

CARTERS DES MACHINES

Les carters des machines doivent toujours être installés et être maintenus en bon état en tout temps, pour la prévention de l'introduction des mains, bras et autres parties du corps des travailleurs au voisinage des pièces mobiles dangereuses. Les carters et accessoires de protection doivent être faits de matériaux durables appropriés (grillage, métal perforé ou déployé) capables de résister aux conditions de service normales. Ces accessoires doivent être solidement fixés à la machine.
Il convient que les carters de protection de remplacement ou modifiés soient conçus par un ingénieur. En l'absence sur la machine de carters de sécurité ou autres accessoires de protection ou de sécurité, on doit toujours installer des barrières ou affiches d'avertissement pour empêcher l'accès à la zone dangereuse.

MESURES D'ÉTIQUETAGE ET VERROUILLAGE

Lors de l'exécution de travaux d'entretien ou réparation sur un équipement ou une machine, on doit isoler les sources d'énergie et appliquer les mesures de verrouillage/étiquetage. Seules les personnes qui ont reçu la formation appropriée sur les mesures de verrouillage et d'étiquetage sont habilitées à exécuter des travaux d'entretien et de réparation sur les équipements et machines. L'application des exigences de verrouillage et d'étiquetage implique le strict respect des mesures décrites dans le manuel de références et règles de sécurité/protection de la santé de la division concernée de la compagnie.

ENTRETIEN DES ÉQUIPEMENTS MOBILES

Interrompre l'alimentation en énergie; arrêter la machine; retirer et conserver la clé de contact avant d'entreprendre le travail.
Ne jamais entreprendre de lubrifier/graisser une machine en fonctionnement. Les lames des bulldozers et des niveleuses, et les godets et bennes des pelleteuses et chargeurs doivent être mis en appui sur le sol lors de l'arrêt de la machine. Respecter toutes les recommandations présentées dans le manuel d'utilisation, entretien et réparation mis à la disposition du personnel.
Les personnels chargés des travaux d'entretien doivent toujours indiquer au superviseur où ils se trouvent; les mécaniciens ne doivent jamais travailler seuls sur un chantier sans indiquer au superviseur où ils se trouvent.

ÉLECTRICITÉ

On doit conserver tous les matériaux et exécuter toutes les activités à une distance appropriée des lignes électriques, pour éviter tout contact ou la formation d'arcs.

Un disjoncteur différentiel doit être installé sur la prise de courant d'un générateur ou de toute autre source d'énergie lors de l'utilisation d'outils électriques portatifs à l'extérieur ou sur un terrain humide.

TRANCHÉES ET EXCAVATIONS

Lorsque des employés doivent pénétrer dans une tranchée ou excavation, il faut que ses flancs soient convenablement inclinés et/ou étayés.
On doit mettre en place une échelle ou un plan incliné permettant d'accéder à la zone de travail et d'en sortir. Dans tous les cas, il faut que les matériaux excavés soient entreposés à bonne distance des bords de la tranchée. Travailler très prudemment pour exposer les canalisations souterraines (gaz, eau, câbles électriques, etc.). Veiller à l'application de toutes les précautions nécessaires avant d'entreprendre le travail. On doit travailler à la main pour identifier toutes les canalisations enterrées avant d'entreprendre l'excavation par moyens mécaniques.
Tout équipement doit être maintenu à bonne distance des lignes électriques aériennes. Toutes les activités au voisinage immédiat des canalisations de service doivent respecter les prescriptions concernant les projets de construction des règlements et de la Loi sur la santé et la sécurité au travail.

ENTRÉE DANS UN ESPACE CONFINÉ

L'accès à l'intérieur d'un réservoir, récipient ou regard, quelle qu'en soit la raison, n'est permis que lorsqu'une personne qualifiée a testé l'atmosphère intérieure et émis le permis approprié de travail en sécurité. Toute entrée dans un espace confiné doit être effectuée en conformité avec les règlements applicables aux projets de construction.

MANUTENTIONS ET TENUE DES LIEUX DE TRAVAIL

Chaque fois que c'est possible, les levages d'objets lourds doivent être effectués au moyen d'équipements mécaniques. Lorsque des opérations de levage manuel sont nécessaires, veiller à soulever correctement la charge : fléchir les genoux, et effectuer les rotations par mouvement des pieds plutôt que par pivotement au niveau de la taille.

OBTENIR L'AIDE APPROPRIÉE POUR LES MANIPULATIONS DE CHARGES LOURDES.

Dans les travaux sur des canalisations d'égout et d'adduction d'eau, maintenir les doigts et mains à bonne distance lors des opérations d'emboîtement des tuyauteries, ajustement des regards, etc. Travailler prudemment lors de la mise en place des câbles de levage, et éviter de se coincer les doigts. Surveiller particulièrement les zones de «coincement». Veiller à ne jamais placer une partie du corps à une

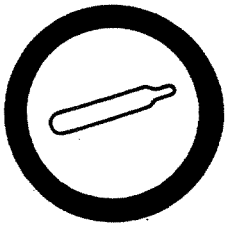
position où un coincement serait possible. Veiller toujours à éviter une position de déséquilibre en exerçant une poussée ou un effet de levier.
Veiller à maintenir les lieux de travail exempts de débris et matériaux dispersés (particulièrement les morceaux de bois comportant de clous). Veiller à toujours conserver un bon appui, pour éviter les glissades et chutes. Ne jamais laisser des outils ou matériaux aux endroits où une personne pourrait buter dessus ou les faire tomber sur d'autres personnes travaillant plus bas.

PRÉVENTION DES INCENDIES

On doit appliquer certaines précautions pour empêcher le déclenchement d'un incendie, particulièrement lors de l'exécution d'opérations de soudage ou découpage. Veiller à ce que des extincteurs soient facilement accessibles; veiller à ce qu'ils soient convenablement entretenus et régulièrement inspectés, et à ce qu'ils soient remplis de nouveau après toute utilisation.
Chacun doit prendre connaissance de l'emplacement de tous les équipements de lutte contre l'incendie du chantier.

SYSTÈME D'INFORMATION SUR LES MATIÈRES DANGEREUSES UTILISÉES AU TRAVAIL (SIMDUT)

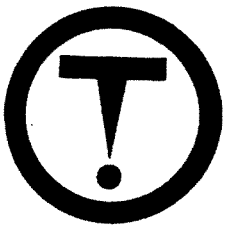
Toute matière potentiellement dangereuse utilisée au travail doit être identifiée conformément au système SIMDUT de la Loi sur la santé et la sécurité au travail.
Des fiches signalétiques seront fournies, et seront conservées pour référence à chaque bureau mobile de chantier; l'information des fiches signalétiques explique aux employés comment manipuler, remiser et éliminer les matériaux et produits dangereux.
Tout employé qui travaille avec des matières potentiellement dangereuses ou à leur proximité, doit bénéficier d'une formation formelle conformément à la réglementation SIMDUT.
Pour information, on présente ci-dessous les symboles de danger de la réglementation SIMDUT.



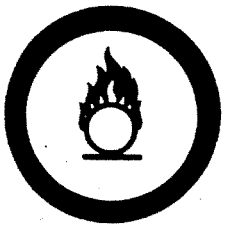
Classe A
Gaz comprimé

Classe D
division 1 Matière toxique et infectieuse, effets toxiques immédiats et graves

Classe B
Matière combustible et inflammable

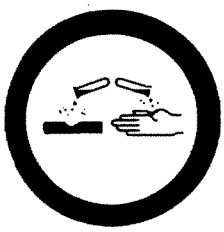


Classe D
division 2 Matière toxique et infectieuse; autres effets toxiques



Classe C
Matière oxydante

Classe D
division 3 Matière toxique et infectieuse; matière infectieuse risque biologique



Classe E
Matière corrosive

Classe F
Matière dangereusement réactive

RENVERSEMENTS DE PRODUITS CHIMIQUES

La libération ou le rejet d'un produit chimique susceptible de présenter un risque pour les humains ou l'environnement est prohibé.

En cas de renversement :

1. Identifier la substance et la source de libération.
2. Chacun doit veiller à sa propre sécurité et à celle des autres.
3. Si c'est possible, interrompre le processus, ou fermer la source de libération.
4. Informer le ministère de l'Environnement, la municipalité concernée et l'autorité locale responsable de l'environnement (tout renversement/rejet doit immédiatement faire l'objet d'un rapport). Si le bureau local du ministère n'est pas ouvert, téléphoner au 1-(800) 268-6060.
5. Endiguer le renversement.
6. Aviser la direction de la compagnie.
7. Exécuter les opérations de nettoyage.

IMPORTANT

Nous avons préparé ce manuel de références et règles de sécurité et de protection de la santé pour vous communiquer les exigences fondamentales auxquelles vous êtes assujetti en tant qu'employé de Dufferin Construction Company. Vous avez la responsabilité de lire ce manuel et de vous conformer aux politiques et règles qui y sont présentées.

La responsabilité de vous remettre ce manuel et de veiller à ce que vous complétiez et signiez la déclaration ci-dessous (avec également signature du contremaître ou de la personne qui vous remet ce manuel) incombe à votre contremaître ou au personnel du bureau du chantier où vous êtes embauché.

Par la présente, je déclare avoir reçu un exemplaire du manuel de références et règles de sécurité et de protection de la santé de Dufferin Construction Company, et je m'engage à respecter les règles et politiques qui y sont présentées.

Nom de l'employé (caractères d'imprimerie)	Signature de l'employé
Numéro d'assurance sociale (caractères d'imprimerie)	Date de remise (caractères d'imprimerie)

Nom du contremaître/responsable (caractères d'imprimerie)	Signature du contremaître /responsable

DUFFERIN CONSTRUCTION COMPANY
REGOLE SULLA SANITA' E LA SICUREZZA

La ditta Dufferin Construction Company si impegna a proteggere operai e proprieta' da incidenti causanti infortuni e perdite.

Nel mantenere tale impegno, provvederemo a mantenere un ambiente lavorativo sicuro e lotteremo per eliminare i pericoli che possono condurre ad infortuni e danni alla proprieta'.

Infortuni e peridet possono essere controllati attraverso una buona amministrazione ed al coinvolgimento attivo degli operai.

La supervisione e la direzione prenderanno tutti i provvedimenti necessari al fine di eliminare o controllare condizioni di lavoro pericolose ed operare in conformita' alle leggi concernenti la sicurezza e la sanita' sul posto di lavoro.

Tutti gli operai sono responsabili della propria sicurezza personale e di quella dei loro compagni di lavoro. Da essi ci si aspetta che usino i metodi piu' sicuri per portare a termine il proprio lavoro ed che indichino fonti di pericolo suggerendo rimedi.

Pongo la mia fiducia nel fatto che ciascuno di voi si unira' a me in questo impegno personale ad applicare le regole sulla sicurezza e sanita' con serieta' e consistenza.

Lloyd Ferguson
Direttore Generale

INTRODUZIONE

Questo libretto si propone di dare una visione globale delle procedure e regole in merito alla sicurezza, che dovrebbero essere seguite da tutti gli operai e subappaltatori della Dufferin Construction Co.. Tuttavia non basta che operai e subappaltatori facciano assegnamento su questo manuale. Essi devono consultare il decreto relativo alla sanita' e sicurezza sul lavoro (Occupational Health and Safety Act) e le regole in esso contenute attinenti a progetti edili e complessi industriali, oltre che alle regole sulla sanita' e sicurezza ed al manuale consultivo della Dufferin Construction Co. (per assicursi di essere conformi).
Le informazioni contenute in questo manuale sono intese a fornire assistenza a tutti i dependenti della Dufferin Construction Co. nel mantenimento di un ambiente di lavoro sicuro.
In aggiunta, ciascun dipendente dovrebbe essere a conoscenza delle proprie responsabilità, come richiesto dall'Occupational Health and Safety Act, Art. 28:

1. Laborare nell'osservanza delle previsioni dela presente legge e delle presenti norme;
2. Usare o indossare l'equipaggiamento, le apparecchiature protettive o l'abbigliamento richiesti dal datore di lavoro;
3. Riferire in merito a equipggiamento difettoso o pericoloso e fonti di pericolo;
4. Non rimuovere alcuna apparecchiatura protettiva;
5. Non impiegara equipaggiamento o macchinario in modo pericoloso;
6. Astenersi dal fare scherzi o condurre attività scherzose di tipo fisico sul posto di lavoro;
7. Notificare immediatamente qualsiasi incident.

Sul retro del presente manuale troverete uno staccando che vi sarà richiesto di firmare quale presa d'atto che avete letto e comprendete la politica aziendale in materia di sicurezza e che aderirete a tale politica nel corso del vostro rapporto di lavoro.
Tale presa d'atto verrà conservata in pratica presso la nostra Sede Centrale.

RESPONSABILITA'

E' responsabilità di ogni direttore, superiore diretto o caporeparto assicurare:

1. L'attuazione pratica di quanto previosto nell'ambito di qualsiasi legislazione federale, provinciale e in materia di sanità e sicurezza aziendali, unitamente a qualsiasi regolamento ivi riferito;
2. La disponibilità e l'uso di equipaggiamento di sicurezza adatto e adeguato;
3. La conduzione delle operazione, sotto il loro controllo, per quanto sia ragionevolmente fattibile, senza danno alla sanità e sicurezza dei dipendenti o di altri che possano venire interessanti dalle loro attività.

E' responsabilità di ciascuno dei dipendenti cooperare nell'attuazione di quanto previsto da tutte la disposizioni di legge riguardanti la sanità e sicurezza e regolamenti relativi; astenersi dal fare alcunché che costituisca pericolo per se stessi o altri; e portare all'attenzione della direzione qualsiasi situazione o pratica da cui possa derivare infortunio o danno alla salute.

IL VOSTRO BENESSERE SUL POSTO DI LAVORO

La nostra azienda è interessata in modo vitale all'aspetto della prevenzione degli infortuni e al vostro benessere e sicurezza in generale. Abbiamo bisogno del vostro aiuto nella prevenzione degli incidenti da cui possono risultare infortuni personali o danni alla proprietà e alle apparecchiature.

Tutti i casi di infortunio devono essere notificati immediatamente al vostro superiore o al capo reparto, in quanto il non conformarsi a questa direttiva può risultare in un ritardo nella prestazione di cure di pronto soccorso o trattamento medico appropriati e di qualsiasi potenziale indennizzo.

Tutti gli attrezzi e le apparecchiature difettosi devono essere portati all'attenzione del vostro superiore o del capo reporto per l'immediata rettifica.

Qualsiasi incidente che occorra quando l'azienda stia conducendo la propria attivita' verra' considerato come materia di particolare gravita' e verra' investigato e verra' adottata azione immediata in medito per evitarne il ripetersi.

La direzione del cantiere e' responsabile per mattersi immediatamente in contatto e notificare il personale del dipartimento per la sanita' e sicurezza qualora si verificasse un serio incidente o una perdita. La direzione del cantiere e' inoltre responsabile per compilare un rapporto d'investigazione interna su tutti i casi di incidenti o perdite. Tali rapporti devono essere consegnati alla sede della ditta immediatamente.

In aggiunta e qualora sia appropriato, le informazioni richieste dagli articole 51, 52 e 53 della legge (vedi articoli 8 - 12 dei Regolamenti per la costruzione) devono pure essere rimesse alla Sede Centrale.

PRONTO SOCCORSO

In tutti i cantieri e in molti dei veicoli aziendali vengono messe a disposizione cassette per il pronto soccorso. Sappiate sempre dove è localizzata la cassetta per il pronto soccorso più vicina nel caso di un'emergenza.

A tutti i dipendenti viene consigliato un corso di addestramento in pronto soccorso. In tutti i casi di infortunio fate quanto necessario per ottener rapidamente le cure di pronto soccorso e impedire ulteriori complicazioni. Riferite immediatamente al vostro superiore circa qualsiasi incidente e infortunio.

ALCOOL E STUPEFACENTI

Il consumo di alcool e stupefacenti e' proibito sulla proprieta' e sui posti di lavoro della Dufferin Construction Co. Chiunque si trovi sotto l'effetto di alcool o droga non sara' fatto entrare o verra' allontanato dagli stabili o dai cantieri. I dipendenti che prendano medicine prescritte da un dottore, che possano indebolire le capacita' di lavorare e di giudizio devono informare il proprio supervisore.

EQUIPAGGIAMENTO PROTETTIVO PERSONALE

E' condizione per l'assunzione il fatto che tutti i dipendenti acquistino per proprio conto i propri stivali di sicurezza. Tutto il rimanente equipaggiamento protettivo personale verrà fornito e dovrà essere indossato senza eccezione. Elmetti e stivali di sicurezza devono essere indossati sempre in tutti i cantieri e stabilimenti da tutti i dipendenti, ivi compresi gli autisti quando lasciano i propri veicoli e chiunque sia in visita presso cantieri e stabilimenti.

Gli elmetti devono essere elmetti di sicurezza certificati CSA Classe "B" e le calzature devono essere certificate CSA Grado 1 con punte ad alta resistenza e protezione della suola.

Abbigliamento protettivo appropriato dovrebbe essere indossato secondo quanto previsto dalla vostra mansione, come:

a) Occhiali di sicurezza quando vengano effettuate operazione di taglio, macinazione o martellamento; o quando si lavori in aree drove del materiale può cadere o essere soffiato negli occhi; o dove particelle di polvere vengano sollevate dal vento;
b) Protezioni per gli orecchi (copriorecchi o tappetti) quando si lavori con o vicino ad attrezzi o equipaggiamento rumorosi.(Non sono permesse cuffie auditive come radio portatili durante il lavoro in cantiere);
c) Giubbetti fluorescenti rifrangenti quando si controlli il traffico o si lavori su o vicino a strade principali o strade dove il traffico può diventare un pericolo per la sicurezza;
d) Guanti, quando si maneggino materiali affilati o abrasivi;
e) Respiratori, quando si lavori in condizioni che possono comportare l'inalazione di particelle, vapore, soluzioni sospese o gas.
f) Cinture di salvataggio devono essere indossate dagli operai esposti al pericolo di annegare in acque abbastanza profonde da rendere necessarie le cinture di salvataggio.
g) Cinture di sicurezza (typo paracadute) o cinghie di sicurezza con il cordoncino assicurato a un supporto fisso devono essere indossate sempre quando il lavoratore si trovi 3 (tre) metri o 10 (dieci) piedi o più al di sopra del suolo.

In aggiunta a quanto sopra, dispositivi per l'arresto delle cadute o abbigliamento protettivo di speciale concezione devono essere indossati quando si operi in determinate condizioni pericolose di lavoro.

USO DELL'EQUIPAGGIAMENTO

Solo al personale autorizzato e' permesso di operare, regolare ed aggiustare veicoli ed equipaggiamento della Dufferin Construction Co.
Nell'uso di un automezzo aziendale vi è richiesto il possesso di una patente di guida valida; di essere a conoscenza di e obbedire a tutte le norme del traffico e di osservare tutte le regole per una guida sicura. Familiarizzatevi con l'uso di qualsiasi veicolo che vi viene assegnato. Mantenete il servizio sul vostro veicolo a un livello appropriato, riferite circa condizioni non sicure e assicuratevi che vengano rettificate immediatamente.
Tutti gli operatori di veicole ed equipaggiamento sono responsabili dell'ispezione da effettuare tutt'intorno a essi prima di partire per assicurarsi che non vi siano ostruzioni nella direzione di marcia. Al momento di partire suonate il clacson quale avvertimento.
Tutti gli operatori devono assicurarsi che il proprio percorso sia libero prima di fare retromarcia con il proprio veicolo o macchinario. Dovrebbe essere sempre impiegata una persona che faccia segnalazioni quando la visuale sia ostruita o quando la macchina venga guidata in un'area dove l'operatore o altre persone possano venire a trovarsi in situazione di pericolo.
Fate sempre particolare attenzione nel manovrare quipaggiamenti intorno a fili elettrici sospesi.
Prima di montare macchinari assicurarsi che lo suole degli stivali siano pulite per evitare scivoloni e cadute. Arrampicatevi su e discendete dai macchinari mantenendo sempre tre punti di contatto (due mani e un piede o due piedi e una mano).
Tutte le structure per il montaggio devono essere mantenute pulite e in condizioni di sicurezza. E' responsabilità di tutti gli operatori assicurarsi che il proprio equipaggiamento sia sempre in condizioni operative sicure e che tutti i problemi vengano notificati immediatamente e si agisca con prontezza in merito.

MANUTENZIONE DELL'EQUIPAGGIAMENTO

Disattivare l'erogazione di energia e fermare i motori prima di effettuare la manutenzione. Non oliare mai o mai applicare grasso sui macchinari mentre essi siano in funzione. Lame di bulldozer e livellatrici, zappe posteriori e caricatrici di benne e battee raschiatrici devono essere abbassate al suolo quando la macchina viene fermata.

Seguire tutte le raccomandazioni contenute nei manuali per l'uso, il servizio e la manutenzione che vi vengono forniti.
I membri del personale addetti al servizio devono sempre notificare a un superiore dove possono essere reperibili e i meccanici non devono lavorare sul posto da soli senza rendere noto a un superiore il luogo in cui essi si trovano.

ELETTRICITA'

Tutte le attivita' lavorative ed il materiale devono essere mantenuti ad una distanza di sicurezza da qualsiasi fonte di elettricita' per prevenire contatto ed incidenti.
Un interruttore di circuito per difetto di massa (GFCI) deve essere installato nel ricettacolo di un generatore o altra fonte di elettricita' quando attrezzi elettrici portabili vengono usati all'aperto o in luoghi umidi.

FOSSATI O ESCAVAZIONI

Quando al personale viene richiesto di entrare in fossati o escavazioni, questi devono avere un'inclinazione appropriata o, laddove richiesto, devono avere un sistema di sostegno del fossato. Una scala o una rampa devono essere messe in opera per permettere l'accesso o l'uscita dall'area di lavoro. I materiali di scavo dovrebbero essere tenuti in ogni caso ben lontani dall'orlo del fassato.
Prestate estrema attenzione quando lavorate nell'esporre all'aperto fonti di erogazione sotterranee quali gas, elettricità, condutture dell'acqua, ecc. Siate certi che tutte le necessarie precauzioni siano state prese prima di iniziare il lavoro.
Tutto l'equipaggiamento deve essere tenuto a distanza di sicurezza da linee elettriche aeree. Tutte le attività condotte vicino a fonti di erogazione esistenti devono conformarsi all'Occupational Health and Safety Act e alle Regulations for Construction Projects (Legge sulla Sanità e Sicurezza sul Lavoro e Regolamenti Relativi ai Progetti di Costruzione).

INGRESSO IN LUOGHI STRETTI E CHIUSI

L'ingresso in una cisterna, serbatoio o tombino, per qualsiasi ragione, non e' permesso a meno che le condizioni interiori non siano state esaminate da un esperto ed il permesso di lavoro necessario che ne garantisce la sicurezza non sia stato rilasciato. Tutte le entrate in luoghi stretti e chiusi deveno essere effettuate in conformita' alle regole attinenti ai cantieri edili.

MANEGGIAMENTO DEI MATERIALI E GESTIONE GENERALE

Ogni volta che sia di pratica utilità, il sollevamento di pesi notevoli dovrà essere effettuato impiegando congegni meccanici per il sollevamento. Quando sia richiesta l'operazione manuale, effettuate il sollevamento in modo corretto

piegando le ginocchia e muovendo i piedi nel girarvi anziché effettuare la torsione della vita. CHIEDETE AIUTO NEL CAS DI CARICHI PESANTI.
Quando lavorate sull'installazione di fognature e bocchette d'acqua, tenete dita e mani libere nel congiungere condotte, botole a incastro, ecc. Usate cura nel congiungere cavi da innalzamento ed evitate di intrappolare le dita. Fate attenzione a punti di "aggrappamento". Non consentite mai ad alcuna parte del vostro corpo di venirsi a trovare in posizione tale da restare "impigliata". Attenzione a non trovarvi in posizione fuori equilibrio quando spingete o usate una leva.
Mantenete le aree di lavoro libere da materiali sciolti o detriti, in modo particolare legname e tavole di legno con chiodi. Fate attenzione ai vostri passi per evitare scivoloni e cadute. Non lasciate mai attrezzi o materiali in luoghi dove possono essere urtati accidentalmente e fatti cadere su persone che lavorano in ambienti sottostanti.
Intorno alle piattaforme destinate ad attività lavorativa su tutte le impalcature, aperture nei pavimenti, rampe e aree aperte dove un lavoratore può cadere da un livello all'altro, devono essere sistemate ringhiere.

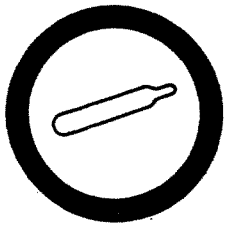
PROTEZIONE ANTINCENDIO

Devono essere prese precauzioni per prevenire scoppi di incendi, specialmente quando si svolgano operaziono di saldatura o taglio. Gli estintori devono essere facilmente raggiungibili, propriamente mantenuti, regolarmente ispezionati e prontamente riempite di nuovo dopo l'uso.
Tenetevi al corrente circa la dislocazione di tutto l'equipaggiamento antincendio sul cantiere o stabilimento.

SISTEMA DI INFORMAZIONI SUI MATERIALI PERICOLOSI SUL LUGO DI LAVORO (WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM, O WHMIS)

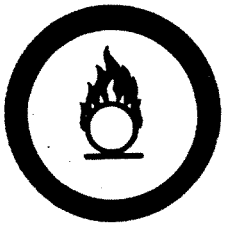
Tutti i materiali pericolosi trovati sul luogo di lavoro devono essere identificati secondo quanto previsto dal "Workplace Hazardous Materials Information System" (WHMIS) nell'ambito dell'Occupational Health & Safety Act.
Schede Dati sulla Sicurezza dei materiali verranno fornite e tenute nella roulotte adibita a ufficio presso ogni cantiere per riferimento, al fine di assistere tutti i dipendenti in merito a come maneggiare, immagazzinare ed eliminare tali materiali.
Tutti i dipendenti che lavorano con o in prossimità di materiali pericolosi devono avere ricevuto un corso di addestramento formale nell'ambito dei regolamenti previsti dal WHMIS.

I simboli di pericolo WHMIS vengono riprodotti qui sotto per vostra informazione.

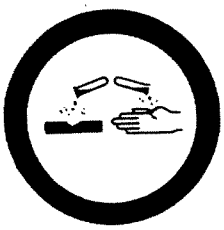


Classe A
Gas compressi

Classe B
Combustibilie materiali infiammabili

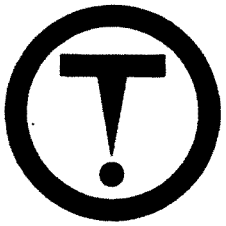


Classe C
Materiali ossidanti



Classe E
Materiali corrosivi

Classe D
gruppo 1 Materiali venefici e infettivi: effeti tossici immediati e gravi



Classe D
gruppo 2 Materiali venefici e infettivi: altri effetti tossici

Classe D, gruppo 3
Materiali venefici e infettivi: materiali infettivi e pericolosi a livello biologico

Classe F
Matereriali dalle reasioni pericolose

ROVESCIAMENTI DI PRODOTTI CHIMICI

La liberazione o lo scarico di un prodotto chimico che costituisca un pericolo per la gente o l'ambiente e' proibita. Nel caso di un rovesciamento:

1. Trovare e identificare la sostanza e la fonte.
2. Garantire la propria sicurezza e quella degli altri.
3. Se possibile, bloccare il processo o chiudere la fonte.
4. Notificare il ministero dell'ambiente e, se applicablile, la municipalita' e le autorita' locali sulla conservazione (i rovesciamenti devono essere riportati immediatamente). Se l'ufficio locale del ministero non e' aperto, il numero di emergenza e': 1-800-268-6060.
5. Contenere il rovesciamento.
6. Notificare la direzione.
7. Procedere con le operazioni di pulitura.

IMPORTANTE

Il presente manuale sulla politica in materia di sanità e sicurezza è stato preparato per informarla sulle esigenze di base la cui osservanza viene da Lei attesa quale dipendente dell'Azienda. E' Sua responsabilità comprendere e conformarsi alla politica aziendale specificata.

E' responsabilità del Suo caporeparto o del personale impiegatizio presso l'ufficio del cantiere o stabilimento dove Ella è stata assunta fornirLe il prsente manuale e assicurarsi che Ella completi e firmi la dichiarazione sottostante insieme al Suo caporeparto o alla persona che Le consegna il presente manuale.

Con la presente scrittura dichiaro di avere ricevuto il Manuale sulla Politica Aziendale in Materia di Sanità e Sicurezza e aderisco a conformarmi alle norme e politiche in esso contenute.

Nome Del Dipendente (in stampatello)	Firma Del Dipendente
Numero Di Assicurazione Sociale Ricevuto (in stampatello)	Data in Cui Viene (in stampatello)
Nome Del Caporeparto/Impiegato (in stampatello)	Firma Del Caporeparto/Impiegiato

DUFFERIN CONSTRUCTION COMPANY
REGULAMENTO DE SAÚDE E SEGURANÇA

A Dufferin Construction Company é responsável pela protecçaõ de acidentes de trabalho, bem como da perda dos seus empregados e propriedades.

Para cumprir com esta responsabilidade, nós procuramos manter e garantir que o ambiente de trabalho seja o mais seguro possível e que continuaremos a lutar para a eliminação ole todos os perigos que possam prejudicar a vida dos empregados, bem como no arrvinamento de propriedades.

Ferimentos e mortes acidentais, podem ser controlados através de uma boa gerência em conjunto com o envolvimento activo de todos os empregados.

A Supervisão e gerência, tomará todas as medidas necessárias para a eliminação e o controlo de todas condições precárias de trabalho e bem como, em colaborar com os estatutos pertencentes a saúde e segurança.

Todos os empregados são responsáveis pela própria segurança e a dos seus colegas e trabalho. Todos são sempre obrigados a usar os métodos de segurança e também de alertar todos os indícios de perigo, bem como o de mostrar e sugerir, quais os melhores métodos de os poder evitar.

Eu confio, que cada um de nós, se sentirá na obrigação de fazer com que este estatuto de saúde e segurança seja fortalecido e empregado como um meio indispensável de vida.

Lloyd Ferguson
Gerente Geral

INTRODUÇÃO

Pretende-se com este manual dar uma idea geral e clara, sobre o Estatuto e o Processo de Seguanança, do qual, deverá ser aplicado por todos os empregados e Subcontratados da Dufferin Construction Company. Os empregados e Subcontratados não derem depender exclusivamente deste manual; Devem também referir-se as Cláusulas da Saúde e Segurança e aos regulamentos introduzidos para todos os projectos da construção e estabelecimentos industriais, bem como, para a Divisão dos Estatutos para a Saúde e Segurança da Dufferin Construction Company, na ordem de assegurar a sua submissão.

A informação deste manual destina-se a dar assistência a todos os empregados da Dufferin Construction Company para manterem um ambiente de trabalho seguro.

Além disso, todos os empregados deveriam ter conhecimento das suas responsabilidades, tal como é exigido pela Lei de Saúde Ocupacional e Segurança (Occupational Health and Safety Act), Artigo 28:

1. Trabalhar de acordo com as cláusulas desta Lei e regulamentos.
2. Usar o equipamento, aparelhos de protecção ou vestuário, como for exigido pela firma.
3. Informar de equipamento defeituoso ou perigoso e outros periogos.
4. Não retirar quaisquer aparelhos de protecção.
5. Não trabalhar com equipamento ou maquinaria de uma maneira perigosa.
6. Não andar com brincadeiras no local de trabalho.
7. Comunicar imediatamente quaisquer acidentes.

Na parte de trás deste manual há um talão destacável que você deverá assinar para confirmar que leu e compreendeu o Estatuto segurança da Companhia e que você cumprirá com este regulamento durante o tempo aqui trabalhar.

Este registo ficará no seu processo na nossa Sede.

RESPONSABILIDADES

Cada Gerente, Supervisor e Capataz tem a responsabilidade de garantir:

1. O cumprimento prático de todas as cláusulas de qualquer Legislação Federal, Provincial e de Saúde e Segurança da Companhia, assim como quaisquer outros.
2. A existência e o uso de equipamento de protecção adequado.
3. Que as operações debaixo do seu controlo são, tanto quanto possível, conduzidas sem qualquer risco quanto à saúde ou segurança dos empregados ou outros que possam ser afectados pelas suas actividades.

Todos os empregados têm a responsabilidade de colaborar para que se cumpram as cláusulas da Legislação de saúde e segurança e outros regulamentos afins; de evitarem fazer qualquer coisa que constitua perigo para si próprios ou para outros;

e de chamar a atenção da administração para qualquer situação ou da práctica que possa a vir causar acidentes ou doenças.

O SEU BEM-ESTAR NO TRABALHO

Esta Companhia está sinceramente preocupada com a prevenção de acidentes e com o seu bem-estar geral e segurança. Nós precisamos da sua ajuda para evitar acidentes que possam resultar em ferimentos pessoais ou danos em propriedade ou equipamento.

Todos os acidentes devem ser imediatamente comunicados ao seu Supervisor porque, se o não fizer, pode causar demora na prestação de primeiros socorros adequados ou tratamento médico e qualquer potencial compensação de beneficios.

O seu Supervisor ou Capataz deverá ser informado imediatamente da existência de quaisquer ferramentas ou equipamento defeituosos, para correcção imediata.

Qualquer acidente que ocorra enquanto está a trabalhar nesta companhia será considerado um assunto muito sério e será imediatamente investigado e tomadas as medidas para evitar que torne a acontecer.

A gerência do local de trabalho é responsável de contactar de imediato o pessoal do departamento da Saúde e Segurança, no caso de um sério acidente ou morte. A gerência do local de trabalho é também, responsável por completar o formulário interno sobre a investigação de acidentes, isto, em todos os casos de acidentes, incidentes ou mortes. Esta reportagem deverá ser enviada imediatamente para o Escritório Central.

Além disso e quando for esse o caso, a informção requerida de acordo com as Secções 51, 52 e 53 da Lei (ver Secções 8 - 12 dos Regulamentos de Reconstrução de Projectos) deve também ser enviada para a Sede.

PRIMEIROS SOCORROS

Há conjuntos de primeiros Socorros (First Aid Kits) em todos os locais onde há projectos e em muitos veículos da Companhia. Saiba onde os conjuntos de Primeiros Socorros estão localizados no caso de uma emergência.

Todos os empregados deveriam tirar cursos de primeiros socorros. Em Todos os casos de ferimento, tome as medidas necessárias para obter primeiros socorros rápidos e evitar mais complicações. Comunique imediatamente quaisquer acidentes ou ferimentos ao seu Supervisor.

ÁLCOOL E DROGAS NÃO AUTORIZADAS

O consumo do álcool e de drogas não autorizadas é expressamente proibido em propriedades e em locais de trabalho, da Dufferin Construction Company. Qualquer pessoa sob a influência de álcool e drogas ilegais, será recusada a sua entrada ou mesmo obrigado a abandonar os edifícios ou projectos da Companhia.

O pessoal que esteja a usar medicamentos prescritos pelo médico e que estejam a causar uma alteração do seu julgamento ou na execução do seu julgamento ou na execução do seu trabalho, deverão informar o seu chefe sobre o tal.

EQUIPAMENTO DE PROTECÇÃO PESSOAL

É condição de emprego que todos os empregados comprem as suas próprias botas de segurança. Todo o outro equipamento de protecção pessoal será fornecido e deverá ser usado sem excepções.

Capacetes e Botas de Segurança devem ser usados sempre em todos os locais de trabalho por todos os empregados. Isto também inclui os motoristas quando sairem dos seus veículos e visitantes.

Os Capacetes devem ser certificados como capacetes de segurança da Classe 'B' CSA e o calçado deve ser Certificado como Grade 1 CSA com biqueira reforçada e protecção da sola.

Vestuário próprio de protecção deverá ser usado de acordo com as necessidades do seu trabalho, tal como:

a) Óculos de protecção quando cortar, desgastar material ou estiver a martelar: ou quando trabalhar em sitios onde possa cair material ou ser-lhe soprado para os olhos; ou onde o vento possa levantar partículas de pó.
b) Protecção dos ouvidos (tampões) quando trabalhar com ferramentas ou equipamento ruidoso ou estiver perto deles. (Quando trabalhar nos locais de construção, não é permitido usar auscultadores tais como rádios portáteis).
c) Quando controlar o tráfego ou trabalhar em ou próximo de auto-estradas ou estradas onde o tráfego pode ser um perigo, deverá usar coletes fluorescentes.
d) Luvas, quando manusear materiais abrasivos ou com arestas cortantes.
e) Respiradores, quando trabalhar em condições que possam causar a inalação de partículas, vapor, neblina ou gás.
f) É mandatório que se use no mínimo uma camisa de mangas curtas e calças.
g) Coletes de salva vidas, deve ser usado pelos trabalhadores expostos ao perigo de afogamento em águas profundas, pois, nessas circunstâncias os coletes têm uma acção efectiva.
h) Quando o trabalhador estiver a trabalhar a três (3) metros ou des (10) pés ou mais acima do solo, deverá usar uma cinta segurança (do género da cinta de pára-quedas) com a extremidade atada a um apoio fixo.

Além do que fica dito acima, deverá usar-se vestuário especial de protecção ou aparelhos para evitar quedas em certas condições perigosas de trabalho.

TRABALHANDO COM EQUIPAMENTO

Só o pessoal autorizado pela Dufferin Construction Company pode trabalhar, ajustar e reparar veículos e equipamentos da Companhia.
Quando trabalhar com um veículo da Companhia, você deverá ter uma licença válida de condução; deverá saber e obedecer a todos os regulamentos de tráfego e observar todas as regras de condução segura. Familiarizar-se com a operação de qualquer veículo devidamente assistido e informe quaisquer condições menos seguras para que sejam corrigidas imediatamente.
Todos os operadores de veículos e equipamento são responsáveis por darem a volta aos veículos ou equipamento antes de o porem a trabalhar para se certificarem que não há obstruções na direcção em que vão sair. Quando os puser a trabalhar, apite a buzina.
Todos os operadores devem certificar-se que o caminho está livre antes de fazerem marcha atrás com os veículos ou com equipamento. Deverá sempre haver uma pessoa para sinalização quando a vista estiver obstruida ou quando o equipamento seja movido numa área onde o operador ou outras pessoas possam correr perigo.
Esteja sempre alerta quando trabalhar com equipamento debaixo de linhas elétricas.
Antes de subir para equipamento certifique-se que as solas das botas estão limpas para evitar escorregar e cair. Para subir e descer do equipamento, mantenha sempre contacto em 3 pontos (duas mãos e um pé, ou dois pés uma mão).
Todas as facilidades para montar devem ser mantidas em condições seguras e limpas. Os operadores têm a responsabilidade de garantirem que o seu equipamento Esteja sempre em condições seguras de trabalho e que todos os problemas são comunicados e resolvidos imediatamente.

PRESTANDO ASSISTÊNCIA AO EQUIPAMENTO

Desligue a electricidade e páre os motores antes de prestar assistência. Nunca ponha óleo ou lubrifique máquinas quando estão a trabalhar. Os "Dozer", "grader blades", "backhoe", "Loader buckets" e "scraper pans" devem ser postas no chão quando as máquinas estão paradas.
Cumpra com todas as recomendações de manuais de operação, assistência e manutenção que lhe tenham sido dados.
O pessoal de assistência deverá informar o supervisor dos locais onde se encontram sempre e os mecânicos não devem trabalhar fora sós sem terem informado o seu supervisor do local onde se encontram.

SERVIÇOS ELECTRICÒS

Todo o material e utensílios de trabalho devem ser guardados à uma distância segura de qualquer fonte de energía elétrica, para prevenir o contacto ou atracção. Um falso interruptor de circuito de Terra (GFCI) Deve ser instalado no receptáculo do gerador ou mesmo de uma outra fonte de energía, quando ferramentas portáteis (electricas) estiveren em uso em áreas não abrigadas ou em locais molhados.

FOSSAS E ESCAVAÇÕES

Quando os empregados tenham de entrar em fossas ou em excavações, deverá sempre haver um sistema próprio de inclinação ou de apoio quando for exigido. Deverá sempre haver uma escada ou rampa para acesso a ou regresso da área de trabalho. Os materiais retirados de escavação deverão ser mantidos longe da beira do fosso em todos os casos.

Tenha sempre muito cuidado quando trabalhar e estiver expôsto aos artigos subterranâneos, tais como do gás, luz, ou canos de água, etc. Certifique-se sempre que tomou todas as medidas de precaução antes de começar a trabalhar.

Todo o equipamento deve estar sempre a uma distância segura de linhas eléctricas aéreas. Todas as actividades adjacentes a "utilities" existentes deverão ser feitas de acordo a Lei de Saúde Ocupacional e Segurança e Regulamentos de Reconstrução de Projectos.

ENTRADA EM ZONAS PROIBIDAS

Não é permitida a entrada em tanques, canalizações e esgotos sem qualquer finalidade, a não ser, que as condiçoes interiores tenham sido préviaménte inspecionados por uma pessoa qualificada e que a necessária licença tenha sido passada. Todas as entradas para as zonas restritas deverás ser feitas de acordo com os regulamentos dos projectos da Construção.

MANUSEAMENTO DE MATERIAIS E INSTRUÇÕES GERAIS

Sempre que seja possível, as cargas pesadas devem ser manuseadas com equipamento mecânico de levantamento. Quando for preciso manusear manualmente, levante a carga correctamente, dobrando os joelhos e movendo os pés quando se voltar, em vez de girar em volta pela cintura. PEÇA AJUDA COM CARGAS PESADAS.

Quando trabalhar em esgotos ou instalação de canos de água, tenha os dedos e as mãos limpas quando ligar canos ou acertar as coberturas, etc. Tenha cuidado ao juntar cabos de elevação e evite ficar com os dedos apanhados. Tenha cuidado com os pontos de "pinch". Nunca permita que qualquer parte do seu corpo fique

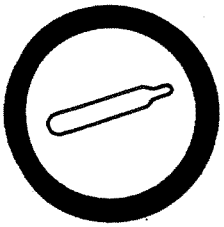
numa posição em que se arrisque a ficar em obstrução. Quando trabalhar com a alavanca ou empurrar, evite ficar numa posição de desiquilibrio.
Mantenha as áreas de trabalho livres de materiais soltos ou de lixo, especialmente bocados de madeira e pregos. Veja onde põe os pés para evitar escorregar e cair. Nunca deixe ferramentas ou materiais em sitios onde possam cair em cima de alguém que trabalhe por baixo. À volta de plataformas de trabalho e andaimes, aberturas no chão, rampas e áreas abertas onde um trabalhador possa cair de um nível para outro, deverá sempre haver corrimão de guarda.

PROTECÇÃO CONTRA INCÊNDIOS

Deverão tomar-se medidas de precaução para evitar que haja fogos, especialmente quando se está a soldar ou a cortar. Os extintores de fogo deverão estar fácilmente acessíveis, deverão ser mantidos adequandamente, ser inspeccionados regularmente e cheios depois de serem usados.
Familiarize-se com a localização de todo o equipamento de combate a incêndios no local de trabalho.

SISTEMA DE INFORMAÇÃO DE MATERIAIS PERIGOSOS DE TRABALHO (WHMIS)

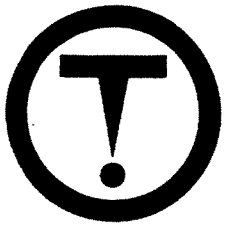
Todos os materiais perigosos encontrados no local de trabalho, devem ser identificados de acordo com as exigências do Sistema de Informação de Materiais Perigosos no Local de Trabalho (WHMIS) da Lei de Saúde Ocupacional e Segurança.
Folhas de Informação de Segurança de Materiais serão fornecidas e mantidas em cada trela-escritório no local de trabalho para ajudar os empregados a saberem como manusear, armazenar e dispôr destes materiais.
Todos os empregados que trabalham com ou na proximidade de materiais perigosos devem ser formalmente treinados de acordo com os regulamentos WHMIS.
Os símbolos perigosos QHMIS estão em baixo para sua informação.



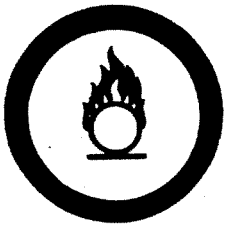
Classe A
Gás comprimido

Classe D, Divisão 1
Material venenoso e infeccioso: causa efeitos toxicos sérios e imediatos

Classe B
Material
combustivel e
inflamável

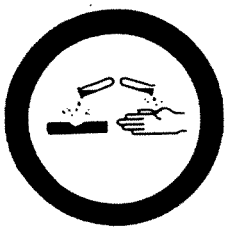


Classe D
Divisão 2 Material
venenoso e
infeccioso que
causam outros
efeitos toxicos



Classe C Material
oxidante

Classe D
Divisão 3 Material
venenoso e
infeccioso:
Materiais de perigos
bio-infecciosos



Classe E
Material corrosivo

Classe F
Material de
reacções perigosas

DERRAME DE PRODUTOS QUÍMICOS

O despejo ou descarregamento de produtos químicos que possam prejudicar as pessoas e ao meio ambiente, é expressamente proibido pela Lei.

Em caso de derrames:

1. Descobrir as origens do derrame e tentar identificar as suas substâncias.
2. Assegure a sua segurança e a dos outros.
3. Se possível, pare com o processo ou tente reter ou fechar a fuga dos quimicos.
4. Informe ao Ministro do Meio Ambiente, ao Município ou a devida Autoridade para a Conservação Local. (Todos os derrames devem ser comunicados de imediato) ao Ministério Local, se este estiver fechado telefone para este número: 1-800-268-6060.
5. Reter o derrame.
6. Notifique a gerência.
7. Continue com as actividades da limpeza.

IMPORTANTE

Este Manual de Saúde e Estatuto de Segurança foi preparado para o informar dos requisitos básicos que se esperam de si como empregado da Companhia. É sua a responsabilidade de compreender e cumprir com os Estatutos especificados pela Companhia.

É responsabilidade do seu Capataz ou do pessoal do escritório no seu local de trabalho onde você foi admitido fornecerem-lhe este manual e certificarem-se que você complete e assine a declaração juntamento com o seu Capataz ou a pessoa que lhe deu este manual.

Declaro que recebi o Manual dos Estatutos para a Saúde e Segurança da Companhia e concordo cumprir com as regras e regulamentos nele contidas.

Nome Do Empregado (Em Maiúsculas)	Assinatura Do Empregado
Numero De Segurança Social (Em Maiúsculas)	Data Recebido (Em Maiúsculas)
Nome Do Capataz/Funcionário (Em Maiúsculas)	Assinatura Do Capataz/Funcionãrio

DUFFERIN CONSTRUCTION COMPANY
A DIVISION OF ST. LAWRENCE CEMENT INC.

HEALTH & SAFETY POLICY AND REFERENCE MANUAL
(Ontario)

(Revised January 2005)

DUFFERIN CONSTRUCTION COMPANY
A Division of St. Lawrence Cement Inc.

HEALTH AND SAFETY POLICY

Dufferin Construction Company is committed to the protection from accidental injury and loss to its employees and property.

In fulfilling this commitment, we will provide and maintain a safe work environment and we will strive to eliminate hazards which may result in injury and property damage.

Accidental injury and loss can be controlled through good management in combination with active employee involvement.

Supervision and Management will take all necessary action to eliminate or control hazardous working conditions and work in compliance with laws pertaining to occupational health and safety.

All employees are responsible for their own personal safety and that of their co-workers. They are expected to use the safest work methods to carry out their job and point out sources of danger and suggest means to remedy them.

I trust that each of you will join me in a personal commitment to enforce this Health and Safety Policy as a way of life.

January 2005

Lloyd Ferguson
General Manager

BASIC BELIEFS

Dufferin Construction Company considers the safety and health of workers on our projects to be as important a factor in our success as quality, production and cost. Our construction management team is committed to continuing improvements for the safety of our workers, clients, contractors and the environment in which we work. To this end, we commit ourselves to the following beliefs:

- Site wide consistency on safety is essential.
- All identifiable risks can be managed to prevent incidents.
- All persons share a responsibility as good workers to maintain a safe and healthy workplace and to work safely.
- It is our policy to meet or exceed the requirements set out in the Occupational Health and Safety Act and all pertinent legislation.
- Hazards resulting in injuries and property damage can be controlled and further reduced.
- Safety is a condition of employment. Every contractor, subcontractor, worker, vendor and visitor must comply with the company safety policies, rules, procedures and exercise good judgment and common sense in each assignment.
- The safety and health of fellow workers, the community and the environment is the responsibility of every worker and contractor, subcontractor and vendor. Contractors, subcontractors and vendors will be evaluated on their safety performance.
- Line management (contractors, subcontractors, vendors) are responsible and accountable for providing a safe work environment.
- We expect excellence in health and safety performance.
- Safety is cost effective. A safe site is an effectively managed site.
- Our loss control program is an integral part of our company operations.

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I INTRODUCTION

This manual is provided as a general overview of safety policies and procedures which must be followed by all workers, contractors, subcontractors and vendors of Dufferin Construction Company.

Workers, contractors, subcontractors and vendors should not rely solely on this manual exclusively, it is intended to draw attention to methods to prevent injury, illness or loss within our industry and promote good communication on our project.

For specific compliance with statutory requirements, please refer to all applicable Federal and/or Provincial statutes that establish health and safety requirements, including the Canada Labour Code and/or any applicable Provincial - Occupational Health and Safety Act(s), and regulations or codes, enacted thereunder, standards or recognized industry guidelines. Reference must also be made to the Dufferin Construction Company, Divisional - Loss Control Manual. **Where the requirements of our policies or procedures exceed legislated requirements, they will take precedence.**

This booklet is a summary of the most important accident prevention procedures and guidelines which apply to all employees and Subcontractors working on Dufferin Construction Company Project Sites.

These Guidelines are designed to prevent accidents and injuries. They are based upon contemporary loss control management practices, health and safety legislation and input from Joint Health and Safety Committee members.

Dufferin Construction Company requires workers, contractors, subcontractors and vendors to place the highest importance and priority on safety. Contractors, subcontractors and vendors shall be responsible and accountable for safety including, but not limited to, the safety of its employees, agents, subcontractors, the public and other persons, facilities, property of Dufferin Construction Company and the property of third parties. These requirements are in addition to all applicable laws, regulations, ordinances and orders of any proper authority having jurisdiction over the performance of the work.

Reference to workers, supervisors and managers shall mean those associated with the contractor, subcontractor or vendor. Reference to the constructor or contractor and facilities are implicit with the contractor's name.

Dufferin Construction Company believes that all accidents can be prevented by making safety an integral part of every job and task. Safety rules do not guarantee freedom from risk or hazard. They do not cover every job situation. Good judgment will dictate that additional precautions may be required.

II ACCIDENT PREVENTION RESPONSIBILITIES

All personnel must understand and comply with all applicable Federal, Provincial and Municipal Acts, Standards and Regulations. A key requirement in all safety legislation is that each person is responsible for working safely with equal concern for the safety of co-workers.

Employees, supervisors and management have specific safety responsibilities. Accident investigations have demonstrated that a failure of any person to adequately fulfill their obligations will lead to situations where an accident may occur.

WORKPLACE RESPONSIBILITIES

Health and safety activities are based on specific individual responsibilities, most of which can be found in the Occupational Health and Safety Act and the Regulations enacted thereunder. Outlined are details of specific responsibilities in the workplace to assist in implementing health and safety functions. This outline is not intended to be all-inclusive, but to help all parties better understand their responsibilities.

All individuals in the company, at all levels and functions are responsible for understanding and carrying out the responsibilities and duties outlined below.
Responsibilities are Assigned to the following parties

- Owner
- Constructor
- Employer
- Director
- Officer
- Supervisor
- Workers
- Contractors
- Subcontractors
- Health and Safety Representative
- Joint Health and Safety Committee
- Certified Members of the Joint Health and Safety Committee

OWNER

"owner" includes a trustee, receiver, mortgage in possession, tenant, lessee, or occupier of any lands or premises used as a workplace, and a person who acts for or on behalf of an owner as his agent or delegate;

- Before a project begins, the owner shall determine whether any designated substances are present at the project site and shall prepare a list of all designated substances that are present at the site.
- The tenderer of the project shall include the list of designated substances with the tender, and ensure that the constructor has received the total list prior to entering into a binding contract.

CONSTRUCTOR

"constructor" means a person (or company) who undertakes a project for an owner and includes an owner who undertakes all or part of a project by himself or by more than one employer;

- Ensure that all appropriate documentation for the start up of a project has been processed.
- Ensure that the measures and procedures required by the current Occupational Health and Safety Act and Regulations for Construction Projects and the Constructor's own Health and Safety Program are carried out on the project.
- Ensure that employers and workers on the project comply with the Act and Regulations and the Constructor's Health and Safety Program.
- Ensure that the health and safety of workers on the project is protected.
- Monitor subcontractors and vendors for compliance with the Occupational Health and Safety Act and Regulations for Construction Projects.
- Ensure that subcontractors and vendors are obliged by contract to comply with the Constructor's health and safety program.
- Monitor safety performance and take corrective action.

EMPLOYER

"employer" means a person (or company) who employs one or more workers or contracts for the services of one or more workers and includes a contractor or subcontractor who performs work or supplies services and a contractor or subcontractor who undertakes with an owner, constructor, contractor or subcontractor to perform work or supply services;

- Ensure that the Health and Safety Policy has been communicated to all staff;
- Take every reasonable precaution in the circumstances for the protection of a worker;
- Provide a safe and healthy workplace;

- Establish, maintain, and review at least annually a health and safety program;
- Establish and maintain Worker Profile, Safety and Training Records;
- Report accidents and injuries to authorities as required by law;
- Provide first aid and medical care;
- Provide workers with health and safety information;
- Inspect projects and meet regularly with supervisors to monitor the program and take corrective
- action where required;
- Conduct Company safety meetings at regular intervals;
- Consider accident prevention and safety performance when evaluating Supervisors and Workers.

DIRECTOR AND OFFICER

- take all reasonable care that the corporation complies with the *Occupational Health and Safety Act* and Regulations.
- take all reasonable care that the corporation complies with orders and requirements of inspectors and Directors.
- take all reasonable care that the corporation complies with orders of the Minister.

SUPERVISOR

"supervisor" means a person who has charge of a work place or authority over a worker;
A Supervisor must also be a competent person (Act S 1. -(1)).
competent person means a person who,

I. is qualified because of his knowledge, training and experience to organize the work and its performance;
II. is familiar with the provisions of the Act and the Regulations that apply to the work; and
III. has knowledge of any potential or actual danger to health or safety in the work place;

- Be responsible for on-site accident prevention;
- Review safe work procedures for the site;
- Monitor the health and safety performance of subcontractors;
- Report accidents and injuries to management as required by the program and regulations;
- Investigate accidents and take actions to prevent reoccurrence;
- Ensure that the Company's Health and Safety Program is followed at the work level;
- Enforce disciplinary actions for violations of the Company's Health and Safety Program;
- Ensure that protective equipment required by law and by the program is provided, accessible, used and maintained properly by workers and that workers understand the reasons for its use;
- Instruct personnel in proper work practices and update instructions as needed;
- Check work practices and work areas for hazards and take corrective action where required;
- Consult and co-operate with the Health and Safety Representative/Committee where appropriate;
- Acquaint the new worker with hazards and safe work procedures;

WORKER

"worker" means a person who performs work or supplies services for monetary compensation;

- Comply with the Occupational Health and Safety Act and all relevant regulations;
- Take every reasonable precaution necessary to prevent accidents;
- Work in accordance with the health and safety program;
- Work in a manner that will not endanger anyone;
- Report unsafe situations immediately to your supervisor;
- Report injury or illness immediately to your supervisor;
- Help new workers recognize job hazards and follow proper procedures;
- Participate in joint health and safety committees where applicable;
- Must be aware that workers are subject to disciplinary action where either Company Safety rules or government regulations are violated;

SUBCONTRACTOR OR VENDOR (i.e. EMPLOYER)

- Maintain a health and safety program as required under the Act;
- Adhere to the Subcontractor's Health and Safety program;
- Monitor site conditions in their work area and take corrective action;
- Report accidents, incidents, lost-time injuries and any hazards immediately to the Constructor.

HEALTH AND SAFETY REPRESENTATIVE

- *(required where the number of workers regularly exceeds five - Section 8 of the Act);*
- Inspect the workplace;
- Identify situations that may be a source of danger;
- Relay concerns from workers and make recommendations to the Supervisor;
- Assist in accident investigations;
- Assist in resolving work refusals and reports of dangerous circumstances.

JOINT HEALTH AND SAFETY COMMITTEE

- *(required where the number of workers regularly exceeds 19 for more than 3 months Section 9 of the Act);*
- Inspect the workplace;
- Attend Joint Health and Safety Committee meetings;
- Review health and safety reports;
- Identify situations that may be a source of danger;
- Relay concerns from workers and make recommendations to theEmployer;
- Assist in accident investigations;
- Assist in resolving work refusals and reports of dangerous circumstances.

CERTIFIED MEMBER OF JOINT HEALTH AND SAFETY COMMITTEE

- *(required where the number of workers at a project regularly exceeds 49 for more than 3 months - Section 45 and 47 of the Act);*
- Same duties as Joint Health and Safety Committee Health and Safety Representative but with additional rights to initiate bilateral and unilateral work stoppage;
- For further information on the effective functioning of the Joint Health and Safety Committee, reference may be made to the CSAO Guidelines for the Structure and Function of a Joint Health and Safety Committee.
- It is emphasized that all workers must read and become familiar with the Occupational Health and Safety Act and all applicable regulations, along with the requirements of the Company's Health and Safety Program. They must know what their responsibilities are and have the required ability and training to fulfill them.

ENFORCEMENT POLICY

- All workers are required to comply with all statutory requirements concerning the health and safety of workers in the workplace, as well as the Safe Work Procedures and any other requirements of the Company's Health and Safety Program. The Company will not condone any breach of any statutory requirements or our health and safety program. The Company has implemented the following disciplinary actions for violations:

VERBAL WARNING

- Given where in the opinion of the supervisor, the violation is of a minor nature and which does not directly endanger the well-being of any person at the workplace.
- Disciplinary action will consist of a mandatory safety talk regarding the violation.

FIRST DISCIPLINE STEP

- A written Notice of Infraction will be issued where in the opinion of the supervisor, the violation is of a major nature which will directly endanger the health and well-being of any person at the workplace.
- Disciplinary action will consist of a mandatory safety talk regarding the violation and possible suspension.
- Repetitive violations of this nature will lead to suspension and possible termination.

SECOND DISCIPLINE STEP

- A written Notice of Infraction will be issued where, in the opinion of the supervisor the violation is life threatening to one or more individuals on site.
- Disciplinary action will consist of a mandatory safety talk regarding the violation and mandatory suspension or termination.

WORKPLACE INSPECTIONS & HAZARD REPORTING

- Workplace inspections of construction projects are vital in maintaining a safe workplace and identifying existing or potential hazards in order that appropriate corrective action can be taken.
- An assessment should be made by the Health and Safety Representative in conjunction with the Supervisor of the frequency of inspections required based on the potential dangers at the project. These inspections must be conducted on a monthly basis as a minimum. Reports should be forwarded to management.
- It is important to observe both conditions and procedures during the inspection. If a hazard poses an immediate threat, take immediate action to eliminate the hazard.
- A follow-up of all reports and action taken to eliminate hazards must be completed in a timely manner.
- Subsequent workplace inspection will review the items from previous inspections to ensure that remedial action has resolved the concern.

REPORTING AND INVESTIGATING ACCIDENTS

- All accidents and injuries must be reported to the supervisor immediately who will in turn inform management. All accidents and injuries will be investigated once the occurrence has been attended to and further risks have been eliminated.
- The prime objective of reporting and investigating accidents is to prevent recurrence. Knowing how to identify accidents and following the procedures and forms set ourhereafter will help prevent the recurrence of accidents. These procedures include the following:
  - Accidents and Incidents.
  - Investigation Required.
  - Investigation.
  - Action of the Investigation.
    - Forms.
    - Records.
    - Follow-up.

ACCIDENTS AND INCIDENTS

- Accidents and incidents vary in severity. The reporting requirements of accidents and incidents by management to the Ministry of Labour, the Health and Safety Committee/Representative and trade union, if any, vary in time. Accidents, incidents and reporting requirements are outlined in the following table:

Circumstances	Action Required
1) Fatality or Critical Injury	Management is immediately to contact the Ministry of Labour followed by a written report within 48 hours with information outlined in the Regulations for Construction Projects. All reports for accidents involving a critical injury or fatality must be reviewed by the Company's legal counsel prior to submission to the Ministry of Labour.
Critical injury is defined in the Act as follows: • Places life in jeopardy. • Produces unconsciousness. • Results in a substantial loss of blood. • Involves a fracture of a leg or arm, but not a finger or toe. • Involves the amputation of a leg., arm, hand or foot. • Consists of burns to a major portion of the body. • Causes the loss of sight in an eye.	
2) When a person requires medical aid, misses next shift, or is disabled from doing his or her usual work.	Report to the Ministry of Labour in writing within four days.
3) When an accident or occurrence involves: • A worker failing a vertical distance of 3 metres or more. • A worker whose fall is arrested by a fall-arrest system. • Overturning or structural failure or a crane or similar hoisting device. • Structural failure of falsework designed by, or legally required to be designed by, a professional engineer. • Structural failure of scaffold supports. • Structural failure of supporting member such as a column, beam, wall or truss. • Failure of an earth-or-water retaining structure such as trench, shaft, tunnel, caisson, or cofferdam. • Failure of excavation wall cut and trimmed to a slope which a professional engineer has specified in writing that will not endanger workers. • Worker becoming unconscious for any reason. • Contact by backhoe, shovel, crane, similar device, or its load with a live powerline of more than 750 volts.	Report to the Ministry of Labour in writing within four days.

INVESTIGATION REQUIRED

- An investigation is required as soon as an accident has been attended to and the risk of further damage is eliminated.

INVESTIGATOR

- The investigation will be performed by management with the assistance of the health and safety committee representative as stipulated in Section 15 of the Act.

ACTIONS OF THE INVESTIGATION

- The key actions to be taken by the investigation are:
  - Secure the scene.
  - Identify witnesses.
  - Survey the scene.
  - Gather evidence.
  - Interview witnesses.
  - Analyse the facts.
  - Prepare a report.
- As an aid when conducting an accident investigation, keep in mind the five W's (who? what? where? when? and why?).

RECORDS

- Keep all records of the investigation and subsequent report of any accidents on file for future reference.

FOLLOW UP

- The results of the investigation should be circulated to all Company work sites for the awareness and education of all workers. A review of the accident reports and recommendations should be conducted at Company health and safety meetings. All recommendations for further action should be followed up.

MINISTRY OF LABOUR INSPECTORS, ORDERS AND APPEALS

- *The Occupational Health and Safety Act* is enforced by Ministry of Labour inspectors and other officials of the Government of Ontario Ministry of Labour. Inspectors are trained in the law regarding the *Occupational Health and Safety Act* and the Construction Regulations. Inspectors have broad authority under the law and may inspect workplaces, conduct investigations where there has been an accident or occurrence, and perform routine review of employer's health and safety procedures and programs.
- Inspectors are authorised under the *Occupational Health and Safety Act* to issue Orders where they determine that a provision of the Act or a regulation is being contravened. It is critical to note that an Order is a legal determination by an inspector that the contractor/employer is breaking the law and must rectify the situation.
- A number of different types of orders may be issued by inspectors. There are compliance orders where certain changes to the workplace must be made within a specific time period. There are stop work orders where all work on a project must stop until the safety issue has been resolved. There are also orders that are issued even after a safety issue has been resolved, to merely confirm that there was a problem that is now resolved or to satisfy the personal interests of the inspector to confirm his presence on the job site that day.
- When an order is received, there are only two lawful responses to the order. First, comply with the order. Second, appeal the order. If the contractor or employer receiving the order disputes its correctness, fairness, or time period for compliance, then the order should be appealed. Appeal should be directed to the office of Adjudication. It is the office of the tribunal that hears the appears of inspectors orders. An appeal must be commenced within 14 days of the date of the issuance of the order.
- The appeal of an order is in the form of a hearing. Legal counsel is recommended when there is an appeal. Witnesses are called and legal argument is made to the adjudicator. The adjudicator will make a decision that is final and binding on the parties to the appeal. The adjudicator may rescind the order, affirm the order, or vary the order. The decision of the adjudicator is final and binding on the parties.

WORKER'S RIGHT TO REFUSE TO DO UNSAFE WORK

UNSAFE WORK REFUSAL PROCEDURE

BASIS FOR REFUSAL

- At the first stage of the refusal, the worker must have a "reason to believe" that either some machinery he operates or his actual work situation is "likely to endanger" himself or a fellow worker. This requires a subjective, personal belief by the refusing worker that his job or workplace is unsafe for himself or others, or both.

REPORTING REFUSAL TO SUPERVISOR

- Work refusals are permitted under the O.H.S.A. to protect the health and safety of workers in the workplace. To facilitate this objective, the work refusal must be promptly reported to the worker's supervisor or employer. It is essential that the refusing worker both base and communicate the refusal on health and, safety concerns; otherwise, management may misinterpret the intentions of the worker.

FIRST INVESTIGATION

- Once the worker has reported the work refusal to his employer or supervisor, the O.H.S.A. requires an investigation to be conducted. The investigation shall be conducted by the supervisor or employer, the refusing worker, and a heath and safety representative or someone with safety experience who is selected by the union that represents the refusing worker.

RETURN TO WORK OR CONTINUING REFUSAL

- The first investigation may either resolve the refusal to work or result in a continuing refusal by the same worker. In the case of the former, the worker will either return to work or remain in a safe place near his work station until the necessary changes have been made to the unsafe working condition that gave rise to the work refusal and then return to work. The worker's continuing refusal may result in a further investigation, the involvement of a Ministry of Labour inspector and possibly, disciplinary action against the worker.

SECOND INVESTIGATION AND ROLE OF MINISTRY OF LABOUR INSPECTOR

- If a worker believes that there are reasonable grounds to continue to refuse to do the work assigned by the employer, and continues to refuse to do the unsafe work, the worker, supervisor or employer must notify a Ministry of Labour inspector. The inspector will attend at the workplace and conduct a second investigation of the circumstances surrounding the continuing work refusal. The second investigation must be conducted in the presence of the employer, the refusing worker and a health representative or a person experienced in health and safety chosen by the union that represents the worker. The Ministry of Labour inspector who conducts the second investigation must make a decision in writing with respect to the basis for the continuing work refusal.

WORKER'S RIGHT TO REFUSE TO DO UNSAFE WORK

- **DEFINITION:** Where a worker has reason to believe that:
  - the use or operation of a machine or equipment, or other thing would likely endanger himself/herself, or another worker; or;
  - the physical condition of the workplace in which he/she works is likely to endanger himself/herself;
  - the use or operation of a machine, equipment or other thing he or she is to use or operate is in contravention of the Act or regulations, and it is likely to endanger a worker; a worker may refuse to work.

STEPS TO BE TAKEN

1. Refusing worker immediately notifies employer or supervisor of the reasons.
2. Supervisor investigates, in the presence of the worker and Joint Health and Safety Committee worker representative. Advise Dufferin Construction Company's Health and Safety Departmental personnel in the investigation stage of the Work Refusal.
3. Worker remains in a safe place near work station while all attempts are made to resolve the perceived problem to the satisfaction of all parties.
4. If problem is resolved to the workers satisfaction, he/she returns to work.
5. If not resolved and worker continues to refuse work, NOTIFY THE MINISTRY OF LABOUR.
6. **NOTE:** Another worker may be asked to perform the job, only if that worker is advised of the refusal to work and the surrounding circumstances, in the presence of the worker Health & Safety Representative or by a worker who because of his knowledge, experience and training is selected by the trade union that represents the worker.
7. A Ministry of Labour Inspector investigates the work refusal in the presence of the worker, employer and the worker representative of the JHSC.
8. Pending the outcome of the investigation, the worker may NOT be sent home or disciplined for his/her actions.
9. A decision will be made in writing and provided to all parties. This decision must be adhered to whether in favor of the worker or employer.
10. An investigation report must be completed by the supervisor ofthe worker refusing work and the worker representative present and provided to the Joint Health & Safety Committee (JHSC).
11. All attempts should be made to resolve the problem before it necessitates Ministry of Labour involvement.

ACCIDENT PREVENTION RESPONSIBILITIES

All personnel must understand and comply with all applicable Federal, Provincial and Municipal Acts, Standards and Regulations. A key requirement in all safety legislation is that each person is responsible for working safely with equal concern for the safety of co-workers.
All workers, supervisors and management have specific safety responsibilities. Accident investigations have demonstrated that a failure of any person to adequately fulfill their obligations will lead to situations where an accident may occur.

WORKERS:

- Use protective devices or clothing as required by the task.
- Maintain equipment and tools in good condition.
- Use equipment in a manner that will not endanger themselves or others.
- Report to their supervisor the absence of, or defect in any equipment or protective device of which they are aware and which may endanger themselves or another worker.
- Report unsafe work conditions, practices and hazards ensuring that appropriate interim action is taken to prevent exposure to other personnel.
- Advise any individual to stop if they are working unsafely or ignoring safety rules or practices. If the individual does not stop when advised, his/her supervisor should then be notified.
- Exercise the right to refuse unsafe work.

SUPERVISORS:

- Analyze all work to ensure that work is correctly planned to avoid risk of injury or accident and executed in an effective manner.
- Provide safe job instructions. Ensure each employee understands the hazards, the correct procedures and applicable regulations pertaining to the task.
- Ensure that safety regulations, safe practices and operating instructions are correctly applied.
- Ensure tools and equipment provided are safe and suitable for the job.

- Ensure that employees perform their work in accordance with correct procedures, protective devices and measures prescribed by the Occupational Health and Safety Act, and any Regulation enacted thereunder; the subcontractor's own safety program (where applicable) and supplementary requirements of Dufferin Construction Company.
- Follow up as prescribed by legislation when a worker refuses unsafe work.

MANAGEMENT:

- Promote and manage accident prevention programs.
- Provide safety and job instruction training.
- Supply proper tools and equipment.
- Supply protective clothing and equipment.
- The Subcontractor is responsible for all employees working for him and for all other persons calling on him or doing business with his firm while on a Dufferin Construction Company project or property. The Subcontractor is responsible for training and advising his respective employees of all site specific hazards, safe work practices, procedures and requirements.
- Ensuring the safe conduct of the visitor(s) or calling person(s).
- Securing compliance with all safety standards, procedures and contracted obligations to Dufferin Construction Company.

A Subcontractor is responsible for explaining and securing compliance with Dufferin Construction Company's rules and practices by any subcontractor engaged by him for work on a Dufferin Construction Company site as if the subcontractor was a direct employee of the principal subcontractor.

III CONTRIBUTING CAUSES OF ACCIDENTS

Accident investigations have clearly shown that accidents do not just happen, they are caused. It is rare that an accident is simply an Act of God. Most accidents are caused by some form of substandard practices and/or conditions. The most common immediate causes of accidents are :

SUBSTANDARD PRACTICES

1. Operating equipment without authority
2. Failure to warn
3. Failure to secure
4. Operating at improper speed
5. Making safety devices inoperable
6. Removing safety devices
7. Using defective equipment
8. Using equipment improperly
9. Failing to use personal protective equipment properly
10. Improper loading
11. Improper placement
12. Improper lifting
13. Improper position for task
14. Servicing equipment in operation
15. Horseplay
16. Under influence of alcohol and/or other drugs

SUBSTANDARD CONDITIONS

1. Inadequate guards or barriers
2. Inadequate or improper protective equipment
3. Defective tools, equipment or materials
4. Congestion or restricted action
5. Inadequate warning systems
6. Fire and explosion hazards

7. Poor housekeeping; disorderly workplace
8. Hazardous environmental conditions: gases, dusts, smokes, fumes, vapours
9. Noise exposures
10. Radiation exposures
11. High or low temperature exposures
12. Inadequate or excessive illumination
13. Inadequate ventilation

Substandard practices and conditions are almost invariably a result of inadequate project management or planning, as well as supervisory and/or employee error.

IV PREVENTING ACCIDENTS

Accident prevention is best achieved by being alert, ensuring the safe way to accomplish each task is understood and that everyone is ever mindful of changing conditions and situations which may compromise safety.

BEFORE STARTING ANY JOB, ASK YOURSELF...

- What are the hazards associated with the job (heat, toxic products, electrical, tools, environmental, etc.)?
- What can be done (and should be done) to eliminate these hazards?
- If the hazard cannot be eliminated, what protective equipment or procedure is necessary to effectively manage the hazard or risk?
- What could go wrong and what contingency action should be taken to minimize the consequences?
- Have all these questions, and the answers, been discussed with everyone involved on the job?

BEFORE CARRYING OUT ANY TASKS, ASK YOURSELF...

- Do I understand what is required and the safe way to do this task?
- Is there a written procedure? (If not, should there be?)
- Is this a deviation from a standard procedure? (If so, exactly what is the deviation?)
- What effect could the deviation have on normal operation? (Is a new job plan necessary?)
- What could go wrong if the operation is carried out this way?
- What contingency actions are available if it does go wrong?
- Has everything above been discussed with those involved in theoperation?

You are the one most responsible for safety. This can only be accomplished by accepting that responsibility and doing the right things at the right time in a safe manner. Remember:

NO JOB IS SO URGENT THAT
IT CANNOT BE PERFORMED SAFELY

V. SAFETY GUIDELINES FOR ALL EMPLOYEES, CONTRACTORS, SUBCONTRACTORS, VENDORS AND THEIR EMPLOYEES

ACCIDENTS/INCIDENTS

- Any employee witnessing an accident or incident (near miss) is expected to offer assistance in reporting all details to his supervisor.
- All accidents shall be reported to the subcontractor's supervisor who will in turn advise the Dufferin Construction Company Project Superintendent and the Health and Safety Department.
- Reports are to be prepared for all accidents or incidents (near misses) and forwarded to the Project Superintendent and the Health and Safety Department.

ACCESS

- All entrances, exists, and access/egress to equipment, platforms, ladders, stairs, and buildings shall be continuously maintained free of all obstructions, slippery conditions, overhead danger, etc.

ACCOUNTABILITY

- Each contractor, subcontractor and vendor and its respective workers are required to comply with all applicable health and safety legislation and with established standards, regulations and procedures.
- Contravention of a safety regulation could result in the issuance of orders and a penalty prescribed and enforced under the Occupational Health and Safety Act.
- **Contravention of a Dufferin Construction Company policy or procedure could result in the subcontractor or its employee(s) being removed from the project, at the discretion of the Project Superintendent.**

ADJUDICATION

- Where a conflict occurs in the application of the Divisional - Loss Control Manual or any other manual or reference document produced by Dufferin Construction, consensus will be established by a third party adjudicator mutually agreed upon by the contractor, subcontractor or vendor and Dufferin Construction Company. The adjudicator will assess the validity of the claims. Wherein an agreement cannot be reached in the selection of an adjudicator, Dufferin Construction Company will appoint a third party professional adjudicator. In all cases, the subcontractor/vendor will be required to pay all reasonable costs associated with the third party adjudicator. The judgment of the adjudicator in all cases will be deemed final and binding.

AGE OF WORKERS (minimum)

- All Dufferin Construction Company Employees, Contractors, subcontractors and vendors shall ensure that workers are at least 16 years of age

ALCOHOL/UNAUTHORIZED DRUGS

- Alcohol and unauthorized drugs are prohibited on Dufferin Construction Company property and work sites. Any person under the influence of alcohol or illegal drugs will be refused entry or removed from the premises.
- Personnel using a medically prescribed drug which may impair performance or judgment must inform their respective supervisor and/or the Project Superintendent.

ASBESTOS

- Prior to commencing operations involving asbestos, contractors, subcontractors and vendors shall complete a written **Project Specific Health & Safety Plan** and submit the completed plan to the Project Superintendent.
- **Project Specific Health & Safety Plans** shall follow the format prescribed in Dufferin Construction Company's Divisional - Loss Control Manual.

(See - Project Specific Health & Safety Plans)

- Asbestos insulation may be present in some locations. If asbestos insulation is suspected, all work affected is to be suspended and the Dufferin Construction Company Project Superintendent immediately notified.
- Special procedures are required when working with or around asbestos. Furthermore the above mentioned special procedures apply to work involving man made mineral fibres (MMMF) e.g. fibrous glass- ceramic fibre - rock wool - and slag wool.

AUTHORIZED

- Defined as any employee who by reason of training and experience has been judged competent by the employer, Subcontractor and regulating authorities to perform specific tasks in a safe manner consistent with his job responsibility and in accordance with established standards, regulations and procedures.

BARRICADING

- All open excavations, trenches, open manholes, temporary ground or floor openings, where there could be a hazard presented to any person through trips or falls, must be adequately and properly barricaded in accordance with the Occupational Health and Safety Act and any Regulation enacted thereunder.

BEARDS/HAIR

- Employees must be clean shaven when the nature of the work requires or may require the effective use of personal respiratory protection.
- Long hair which may catch in equipment or other facilities must be appropriately covered by a hard hat or cut to prevent entanglement.

BLASTING & DRILLING OPERATIONS

- Prior to commencing drilling and/or blasting operations, contractors, subcontractors and vendors shall complete a written **Project Specific Health & Safety Plan** and submit the completed plan to the Project Superintendent.
- **Project Specific Health & Safety Plans** shall follow the format prescribed in Dufferin Construction Company's Divisional - Loss Control Manual.

(See - Project Specific Health & Safety Plans)

CAMERAS

- Cameras are not permitted on Dufferin Construction Company projects or property unless authorized by the Project Superintendent.

CHAINSAW USE

- Every chainsaw that is used on a project must be stopped when not being used to cut.
- Chainsaws must be equipped with a chain that minimizes kickback and have a device to stop the chain in the event of a kickback.
- No worker shall use a chain saw unless he or she has been adequately trained in its use.
- Chainsaws must be held firmly when starting the chainsaw. Chainsaws must be held with two hands at all times while in use.
- No worker shall use a chain saw unless he or she is wearing adequate PPE and clothing including gloves and adequate eye and hearing protection.

CLEANING

- Approved cleaning agents are to be used.
- Ensure Material Safety Data Sheets are available.
- The use of gasoline or similar materials capable of giving off hazardous vapours at normal atmospheric temperatures are prohibited for cleaning clothing, carpets, floors, motors, engines or other equipment.

COMPANY

- Company is defined as Dufferin Construction Company and its associates and affiliates. DCC is the abbreviated designation for Dufferin Construction Company.

COMPANY FACILITIES

- Contractor, subcontractor or vendor workers are not permitted to use any Dufferin Construction Company facilities, tools or equipment unless permission is granted by a Dufferin Construction Company supervisory representative.
- Subcontractor's employees are not permitted to use any lunchroom, locker room or sanitary facilities provided by the Dufferin Construction Company for its employees unless required by contract or when permission is granted, by a Dufferin Construction Company supervisory representative.

COMPRESSED AIR

- Compressed air must not be used for cleaning clothes or directed towards any part of the body.
- Air hoses should not be placed on a sidewalk or roadway unless precautions have been taken to minimize tripping, entanglement or damage to the hose.
- Verify the source of supply before connecting air-powered tools. Be sure it is industrial air, not natural gas, etc.

COMPRESSED GAS CYLINDERS

- Compressed gas cylinders must be secured in an upright position.
- Compressed gas cylinders (full or empty) must be disconnected, cylinder caps installed and secured in an upright position when not in use or during transportation.
- Compressed gas cylinders must be stored in a safe place away from hazardous work areas when not in use.

CONFINED SPACES ENTRY

- Prior to commencing confined spaces entry operations, contractors, subcontractors and vendors shall complete a written **Project Specific Health & Safety Plan** and submit the completed plan to the Project Superintendent.
- **Project Specific Health & Safety Plans** shall follow the format prescribed in Dufferin Construction Company's Divisional - Loss Control Manual.

(See - Project Specific Health & Safety Plans)

- Entering a tank or vessel for any purpose is not permitted unless the interior conditions have been tested by a qualified person and the necessary safe work permit issued.
- Tank, vessel or any confined space entry must be made in accordance with the Occupational Health and Safety Act and Regulations for Construction Projects.
- A stand-by person shall be located immediately outside of the confined space work area to render assistance in the event of an unsafe or emergency condition.
- All personnel working inside a confined space must wear a safety lifeline where a harmful atmosphere exists or may develop. An appropriate communications system must be developed and enforced between the stand-by person and the inside workers.
- Specific confined spaces entry procedures may be requested at the discretion of Dufferin Construction Company

CONTACT LENSES

- Contact lenses shall not be worn during any workwhich would expose the wearer to chemicals, gases, vapours, dust or other materials that may harm the eyes or cause irritation.
- Contact lenses must not be worn when wearing self contained breathing apparatus (S.C.B.A.).

DIVING OPERATIONS

- Prior to commencing diving operations, contractors, subcontractors and vendors shall complete a written **Project Specific Health & Safety Plan** and submit the completed plan to the Project Superintendent.
- **Project Specific Health & Safety Plans** shall follow the format prescribed in Dufferin Construction Company's Divisional - Loss Control Manual.

(See - Project Specific Health & Safety Plans)

DRILLING & BLASTING OPERATIONS

- Prior to commencing drilling and/or blasting operations, contractors, subcontractors and vendors shal complete a written **Project Specific Health & Safety Plan** and submit the completed plan to the Project Superintendent.
- **Project Specific Health & Safety Plans** shall follow the format prescribed in Dufferin Construction Company's Divisional - Loss Control Manual.

(See - Project Specific Health & Safety Plans)

DRINKING WATER

- Approved containers used to store drinking water shall be clearly marked and shall not be used for any other purpose.
- Potable water and disposable cups must be available in the immediate vicinity of all work areas.

DYNAMITE

- Dynamite or other explosives are prohibited on Company property unless written permission is granted by the Company representative.
- Contractors or subcontractors employing explosives on the project must appoint a competent person to oversee all blasting operations; and the name of the competent person must be conspicuously posted at the project.
- Contractors or subcontractors must employ and enforce all D.C.C. blasting and handling procedures.

ELECTRICAL HAZARDS

- Prior to commencing electrical maintenance and/or repair operations, contractors, subcontractors and vendors shall complete a written **Project Specific Health & Safety Plan** and submit the completed plan to the Project Superintendent.
- **Project Specific Health & Safety Plans** shall follow the format prescribed in Dufferin Construction Company's Divisional - Loss Control Manual.

(See - Project Specific Health & Safety Plans)

- No work shall be performed, no material piled, sorted or handled, no scaffolding erected ordismantled, nor any tools, machinery or equipment operated in close proximity to electrical power sources where contact or arcing may occur.
- All electrical systems shall be de-energized and the controls locked out in accordance with Occupational Health and Safety Act or any Regulations enacted thereunder.
- Electrical systems shall not be energized except when permission is granted by the person in charge and then, only by a qualified electrician.
- All electrical panels and generators must be equipped with a functional ground fault circuit interrupter (GFCI)
- Ground fault circuit interrupters shall be inspected and tested daily in a manner consistent with the manufacturer's instructions.

- A signal person shall assist an operator if any part of the load may approach the minimum distance noted as follows:

Nominal Phase to Phase Voltage Rating	Minimum Distance
750 to 150,000 volts	3 metres
150,000 to 250,000 volts	4.5 metres
more than 250,000 volts	6 metres

EMERGENCIES

- An emergency response plan will be developed at each site prior to commencing work.
- Report all emergencies (fire, spill, serious injury, serious illness, etc.) to the project superintendent and Dufferin Construction Company's Health and safety Department.
- Emergency telephone numbers shall be posted at each job site adjacent to the phone.

EMERGENCY ACTION

- All personnel must be familiar with the emergency procedures established for the work site and their required response.
- In the event of a fire or serious injury to a fellow worker, all qualified employees are expected to take prompt action to render assistance in addition to making the emergency call. Use the available fire fighting equipment provided to extinguish a fire if possible. Once the fire fighting personnel, and/or ambulance arrive, proceed with your normal or emergency duties depending on the nature of the emergency situation.
- Personnel not involved in the emergency action shall leave the area and proceed to their designated safe location and report to their supervisor on arrival.
- Personnel must remain at the designated safe location until an "All Clear" is announced, or alternate instructions are received from the Site Superintendent.

EMERGENCY VEHICLES

- All vehicles and personnel shall give emergency vehicles and response crewsthe right of way.
- Fire and ambulance routes must be maintained clear and emergency vehicles should be directed by knowledgeable personnel.

EQUIPMENT

- Contractor's equipment, such as trucks, cranes, welding machines, etc. must be maintained in good working condition in accordance with manufactures specifications.
- All equipment must be identified to the Project Superintendent prior to use on site.
- All equipment and tools used by the Subcontractor and his employees must be suitable for the work and the work area environment.
- No equipment shall be modified or altered to perform differently than intended unless written agreement by the manufacturer or certification from a Professional Engineer is obtained.
- Defective equipment shall not be used on a Dufferin Construction project.
- Defective equipment shall be turned off and sufficient measures taken to prevent the equipment from being operated and warning signs posted.
- All mobile equipment and similar vehicles shall be equipped with a functional back up warning device.

EQUIPMENT OPERATION

- Only authorized personnel are permitted to operate, adjust and repair D.C.C. equipment.
- No equipment shall be left running unattended.

EQUIPMENT/VEHICLE BACKUP PROCEDURES

- Prior to commencing equipment and vehicle backup procedures, contractors, subcontractors and vendors shall complete a written **Project Specific Health & Safety Plan** and submit the completed plan to the Project Superintendent. All subcontractors must complete a **Backing up Permit** and submit this to the Project Superintendent prior to beginning any construction operations.
- **Project Specific Health & Safety Plans** shall follow the format prescribed in Dufferin Construction Company's Divisional - Loss Control Manual.

(See - Project Specific Health & Safety Plans)

- Every project shall be planned and organized so that vehicles and machines and equipment are not operated in reverse or are opearated in reverse as little as possible. Vehicles, machines and equipment at a project shall not be operated in reverse unless there is no practical alternative to doing so.
- Where vehicles and equipment must operate in reverse, signs shall be posted at the project in conspicuous places warning workers of the danger.
- Workers on foot should be kept to a minimum in the vicinity of movingvehicles and equipment.
- Workers in the vicinity of moving vehicles and equipmentmust wear a reflective safety vest or an equivalent T-shirt.
- Wherever possible, a barricade should be erected in order to separate workers on foot from vehicles and equipment in motion within the job site.
- When vehicles and equipment must travel in reverse within the construction area and the vicinity of workers who may be endangered, it is necessary for the supervisor to appoint a signal person or "spotter". The spotter shal assist drivers/operators while vehicles or equipment are traveling in reverse.
- The signal person or spotter must:
- not perform other tasks while acting as a signal person.
    - be trained or instructed to perform the task
    - know and understand proper signals
    - know driver/operator blind spots
    - remain out of the path of the vehicle
    - remain in full view of the operator/driver
    - maintain full view of workers and obstructions in the path of the vehicle.
- All vehicles and equipment must be equipped with an automatic audiblealarm that signals when the vehicle or equipment is being operated in reverse. All dump trucks, must have back up alarm in accordance with Section 105 of the Regulations for Construction Projects.
- All vehicle/equipment operators, signal persons and workers on foot within the construction area must be provided with instructions specific to the conditions and procedures to be employed on the construction site.
- All vehicle and equipment operators, supervisors, signal persons and workers on foot shall be provided with instructions specific to the hazards, conditions and procedures appropriate for the circumstances.

EXCAVATIONS

- Prior to commencing trenching, excavating and boring operations, contractors, subcontractors and vendors shall complete a written **Project Specific Health & Safety Plan** and submit the completed plan to the Project Superintendent. Subcontractors must also complete an approved **Trenching and Excavation Permit** and submit the permit for review to the Project Superintendent.
- **Project Specific Health & Safety Plans** shall follow the format prescribed in Dufferin Construction Company's Divisional - Loss Control Manual.

(See - Project Specific Health & Safety Plans)

- All excavations and trenches shall be prepared in accordance with the OccupationalHealth and Safety Act and Regulations for Construction Projects.
- All excavations must be regularly inspected by a competent person in order to ensure the integrity of site conditions and the protective measures employed within or around an open excavation.
- All excavations must have appropriate entrance and exit routes in accordance with the nature of the excavation.
- All open excavations or trenches which pose a hazard must be properly guarded by a substantial railing or barricade. Flashing warning lights, appropriate to the area classification, must be installed when necessary.
- All open manholes, removed gratings or floor openings must be guarded with proper barricades or appropriate covers.

- See Underground Facilities.
- No worker shall enter an excavation or trench unless properly excavated or shored to ensure their safety.

FACILITIES - CONTRACTOR/SUBCONTRACTOR/VENDOR

- Subcontractor's temporary buildings such as, field offices and similar structures may only be placed in areas approved by Owner's representative.
- Open electric or flame heaters are not allowed without the specific approval of the Project Superintendent.

FALL ARREST SYSTEMS

- Prior to commencing operations which may expose a worker to the risk of falling, contractors, subcontractors and vendors shall complete a written **Project Specific Health & Safety Plan** and submit the completed plan to the Project Superintendent. The plan shall include a **Working at Heights Permit** to be submitted to the Project Superintendent prior to work proceeding at heights where workers are exposed to falls greater than 2.4 m.
- **Project Specific Health & Safety Plans** shall follow the format prescribed in Dufferin Construction Company's Divisional - Loss Control Manual.
- All workers who may use a fall protection system are adequately trained in its use and given adequate oral and written instructions by a competent person. A record of training and instruction shall be available to Dufferin Construction Company's Superintendent and the Ministry of Labour.

(See - Project Specific Health & Safety Plans)

- Appropriately secured body harnesses and lifelines must be worn by employees :
  - To ensure that workers are continuously protected at all times from the hazards of falling.
  - when working at heights greater than 10 feet above grade orfloor level where it is impractical to provide adequate work platforms or staging with guard rails.
  - When working over an operating machinery, open space or hazardous substance which cannot be guarded.
  - When occupying an elevated or aerial work platform.
  - When entering a confined space where a harmful atmosphere exists or may develop.
- Body harnesses will provide better fall protection against injury (extensive research and testing support this statement). A safety net shall be used when safety harnesses andadequate work platforms are not possible.
- The use of a safety belt as an alternative to a full body safety harness is unacceptable and will not be permitted on Dufferin Construction projects.
- Before any use of a fall arrest system or a safety net by a worker at a project, the worker's employer must develop written procedures for rescuing the worker after his or her fall has been arrested.

FALLING MATERIALS

- When there is a danger of material falling onto work areas or where the public might be endangered,it is required that such areas be barricaded against entry and warning signs prominently displayed on all sides and approaches or protective canopies installed.

FENCING

- Where applicable, construction site perimeters should be fenced off in such a mannerand using such temporary fencing materials that will provide high levels of warning and protection to all persons on or attending the work site. Fencing should be erected so as to enhance the overall appearance of the project.

FIREARMS

- Possession of firearms by any person except police officers is prohibited on Dufferin Construction Company property or projects.

FIRE EXTINGUISHERS

- Contractor, subcontractor and vendor employees shall be trained in the proper use of fire extinguisher equipment.
- A 4A40BC dry chemical fire extinguisher shall be placed at the point of welding, grinding or cutting.
- The contractor, subcontractor or vendor shall supply sufficient fire extinguishing equipment to handle any anticipated emergency in the contractor's, subcontractor's or vendor's respective work area and ensure that the extinguishers charge is confirmed at an appropriate frequency.
- All Welding machines are to be equipped with a 4A40BC dry chemical fire extinguisher.
- Discharged fire extinguishers must be reported and recharged.

FIRE FIGHTING EQUIPMENT

- Know the location of fire fighting equipment in your area.
- Fire fighting equipment must be used only for its intended purpose and not removed from its place of storage.
- Do not block access to fire fighting equipment.
- Every worker who may be required to use fire extinguishing equipment shall be trained in its use.

FIRST AID/EMERGENCY RESPONSE DEVICES AND PERSONNEL

- All contractors, subcontractors and vendors must ensure the provision of trained first aid and emergencyresponse personnel, facilities and adequate supplies as required by the Workplace Safety and Insurance Act and First Aid Regulations as well as the Occupational Health and Safety Act and any Regulation enacted thereunder.
- Emergency telephone numbers are to be posted beside telephones in all subcontractor trailers.

FORMWORK AND FALSEWORK

- Prior to commencing formwork, falsework and concrete placement operations, contractors subcontractors and vendors shall complete a written **Project Specific Health & Safety Plan** and submit the completed plan to the Project Superintendent.
- **Project Specific Health & Safety Plans** shall follow the format prescribed in Dufferin Construction Company's Divisional - Loss Control Manual.

(See - Project Specific Health & Safety Plans)

- Prior to the placement of concrete, formwork and falsework shall be inspected by a professional engineer (or a competent worker appointed by the engineer) to examine and verify in writing that the form and falsework has been erected in accordance with engineered drawings.

FUELING

- All gasoline, diesel and propane powered engines must be shut off when refueling.
- Fuels must be dispensed with a pump and hose.
- Fuels must be stored in approved safety containers and appropriately labeled.
- Material Safety Data Sheets must be available at the area of dispensing.

GRINDERS

- Hand grinders must not be altered and used as a bench grinder.
- Proper grinding wheels matched to the grinder speed must be used.
- Safety glasses and face shields must be worn when grinding.
- Do not remove or make guards inoperative.

GUARDS

- All protective guards for equipment and portable tools must be used as intended by the manufacturer unless a specific procedure deviation request is approved by DCC's Project Engineer.
- All openings and excavations must be appropriately guarded.

- All stairs having more than four risers must have handrails.

GUARDRAILS

- All guardrails shall be construction assembled and maintained in accordance with the Occupational Health & Safety Act and Regulations for Construction Projects also the Regulations for Industrial.
- A guardrail shall be provided in locations as prescribed in the Occupational Health & Safety Act and Regulations for Construction Projects.
- For guidance on Construction and Assembly of Construction Guardrai, refer to document DS021 as provided by Construction Safety Association of Ontario titled "Guardrails".

GUY WIRES

- Guy wires erected by the contractor, subcontractor or vendor must be identified by hanging a sign from the wire, warning of low clearance.

HAND TOOLS

- Avoid hand tool injuries by:
  - using the right tool for the job
  - maintaining tools in clean and good condition
  - using tools in the intended way
  - carry pointed or sharp edged tools in pouches or sheath
  - hammer head, screwdriver and etc., should be ground periodically to remove mushrooming and rounding.
  - do not hold the work in one hand while directing a screwdriver or chisel with the other. The tools will most likely injure the holding hand when they slip.

HOISTING OPERATIONS

- Prior to commencing hoisting operations, contractors, subcontractors and vendors shall complete a written **Project Specific Health & Safety Plan** and submit the completed plan to the Project Superintendent.
- **Project Specific Health & Safety Plans** shall follow the format prescribed in Dufferin Construction Company's Divisional - Loss Control Manual.
  (See - Project Specific Health & Safety Plans)
- Boomtrucks, mobile and stationary cranes shall be operated by a competent worker.
- Crane operators shall retain their Certificate of Qualification on the project at all times while performing hoisting operations and shall provide the certificate to the contractor on demand.
- Boomtrucks and cranes shall be inspected monthly or more often as required.
- Mobile Crane Logs shall be completed monthly for each crane on the project; and the log shall be available for review by the contractor on demand.

HORSEPLAY

- Startling, scaring, pushing, distracting, fighting, etc. is strictly forbidden and will result in immediate termination and/or removal from the project.

HOUSEKEEPING

- The work site is to be kept clean and free from slip and trip hazards.
- All equipment, tools and unused materials at a job site must be returned to their proper storage area when not in use.
- All waste material must be appropriately disposed of in a designated location.
- Keep all walkways, stairs and platforms free of obstructions.
- Clean up all spills immediately.
- Observe good housekeeping practices at all times and maintain the work area free of combustible/flammable materials and tripping hazards.

- Store all waste or rags in closed metal containers.
- Ensure waste containers are emptied when full.
- Nails shall be removed from all lumber prior to storage or disposal.
- Remove scrap and waste materials regularly during each shift to maintain access/egress routes and at least daily for all other work areas.

JOINT HEALTH AND SAFETY COMMITTEE

- A Joint Health and Safety Committee will be established at all projects where the number of employees regularly exceeds 20 and the expected duration of the project will exceed 3 months; or as prescribed by the Occupational Health and Safety Act.
- Subcontractors and vendors shall participate, cooperate and provide supervisory and/or employee representation on the committee, at the request and discretion of Dufferin Construction Company.
- A Worker Trade Committee will be established where the number of employees regularly exceeds 50 and the expected duration of the project will exceed 3 months.
- The trade unions shall be actively involved in selection of worker representatives.

KNIVES

- A knife shall be used carefully and not as a screwdriver or pry bar.

LADDERS

- Metal or wire reinforced ladders shall not be used in close proximity to electrical equipment.
- All ladders must be inspected and found to be free of defects prior to use. Unacceptable ladders shall be removed immediately from the site.
- Ladders must be equipped with non-slip devices or safety shoes at the foot.
- Ladders must be secured at the top or held by a second person to prevent movement during use
- The base of an inclined portable ladder shall be no further from the base of the wall or structure than 1/4 the length of the ladder, measured from the point at which the ladder contacts the wall or structure.
- When sections of an extension ladder are extended, the overlap between ladder sections must not be less than 3'0" for ladders up to 36'.
- Do not stand on, or work from, the top two rungs of a ladder.
- Step ladders must be fully extended when in use.
- Face the ladder and use both hands while climbing or descending.
- Tools must be carried in a pouch or lifted by a handling or lifting device when ascending or descending ladders.
- Ladders must be appropriately stored and made secure.
- Ladder jack scaffolds are prohibited.
- The area around the ladder base must be free from slippery substances and tripping hazards.
- Landings at the top and bottom of ladders must be free from slippery substances, obstructions and trip hazards.

LANGUAGE

- Where a contractor's, subcontractor's or vendor's employee cannot read or understand English, his supervisor is responsible for ensuring that he thoroughly understands the safety standards and regulations and all other pertinent safety requirements.
- Where a contractor's, subcontractor's or vendor's employee has a communication problem, special procedures, must be developed by the employer to ensure he/she can perform the work in a safe manner and that he or she can be made aware of emergency situations.

LIFTING & MATERIAL HANDLING

- Appropriate signs and warning devices must be posted at the perimeter of all areas where hoisting operations are performed.
- Do not lift more than can be safely handled. Get help.

- When manually lifting a heavy object, bend the knees, keep a straight back and use your legs to lift the load.
- Use mechanical equipment wherever practical for heavy objects.
- Only authorized personnel are permitted to operate material hoisting equipment.
- Safe lifting loads marked on lifting devices must not be exceeded.
- All hooks on lifting on hoisting equipment shall comply with safety standards and regulations. Se additional regulations for precautions for lifts near energized power lines.
- Persons must not stand or pass under any suspended load.
- **The use of a crane, forklift or other equipment as a personnel lift device and/or work platform is prohibited unless it is designed and intended for that purpose**
- Cranes shall be regularly inspected by a competent person and a report detailing the findings of the inspection shall be kept with the crane for review by the contractor.

LIGHTING

- All electrical facilities temporary or permanent must comply with the requirements of the applicable Federal, Provincial or Local Electrical Code and applicable Safety Standards and Regulations.
- Temporary lighting shall be suitable for the work being conducted with cords and cables suitably strung to prevent tripping, or entanglement.
- All temporary lighting must be equipped with proper guards to prevent accidental contact with the bulb.

MACHINE GUARDING

- An effective machine guard should have certain characteristics in design and construction. Such a guard should:
    - Be considered a permanent part of the machine or equipment.
    - Afford maximum protection.
    - Prevent access to the danger zone during operation.
    - Be convenient; it must not interfere with efficient operation.
    - Be designed for the specific job and specific machine, with provisions made for oiling, inspecting, adjusting, and repairing machine parts.
    - Be durable and constructed strongly enough to resist normal wear.
    - Not present a hazard in itself.
- Machine guards manufactured and/or provided by the equipment manufacturer shall meet or exceed the requirements of the Occupational Health and Safety Act or any applicable Regulation(s) enacted thereunder. Modified or replacement machine guards from other than theoriginal equipment manufacturer shall be designed, manufactured and installed consistent with **CSA Z432-94 Safeguarding of Machinery** or shall be designed by a licensed Professional Engineer.

MACHINERY

- Guards must be placed on machinery to prevent contactwith moving parts.
- Guards must not be removed except when the machine is shutdown and locked out. Guards must be replaced before machinery is put in operation.
- Machines must be shut down, locked out and tagged before any repair work is done. This includes electrical, air, steam or other driven equipment.
- Safe operating procedures for machinery must be followed
- Work over moving machinery is prohibited unless adequate protection is provided.
- Be aware of pinch points where hands/fingers could be caught or trapped.

MARINE OPERATIONS

- Prior to commencing marine operations, contractors, subcontractors and vendors shall complete a written**Project Specific Health & Safety Plan** and submit the completed plan to the Project Superintendent.
- **Project Specific Health & Safety Plans** shall follow the format prescribed in Dufferin Construction Company's Divisional - Loss Control Manual.

(See - Project Specific Health & Safety Plans)

- As a minimum, contractors, subcontractors and vendors shall comply with recommendations outlined in the Construction Safety Association of Ontario publication, entitled- **Construction Safety Over and Around Water and Ice.**

MARKING PHYSICAL HAZARDS

- Hazards shall be appropriately identified, guarded and where appropriate, warning signs should beposted (falling material, noise protection, overhead electrical power lines).
- See Excavations.

NAILS

- Exposed nails and spikes must be removed or bent flat.
- Discarded nails must be properly disposed of and not left on the ground or other surfaces.

NEW OR INFREQUENTLY PERFORMED JOBS

- All new or infrequently performed jobs should have a pre-job review and approved procedures developed when warranted.
- Workers must be oriented to these procedures.

NOISE PROTECTION

- Suitable ear protection devices such as muffs or plugs must be worn while working in areas posted with hearing protection signs or when required by the nature of the work being performed.
- Judgment may be required as to the noise level in areas not posted.
- If there is any uncertainty, hearing protection must be worn.

OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATION FOR CONSTRUCTION PROJECTS

- As a minimum, a copy of the Occupational Health and Safety Act and Regulations for Construction Projects or amendments must be retained at each work site and made available to all contractor, subcontractor or vendor employees.

ORIENTATION

- All contractors, subcontractors and vendors must provide their respective employee(s) with adequate and appropriate safety orientation prior to commencing work.
- Visitors must be briefed by the applicable contractor, subcontractor or vendor responsible for the visitor.

OVERHEAD ELECTRICAL POWER LINES

- Before any work is begun, the contractor, subcontractor or vendor and its applicable employees must investigate and be aware of any overhead electrical power or telephone lines and maintain a safe distance at all times in accordance with the Regulation for Construction Projects.
- Warning signs must be posted where appropriate and applicable.
- A signal person shall assist an operator if any part of the load may approach the minimum distance noted as follows:

Nominal Phase to Phase Voltage Rating	Minimum Distance
750 to 150,000 volts	3 metres
150,000 to 250,000 volts	4.5 metres
more than 250,000 volts	6 metres

PARKING AND JOB ACCESS

- Contractor's, subcontractor's and vendor's employees will use proper entrances and travel routes when proceeding to there respective work area in order to avoid passing through other operating locations.
- Parking shall occur only in designated areas as assigned by the Project Superintendent.

PERSONAL PROTECTIVE CLOTHING

- Wear appropriate protective clothing suitable for the task to cover and protect the body.
- Wear goggles, face shield, rubber gloves, rubber suits when a worker may be exposed to an acid, caustic or other similar hazardous material.
- Sleeved shirts and long pants are mandatory.
- Do not wear neckties, loose sleeves, loose clothing, jewelry, rings, bracelets and necklaces which may be caught in machinery or other devices.

PERSONAL PROTECTIVE EQUIPMENT

- Ensure all personal protective equipment is in good working order prior to use.
- Appropriate personal respiratory protection must be worn when handling any hazardous materials/substances, which poses an inhalation hazard.
- Self-contained breathing apparatus (SCBA) or other approved means of supplied air and breathing protection, must be worn whenever prescribed to protect an employee from exposure to harmful gases, vapours or oxygen deficiency. Each employee required to wear such equipment, must be instructed and qualified in its use.
- Life jackets must be worn by workers exposed to the danger of drowning in water deep enough for the life jacket to be effective.
- Foot and leg guards must be worn for all work where the lower part of the body is exposed to injury. Such work include the use of chain saws, jackhammers, tamps, etc.
- Refer to Sections: Safety Glasses/Goggles, Safety Hard Hats, Safety Footwear and Fall Arrest Systems.

PORTABLE FLAMMABLE/COMBUSTIBLE LIQUID CONTAINERS

- Only approved safety containers may be used to store gasoline and other flammable or combustible liquids.
- Only working quantities of flammable or combustible liquids may be present in working areas. Bulk or reserve quantities of such substances shall not be present in working areas.
- Portable containers must be adequately labeled as to contents and hazards.

POWER TOOLS

- Tools must be suitable for the job being performed, in good condition and appropriate to the hazardous conditions which may exist during their use.
- All electrical tools must be either three prong grounded, double insulated or rechargeable.
- Keep guards in place on all power tools.
- Air hoses and electric cords should not be placed on walk and roadways unless precautions have been taken to prevent tripping entanglement and wear.
- Inspect couplings, hose and hose connections of pneumatic tools prior to use.
- Verify the source of supply before connecting air-powered tools. Be sure it is industrial air, not natural gas, nitrogen, etc.
- Ensure air hose is connected to the equipment prior to turning on the air supply.
- The air supply must be shut off when changing pneumatic tools. Air supply must not be shut off by kinking the air hose.
- Disconnect power tools from power source before making repairs or adjustments.
- Explosive actuated fastening tools must only be operated by authorized personnel who have received adequate training to ensure competence.

POWERED ELEVATING WORK PLATFORMS

- Ensure powered elevating work platforms are operated in accordance with the manufacturer's specifications.
- Platforms must be level and stable.
- Platforms should be selected in consideration of load requirements, project conditions and equipment limitations.
- Contractors, subcontractors and vendors must ensure that their respective personnel using a powered elevating work platform have received adequate written and oral training to operate the platform safely.
- Do not travel in an elevated position.
- A full body harness shall be worn when moving.

PROJECT SAFETY ASSESSMENTS

- Project Safety Assessments will be conducted periodically by the Dufferin Construction Company Health and Safety Department to assess site conditions and compliance to safe work requirements.
- **Subcontractors shall participate and cooperate with the efforts and recommendations prescribed as a result of all Project Safety Assessments.**

PROJECT SPECIFIC HEALTH AND SAFETY PLANS

- Prior to commencing work, subcontractors and vendors shall complete a **Project Specific Health & Safety Plan** submit the completed legibly printed or type written plan to the Project Superintendent.
- Completion of a **Project Specific Health & Safety Plan** shall as a minimum require the following steps:
- Assessment of the nature and scope of the work to be performed
- Assess and identify the operations involved and potential hazards that may result from each operation
- Develop specific strategies to address each potential hazard scenario
- Identify workers who may be affected by potential hazards and develop strategies to address worker requirements
- Identify worker skill sets require to perform all tasks and evaluate workers to identify and address skill deficiencies.
- Identify the time frame in which the potentially hazardous operation will be performed, and when remedial and preventive measures will be in place to mitigate the potential hazard
- Complete and submit the **Project Specific Health & Safety Plan** to the Project Superintendent.
- Communicate to all applicable workers the details of the completed **Project Specific Health & Safety Plan.**
- Implement all recommendations as prescribed in the plan.
- Monitor the effectiveness of the **Project Specific Health & Safety Plan.**
- Modify the plan as required to address required changes.
- Changes to the plan must be approved by the Project Superintendent.

RADIOS

- All communication radios are to be carried with an approved belt and holster.
- AM/FM radios or portable cassettes are prohibited from use in the work areas except when approved by Owner's Project Representative.
- Permission must be obtained from the Project Superintendent prior to using radios or cellular telephones on or near a project where blasting operations are being conducted.

RAILROADS

- Do not climb through, over, under or between railroad cars whether they are standing or moving. Keep a safe distance from the ends of cars and be alert for unexpected movement.
- Do not pile materials, build scaffolds, park vehicles or erect any structure closer than 8' from the centre line of any railroad track.

REPORTING VEHICLE ACCIDENTS

- Any contractor, subcontractor or vendor employee involved in a motor vehicle accident on a Dufferin Construction Company project must report the accident at once to his supervisor who will in turn be expected to advise the Project Superintendent.
- A Dufferin Construction Company accident report must be prepared and submitted to the Project Superintendent.
- Only essential vehicles are allowed on Dufferin Construction Company projects.

RESPIRATORY PROTECTION

- Contractors, subcontractors and vendors shall arrange and supply suitable respiratory protective equipment when required by the hazards of the job being performed.
- Contractors, subcontractors and vendors shall ensure all personnel using respiratory protective equipment are appropriately trained and fit tested to the equipment.

RIGGING

- Know the weight of the load to be lifted.
- Ensure loads are properly rigged and stable during the lift.
- Use tag lines to control loads unless such use will create a hazard.
- Inspect all hardware, slings, cable and equipment before using.
- Replace worn equipment.
- Never rig or hoist any load if weather conditions are such that hazards to personnel or property are created, e.g. high wind velocity, low visibility, etc.
- Specific procedures must be prepared and submitted to the contractor prior to performing an unusual or complex hoisting operation.

ROLL-OVER PROTECTIVE STRUCTURES (ROPS)AND RESTRAINING SYSTEMS

- Roll-over protective structures and restraining systems are required on all mobile equipment except:
    - rated by the manufacturer at 15 kilowatts or less and has a tare mass of 700kg or less;
    - was manufactured before 1980 and is not factory-equipped with adapters to accept a roll-over protective structure.
- Mobile equipment not equipped with a roll-over protective structure shall be restricted to locations and operations where the risk of overturning is minimal.

RUNNING

- Running is not allowed on Dufferin Construction Company projects or property.

SAFETY GLASSES/GOGGLES/FACE SHIELDS

- Wear safety glasses with side shield or goggles whenever the nature of the job presents an eye hazard
- Some areas of the project may require the compulsory use of safety glasses, chemical goggles or face shields. Observe signs indicating this requirement.
- Wearing of safety glasses is strongly recommended as a general practice for those areas and taskswhere safety glasses are not mandatory.

SAFETY HARD HATS

- Approved safety hard hats must be worn by all personnel in all work areas.

SAFETY INSPECTIONS

- All contractors, subcontractors and vendors are required to conduct regular safety inspections forall areas for which they are responsible.
- Dufferin Construction Company will perform additional project safety assessments.

SAFETY FOOTWEAR

- Appropriate CSA approved "green patch" safety boots must be worn in all work areas.

SAFETY SHOWERS/EYE WASH STATIONS

- Emergency eye wash stations will be provided by the contractor, subcontractor or vendor for areas not having safety showers and eye wash stations when required by the nature of the work and inherent hazards.

SCAFFOLDS

- Scaffolds, swing stages or other temporary work platforms used for maintenance, installation or removal of equipment must be constructed, maintained and used in compliance with Regulations for Construction Projects.
- Scaffolds must be erected, maintained and dismantled under the direction of a competent worker.
- Ladder jack scaffolds are prohibited from use.

SIGNAL PERSON

- (See - Equipment/Vehicle Backup Procedures, Electrical Hazards and Overhead Electrical Power Lines)

SMOKING

- Obey all no smoking signs.

SPILLS

- Clean up all spills or slippery surfaces which would create a slipping or environmental hazard.
- Report all significant spills to the Project Superintendent and call the emergency number provided by the Project Superintendent (where applicable).

SUBCONTRACTOR OR VENDOR SUPPLIED MATERIALS

- All vehicles arriving on the project shall first report to the project office trailer and/or Project Superintendent.
- Contractors, subcontractors and vendors shall provide sufficient notice and information to permit Dufferin Construction Company to assess the circumstances, identify potential hazards or productivity interruptions and implement corrective measures.

TRAFFIC

- Speed Limits must be obeyed.
- Where no speed limit is posted, travel with caution and according to the terrain, job conditions, adjacent work activities and weather conditions.
- All street, railroad stop and warning signs must be obeyed.
- Passengers must never leave or board a vehicle in motion.
- Workers are not permitted to ride in the back of a pickup truck
- Vehicles parked on a Dufferin Construction project or property must be left with the engine shut off and parking brake set.
- All vehicle accidents occurring on a Dufferin Construction Company project or property must be reported and an Accident Report prepared.

TRAFFIC CONTROL

- Traffic control measures must be employed in order to meet therequirements of the Ontario Traffic Manual - Book 7, Section 67-69 of the Regulations for Construction Projects and the following objectives :
    - To protect construction crews and the motoring public by regulating traffic flow.
    - To stop traffic whenever required by the progress of work.
    - Otherwise to keep traffic moving at reduced speeds to avoid tie-ups and delays.
    - To allow construction to proceed safety and efficiently.
    - To ensure that public traffic has priority over construction equipment.
- Equipment used for traffic control including, but not limited to signs, delineators, cones, barricades, flashers, barriers, markers, crash trucks and drums must meet all applicable Federal, Provincial or local requirements.
- Where required, the contractor, subcontractor or vendor is responsible for appointing a competent traffic control person who shall not perform any other work while setting up or removing the measures and shall develop in writing a traffic protection plan specifying the vehicular hazards and the measures described to protect workers.
- The contractor, subcontractor or vendor must ensure that the trafficprotection plan is kept at the project and made available for review by a worker on request.
- All signs shall be in accordance with the latest reflectivity standards of Book 7 and workers shall wear CSA approved safety vests with 360 degree visibility.
- Workers directing traffic shall receive training and deemed competent, shall not direct vehiculartraffic for more than one lane in the same direction and not direct traffic if the posted speed is greater than 90km/h.

UNDERGROUND UTILITIES

- Locations of all underground utilities must be requested by the contractor, subcontractor or vendor.
- The contractor, subcontractor or vendor shall thoroughly review locate information with the utility company's representatives before excavations are begun.
- Extreme caution must be exercised during excavations as supplied underground drawings may not be accurate.
- The contractor subcontractor or vendor shall comply with the procedures outlined in the Technical Standards and Safety Authority's - **"Guidelines for Excavations in the Vicinity of Gas Lines"** when excavating in the vicinity of pipes, conduits and cables for gas electrical and other services.
- Piping and other underground services must not be damaged during excavation.
- The Project Superintendent must be advised of any damage.

VEHICLES AND MOBILE EQUIPMENT (also - see Equipment/Vehicle Backup Procedures)

- Vehicle operators must have a valid operators license.
- All vehicles must be maintained in proper working order and inspected prior to use.
- All dump trucks, trucks and mobile equipment used at the work site area are to be equipped with working automatic back-up audible warning alarms.
- It is unacceptable to transport workers in the back of a pickup truck or mobile equipment not equipped with a seat and seat belt.

VENTILATION

- Effective ventilation shall be maintained to ensure a proper air supply free of contaminants and impurities which would exceed safe exposures.
- Forced ventilation systems will be required depending on the nature of the work, work environment and atmospheric condition.
- An inadequate air supply will require the use of appropriate personal protective equipment.

VISITORS

- Contractors, subcontractors and vendors are responsible for the safe conduct of visitors at the work site and must provide orientation to safety requirements during their visit.

- The Project Superintendent must be advised of all anticipated visitors, new workers, vendors and other workers prior to their arrival.

WEEKLY, TAILGATE TRAINING MEETINGS

- Each contractor, subcontractor and vendor shall conduct a tool box safety meeting at least bi-weekly with all respective personnel in attendance.
- Topics to be addressed at tool box safety meetings will be decided in consultation with the Project Superintendent.
- Weekly tailgate training meetings will be properly documented and the document submitted to the Project Superintendent.

WELDING

- Prior to commencing welding operations, contractors, subcontractors and vendors shall complete a written**Project Specific Health & Safety Plan** and submit the completed plan to the Project Superintendent.
- **Project Specific Health & Safety Plans** shall follow the format prescribed in Dufferin Construction Company's Divisional - Loss Control Manual.

(See - Project Specific Health & Safety Plans)

- Inspect all welding or burning equipment before use for leaks and the presence of oil or grease.
- Flash back preventers must be installed on the fuel and oxygen lines at the torch and regulators.
- Safety glasses and face shields must be worn when cutting, chipping or grinding.
- Suitable eye protection must be worn by anyone assisting or working near a cutting, welding, chipping or grinding operation.
- A fire hose or extinguisher must be readily available at the work area.
- Welding machines must be shut down prior to fueling.
- Remove all combustible materials to a safe distance from the welding area.
- Suitable shielding must be placed around welding and grinding areas to protect personnel in adjacent areas from flashing and flying particles.

WORK PERMITS - HOT WORK

- Prior to commencing operations requiring a hot work permit, contractors, subcontractors and vendors shall complete a written **Project Specific Health & Safety Plan** and submit the completed plan to the Project Superintendent.
- **Project Specific Health & Safety Plans** shall follow the format prescribed in Dufferin Construction Company's Divisional - Loss Control Manual.

(See - Project Specific Health & Safety Plans)

- The following operations are specifically classified as "hot work": welding, burning, hot riveting, hot forging, use of electric hot plate, open fires of any kind, grinding, soldering, the use of any electrical arcor sparking device, etc.
- Procedures must be submitted to the Project Superintendent prior to commencing hot work.

WORKER TRAINING

- Contractors, subcontractors and vendors must provide their respective workers with adequate training to ensure workers are familiar with their work tasks, the hazards and the application of the Act and all applicable Regulations.
- Proof of training is required whenever a task is required to be performed which necessitates a competent person and/or competent worker as prescribed by the Occupational Health and Safety Act and any Regulation enacted thereunder.
- All contractors, subcontractors and vendors shall ensure their respective workers are trained in the following areas, where applicable:
    - Accident/Incident Investigating
    - Back-Up Hazard Awareness
    - Controlling Traffic Safely
    - Equipment Lock-out Procedures
    - Fall Protection
    - Manbasket Operation

- Project Site Security
- Safe Work Practices Near Underground and Overhead Utilities
- Site Remediation
- Train the Trainer - Tailgate Safety Meetings
- Working with Concrete

- Contractors, subcontractors and vendors are responsible for the training of their personnel.
- Training may be available through various health and safety delivery organizations, including but not limited to, the Construction Safety Association of Ontario, the Industrial Accident Prevention Association , Natural Resource Safety Association.
- Additionally, training may be available from unions or private consulting organizations.
- Dufferin Construction Company reserves the right to evaluate the veracity of training claimed by the contractor, subcontractor or vendor.
- The contractor, subcontractor or vendor shall immediately furnish to the Project Superintendent any information relating to claimed training, including but not limited to:
  - training course outline
  - course curriculum
  - representative training materials
  - details relating to facilitation format
  - name and details of the instructor(s)
  - documents confirming worker attendance
- contractor shall be provided on request
- Remedial training shall be provided and paid for by the respective contractor, subcontractor or vendor when training is assessed and deemed insufficient, in the opinion of the Project Superintendent or DCC Health and Safety Department.

WORKING AROUND WATER

- See - Marine Operations

WORKING HOURS

- Normal working hours are form 7:00 am to 5:30 p.m. Monday to Friday excluding statutory holidays unless otherwise prescribed in the tender or contract documents.
- Unless otherwise permitted, the contractor, subcontractor or vendor shall submit a written request 48 hours in advance of its intent to work other than normal working hours.
- The contractor, subcontractor or vendor is responsible for all reasonable costs when a Dufferin Construction Company employee is required to attend the project as a direct consequence of the contractor's, subcontractor's or vendor's request to work other than normal working hours.

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS)

- The purpose of the Workplace Hazardous Materials Information System is to ensure that the hazards of all chemicals produced or employed are evaluated, and that information concerning their hazards is transmitted to employers and employees. This transmittal of information is to be accomplished by means of a comprehensive **WHMIS** program, which must include container labeling and other forms of warning, material safety data sheets and employee training.
- Subcontractors shall develop, implement and maintain at the project, a written **WHMIS** program for the nature of work to be performed. Subcontractors must inform their employees of the availability of the program, including the required list(s) of hazardous chemicals, and material safety data sheets required.
- The subcontractor shall ensure that each container of hazardous chemicals on the project is labeled, tagged or marked with the identity of the hazardous chemical(s) contained therein; and must show hazard warnings appropriate for employee protection.
- Subcontractors shall have a material safety data sheet for each hazardous chemical which they use.
- The subcontractor shall provide employees with information and training on hazardous chemicals in their work area at the time of their initial assignment, and whenever a new hazard is introduced into their work area. Subcontractors shall also provide employees with information on any operations in their work area where hazardous chemicals are

present; and the location and availability of the written **WHMIS** program, including the required list(s) of hazardous chemicals, and material safety data sheets required by the standard.

- The Project Superintendent will advise subcontractors of any chemical hazard that may be encountered in the normal course of their work on the premises, the labeling system in use, the protective measure to be taken, and the safe handling procedures to be used.
- In addition, the Project Superintendent will notify all subcontractors of the location and availability of MSDSs.
- Each subcontractor bringing chemicals on-site must provide the Project Superintendent with the appropriate hazard information on these substances, including the labels used and the precautionary measures to be taken in working with these chemicals.

VI IN CONCLUSION

Think - Plan - Decide - Act Effectively and Safely

Think about the task before you start doing the work.

Plan ahead, layout your work in a safe and logical sequence.

Decide upon the best and safest way to achieve your objective.

Act Proceed with your plan in the safest manner possible considering yourself and those working with or around you.

"SAFETY IS EVERYONE'S RESPONSIBILITY"

Dufferin Construction Company
PreConstruction - Subcontractor Safety Compliance Review
(Ontario)

Project Description: _____

Name of subcontractor _____

Scope of Subcontractor work: _____

_____

Important Note: Where specified in the contract, Dufferin Construction Company reserves the right to verify any statement, procedure, document or other representation made as a result of this review. Completion of this review, subsequent verification or periodic safety audits performed by Dufferin Construction Company does not absolve the subcontractor of the responsibility to ensure a safe and healthful work environment, with full consideration of the nature of the work and the hazards involved, so that human and financial losses are minimized. The use of the term "Subcontractor" refers to a "Contractor" where appropriate and meaningful.

Representative(s) of Dufferin Construction Company in attendance during the meeting:

Name	Title

Representative(s) of subcontractor in attendance during the meeting:

Name	Title

I, _____ of _____ understand the contents of this document and agree to abide by the ***Occupational Health and Safety Act***, applicable safety ***Regulations*** and all requirements contained within the subcontract agreement and as outlined during the Pre-Construction - Subcontractor Safety Compliance Review.

_____ _____

Subcontractor Supervisor or Representative Date

Confirmed and witnessed by;

_____ _____

Dufferin Construction Company Superintendent Date

or Representative

PreConstruction - Subcontractor Safety Compliance Check List

Subject	Status			Comments
	A	Un	N/A	
General Requirement				
1) Does the subcontractor have a documented safety program and is it on file with D.C.C.?				Subcontractors must maintain a copy on site in a prominent place.
2) Has the subcontractor reviewed both DCC's and the subcontractor's own safety programs and any Safety Regulations with their respective employees?				The most stringent requirements of either program, OH&S Act will apply at all times.
3) Has the subcontractor appointed a competent supervisor who will be responsible for enforcement of all safety program/rules/procedures on the subcontractor's respective area of the project?				Name of appointed competent supervisor: _____
4) Has the subcontractor received a copy of DCC's Health & Safety Policy and Reference Manual for Subcontractors and has it been reviewed with the subcontractor's supervisors and subcontractors?				
5) Is the subcontractor and its supervision familiar with the OH&S Act and all Safety Regulations pertaining to the scope of work to be performed, including: • Construction Projects				Subcontractor must review pertinent sections of the OH&S Act and all pertinent Regulations enacted thereunder with subcontractor(s) and employees.
• Industrial Establishments				
• Mines and Mining Plants				
• Diving Operations				
• WHMIS				
• Critical Injury				
• Designated Substances				
• Workers Compensation and First Aid				
• Highway Traffic Act				
• Environmental Protection Act				
6) Does the subcontractor have a written Workplace Hazardous Materials Information System (WHMIS) program?				* Include a copy of the program.
7) Does the subcontractor have a copy of all Material Safety Data Sheets (MSDS) for all hazardous products to be used or stored on site?				
8) Has the subcontractor provided D.C.C. with copies of all applicable MSDS's outlined under item 7?				
9) Has the subcontractor reviewed the contents of the MSDS's with their respective employees and/or subcontractors?				
10) Are the following documents maintained on site by the subcontractor: • Subcontractor's safety policy and program				
• DCC's Health & Safety Policy and Reference Manual for Subcontractors				
• OH&S Act and as a minimum, Regulations for Construction Projects				
• Other Safety Regulation as required				

PreConstruction - Subcontractor Safety Compliance Check List

Subject	Status			Comments
	A	Un	N/A	
General Requirement (cont'd)				
11) Is the subcontractor aware of his responsibility for the health & safety and safe work practices of all employees and subcontractors working for him and/or doing business with him on the project?				
12) Is the subcontractor aware of any work force personnel who may have a communication deficit (including functional illiteracy) and/or any other disability which may affect the safety of the worker ; and if so, are appropriate accommodations employed?				
13) Is the subcontractor aware of legal and/or DCC policy requiring the of the subcontractor participation on a project JHS Committee?				Nominated representatives of the subcontractor: Management: Labour:
14) Have emergency phone numbers been posted near the subcontractor's project office telephone: • Ambulance				
• Police				
• Fire				
• Local ministry of Labour, Construction Health and Safety Program				
• DCC Office number				
• DCC Project supervision cellular number				
15) Is the subcontractor aware of DCC's policy and procedures requiring the subcontractor to conduct weekly tail-gate safety meetings?				
Standards, Regulations and/or DCC Policy				
16) Is the subcontractor aware of pertinent legislation and/or DCC policy regarding: • Accident/Incident investigation and reporting				
• alcohol or drugs				
• personal protective equipment				
• hard hats				
• steel toed work boots				
• hearing protection				
• fire protection				
• respiratory protection				
• hoisting operations				
• housekeeping				
• barricades				
• smoking				
17) Does the subcontractor know where to park equipment and vehicles on the project?				
18) Is the subcontractor aware of the details of an emergency procedure or project specific evacuation plan (if applicable)?				
19) Does the subcontractor have written safe work procedures and has worker training been provided with regard to: • scaffold assembly, erection and inspection				
• work at heights				
• work over/near water				
• fall arrest and travel restraint systems				
• work near traffic				
• equipment/vehicle backup procedures				
•				

PreConstruction - Subcontractor Safety Compliance Check List

Subject	Status			Comments
	A	Un	N/A	
Standards, Regulations and/or DCC Policy (cont'd)				
• equipment/vehicle lockout & tagout				
• confined spaces entry				
• trenching & excavation operations				
• electrical work				
• compressed gas cylinder storage				
• hoisting				
• powder actuated tools				
• pressure testing				
• form and falsework inspection				
• powered elevating work platforms				
• suspended access platforms				
• blasting operations				
• tunnels and shafts				
• signal person requirements				
• inspection and maintenance of vehicles/equipment/tools				
• first aid provisions				
20) Does the subcontractor provide their employees with: • hard hats				
• safety footwear (rubber boots)				
• protective clothing				
• eye protection				
• hearing protection				
• respiratory protection				
21) Does the subcontractor ensure the availability where required: • fire extinguishers				
• fall arrest/travel restraint equipment				
• confined spaces monitoring devices and protective equipment				
• barricades				
22) Are subcontractor employees trained to use the following: • equipment/vehicle lockout & tagout procedures				
• fall arrest/travel restraint systems				
• fire extinguishers				
• confined spaces atmospheric monitoring devices				
• SCBA systems				
• personnel protective equipment				
• hearing protective devices				
• respiratory protective devices				
• cranes & lifting devices				
23) Are trucks and mobile equipment equipped with operational backup warning beepers?				
24) Is the subcontractor aware of DCC accident/incident/occurrence response, investigation and reporting requirements?				
25) Is the subcontractor aware of the various signs which may be required by the subcontractor to post on the site: • fall hazard area, do not enter				
• authorized personnel only				
• no parking				
• open excavation				
• confined space - no entry				

PreConstruction - Subcontractor Safety Compliance Check List				
Subject	**Status**			**Comments**
	A	**Un**	**N/A**	
Standards, Regulations and/or DCC Policy (cont'd)				
• flammable gas/liquid				
• danger, high voltage				
• overhead obstructions				
• overhead work				
• traffic control devices as per MTO requirements				
• danger, blasting ahead				
• turn off radio transmitters				
• hazardous equipment/substance, do not enter				
• no trespassing				
26) Are hazards identified and located: • overhead power lines				
• fall hazards				
• underground utilities				
27) Has the subcontractor agreed to provide a suitable and adequately sized site office trailer?				
28) Has the subcontractor agreed to provide adequate and appropriate toilet and/or wash-up facilities for subcontractor employees?				

DUFFERIN CONSTRUCTION
MOBILE EQUIPMENT/TRUCK SAFETY POLICY

Dufferin Construction is vitally interested in the occupational health and safety of all of its employees, independent brokers/contractors and members of the public. Our company is committed to meeting or exceeding all of the legal minimum requirements, duties, and the standards set by the applicable provincial health and safety legislation and highway traffic legislation.

We encourage every employee and, independent broker/contractor and hourly rental, to be concerned not only about his or her own health and safety, but also to ensure healthy and safe work practices of others around them.

Health and safety is everyone's business. Ensuring full compliance with the applicable provincial health and safety legislation and highway traffic legislation, will not only make our company a healthier and safer workplace, but also improve employee morale and encourage other good business practices.

Dufferin Construction adopts and will enforce the following rules:

- All workers must read and become familiar with; the Dufferin Construction Mobile Equipment/Truck Safety Policy, the Ontario Occupational Health and Safety Act, and the Highway Traffic Act and its regulations, and adhere to the safe work procedures as detailed therein.

- Dufferin Construction mandates that all dump trucks and mobile equipment entering or operating on Dufferin sites must be equipped with an audible automatic back-up alarm that signals when the truck or mobile equipment is being operated in reverse.

- All drivers and operators are to adhere to the Company's policy for safely backing up and obey the signal person at all times. Signs are posted on Dufferin job sites that "Drivers <u>must</u> obey a signal person". At no time is a truck or mobile equipment allowed to reverse unless a signal person is present and providing clear hand signals

to assist the operator. All drivers and operators are to immediately stop if the signal person is not in full view of the operator at all times.

- Hard hats, safety vests and safety footwear is mandatory when operators exit their vehicles and equipment at all Dufferin yards and job sites.

- All drivers and operators must obey all speed limit, stop, and yield signs at all Dufferin locations and surrounding areas. Truck drivers are not allowed to exit their vehicles while being loaded at the Company's Plants and Yards.

- All truck drivers and mobile equipment operators must have and supply Dufferin Construction with the following information:

1. Valid Drivers' License and MTCU hoisting license matching the type of vehicle driven where applicable.
2. Ministry of Transportation Registered Gross Weight Papers
3. Proof of Insurance coverage; minimum 2 million dollars ($2,000,000)
4. Proof of ownership
5. Proof that the driver has received a copy of Dufferin Construction Truck Safety Policy and signed acknowledgement sheet.
6. Valid W.S.I.B. Clearance Certificate or Waiver of Coverage, renewed every sixty days
7. Proof of valid C.V.O.R. certificate, maintaining an acceptable violation rate in accordance with criteria set out by the Ministry of Transportation
8. Proof of a current valid Annual Inspection Sticker and Certificate

- Dufferin Construction will **NOT** accept, tolerate or condone any breach of any statutory requirements of Dufferin's Mobile Equipment/Truck Safety Policy, the Ontario Occupational Health and Safety Act, and the Highway Traffic Act.

DUFFERIN CONSTRUCTION
MOBILE EQUIPMENT/TRUCK SAFETY POLICY
Conformation of Compliance

Name of Company or Independent Broker: _____

_____

Address: _____

_____

City: _____ **Province:** _____

Postal Code: _____

Telephone No: _____ **Fax No:** _____

CVOR No: _____ **Insurance Certificate (Attach)**

WSIB Clearance Certificate (Attach) or

WSIB Independent Operator Confirmation (Attach)

I acknowledge that I have received a copy of the Dufferin Construction Mobile Equipment/Truck Safety Policy.

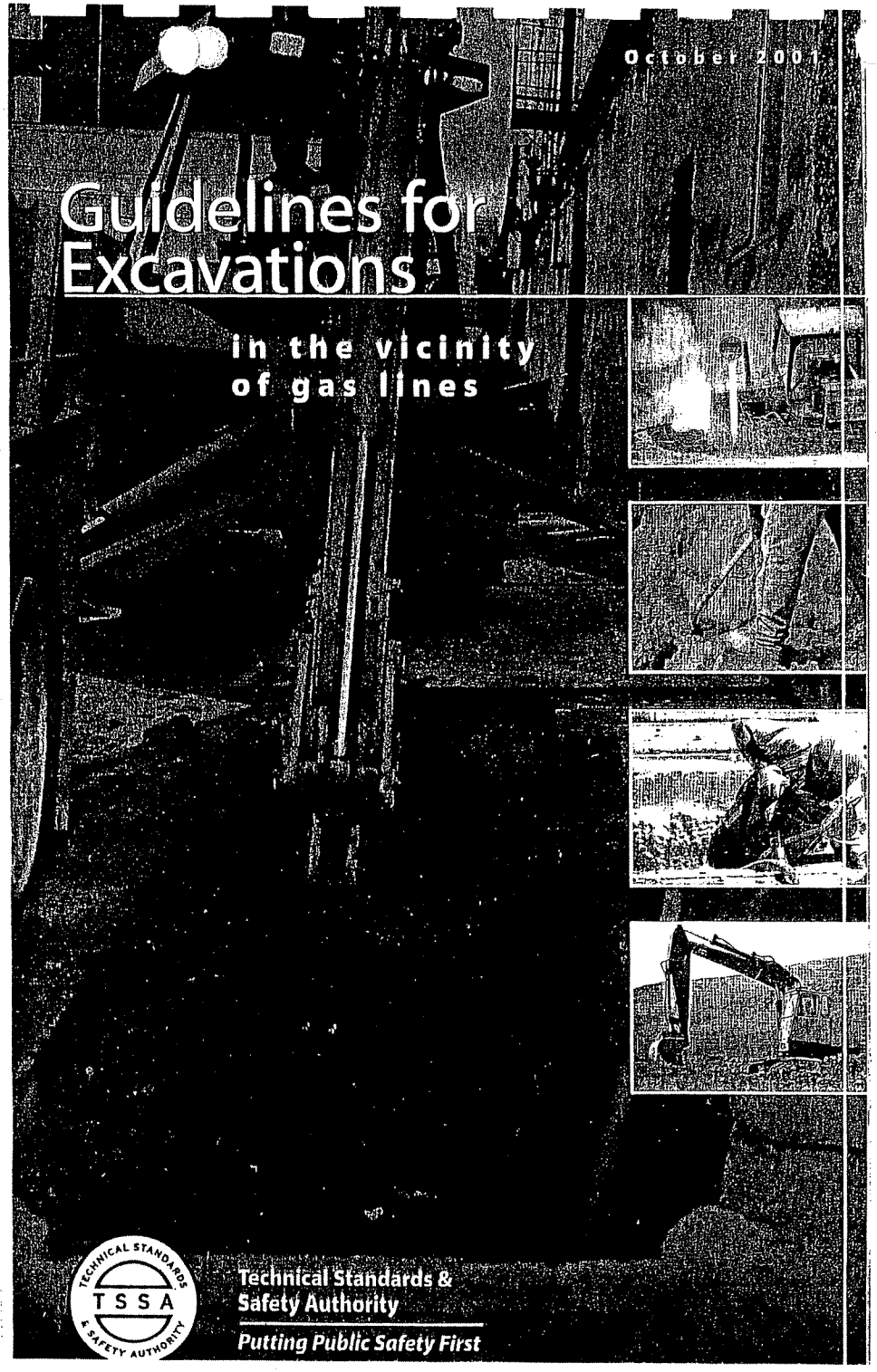
_____ _____

Date **Name (printed)**

_____

Signature

Please forward completed forms to:
Health and Safety Department
Dufferin Construction Company
690 Dorval Drive, Suite 200 Oakville, Ontario, L6K 3W7 or Fax 905-842-2137
By May 30, 2004



Definitions

Boundary Limits means the volume of soil contained by vertical planes placed 1 metre each side of the centre line of the pipeline.

Contractor or Excavator means the individual, partnership, corporation, public agency or other entity that dig, bore, trench, grade, excavate or break ground with mechanical equipment or explosives in the vicinity of a pipeline.

Gas Company means the individual, partnership, corporation, public agency, or other entity that operates the pipeline system.

Gas line or Pipeline means those facilities operated by a Gas Company through which gas is conveyed and includes pipe, components, and appurtenances attached to the pipe such as valves and fittings.

Locate means identification on the ground of the position of the pipeline based on records or electronic locating equipment.

Mechanical Equipment means any powered excavator, earth mover, earth piercing equipment or any other device that may damage the pipeline.

1.0 General Conditions

1.1 All work shall be carried out in accordance with:

(a) the *Occupational Health and Safety Act* (OHSA) and Regulations which apply under this Act, including regulations for construction projects; and

(b) the *Technical Standards and Safety Act* and Regulations which apply under this Act.

1.2 The procedures described herein are prepared in the interest of safety to the general public, the workers carrying out the excavation, and the prevention of damage to gas lines and property.

2.0 Notification

2.1 a) Prior to excavation the contractor responsible for the work shall contact the "Ontario One Call" at the telephone or facsimile numbers listed in Table 1 below, or local Gas Company or the equivalent in the service area, as the case may be, and request locates of the gas lines in the areas where excavation will be taking place. The contractor must receive the locates as described in Section 3.0 prior to commencing any excavation.

b) If removing asphalt but not road base, or removing sidewalk but not curb, a locate is not required.

Table 1: Ontario One Call

Toronto Area	Toll Free - Outside Toronto Area
Tel: (905) 709 - 1717	Tel: 1-800-400-2255
Fax: (905) 709 - 1711	Fax: 1-800-400-8876

Call Two Working Days Before You Dig

- Enbridge Consumers Gas [illegible] Ontario One Call
- Union Gas [illegible] Ontario One Call
- Kitchener Utilities [illegible] Ontario One Call
- Utilities Kingston [illegible] (613) 546-1181 Ext. 2000 or 2010
- Natural Resource Gas (NRG) [illegible] (519) 773-5291
  (Aylmer area, south of London)
- Six Nations Natural Gas [illegible] (519) 445-4213
  (South of Brantford area)

Note: If you are planning to excavate in an area not serviced by any of the above gas utilities please contact the local municipality before excavating.

2.2 The notification shall provide the location where the work will take place, the expected time when the work will begin, the scope of the work, the expected duration, the name, address and telephone number of the contractor, and the name of the contractor's site representative.

2.3 Except in emergency situations, requests for stakeouts or locate information should be made at least 48 hours in advance (two working days).

2.4 Except in cases of emergency, or where the response for the location request has been agreed with the excavator or in extremely remote rural areas, Gas Companies will make every reasonable effort to respond to notification requests and provide locates where applicable within 48 hours (two working days) of the notification.

3.0 Locates

3.1 The locate, using labelled stakes, flags, and/or high visible paint marks, should indicate the centre line of the gas line in the defined area of the proposed excavation.

3.2 When requested, a diagram describing the locate information in 3.1 should be provided to the contractor's site representative if present at the time of locate; otherwise, sent to the person who requested the

locate. The diagram should indicate in clear legible terms the locate information and may be qualified by words regarding scale or orientation.

3.3 Where no gas lines are in the defined area of the proposed excavation a verbal confirmation may be provided to the contractor by the Gas Company. Written confirmation will be provided on request.

4.0 Locate Boundaries/Accuracy

4.1 The excavator must not work outside of the area covered by the "Stakeout Information" without obtaining a further stakeout.

4.2 Locate accuracy should be considered to be 1 metre on either side of the surface centre line locate unless the locate instructions specifically indicate other boundary limits.

4.3 Gas lines are usually found within 1.5 metres of the surface. Where the Gas Company knows that the gas line is deeper than 1.5 metres, the Gas Company must so indicate to the excavator. However, this information does not permit the excavator to use mechanical equipment to dig within the boundary limits to locate the gas line.

4.4 Where the gas line cannot be located using the procedures described in Section 6.0, the contractor must contact the Gas Company and the Gas Company must assist with the locate.

5.0 Duration

5.1 Stakes or markings may disappear or be displaced. Old stakeouts should not be used. Where delays occur beyond the specified period stated in 5.2 or where the stakeout markings become unclear, a new locate must be requested by the contractor.

5.2 Where a locate is valid for a specified period of time the deadline must be indicated on the locate form or diagram.

6.0 Initial Exposure

6.1 At no time, with the exception of 2.1 (b), should a contractor or their sub-contractors use mechanical equipment within the boundary limits of the locate without first digging hole(s) to determine the gas line's exact centre line and depth of cover.

6.2 Test holes should in general be excavated by one of the following methods:

a) mechanical equipment could be used immediately outside

of the boundary limits and then hand dug laterally until the gas line is found; or

b) i) hand excavation between the boundary limits of the locate in cuts of at least 0.3 metre (1foot) in depth,

ii) mechanical equipment could then be used to widen the hand dug trench to within 0.3 metre (1 foot) of the depth of the hand excavation,

iii) repeat step (i) and (ii) until the pipeline is located,

iv) with prior agreement of the Gas Company, machines using vacuum, water or air as the cutting method may be used to locate and expose pipelines as an alternative to hand digging.

6.3 a) concrete saws, jackhammers, hand tools or other similar equipment may be used to break concrete or asphalt on a road or sidewalk surface.

b) With the exception of 2.1 (b), 6.2 (a) and (b), mechanical equipment should only be used to remove broken asphalt or concrete.

c) Concrete below the road surface layers should not be removed without consultation with the Gas Company which may have gas lines encased therein.

6.4 Additional test holes should be dug where:

a) alignment changes are identified by Gas Company representatives, or

b) changes in elevation are identified by Gas Company representatives.

7.0 Excavating After Test Holes Are Completed

7.1 Where test holes in an area have been completed and the gas line located excavation using mechanical equipment may take place provided the following procedures are used:

a) wherever possible, mechanical excavating equipment should be operated parallel to the direction of the gas line when the excavation is within 1 metre of the gas line; and

b) mechanical equipment must not be used closer that 0.3 metre (1 foot) to the gas line;

c) excavation within 0.3 metre (1 foot) of the gas line must be carried out by hand equipment and tools;

d) where the proposed excavation is closer than 0.3 metre (1 foot) to the gas line, the line shall be exposed:

i) by mechanical equipment up to 0.3 metre (1 foot) above the gas line,

ii) by hand equipment and tools within 0.3 metre (1 foot) of the top of the line.

e) as an alternative to hand equipment and tools, with prior agreement of the Gas Company, machines using vacuum, water or air systems as the cutting method may be used to locate and expose the pipeline.

7.2 Guidelines for blasting close to gas pipelines must be obtained from the local Gas Company.

7.3 Guidelines for pipelines needing support must be obtained from the local Gas Company.

8.0 Backfilling

8.1 Where trenches are to be backfilled, the following requirements should be followed:

a) backfilling should be performed in such a manner as to provide firm support under the pipe; and

b) trench must be backfilled with clean fill or granular material free of material injurious to the pipe coating and pipe; the Gas Company must be contacted for the selection of other backfill material; and

c) where flooding of trenches is done to consolidate the backfill, care must be exercised so that the pipe is not floated from its firm bearing on the ditch bottom.

9.0 Abandoned Gas Lines

9.1 Where a line is found during excavation that was not located by the Gas Company, but within the area covered by the locate, never assume the line is abandoned. The Gas Company should be notified immediately to determine if the line is abandoned.

9.2 Abandoned gas lines are defined as lines which have been disconnected and purged in accordance with the CSA Z662 Standard. Excavations in the vicinity of abandoned gas lines shall not be subject to the guidelines in Section 7.0.

10.0 Colour Coding

10.1 Markings on stakes, streets and sidewalks must be yellow.

11.0 Procedure Where Damage Occurs

11.1 If damage to the coating or pipe occurs and no gas is escaping, leave the pipe exposed and contact the Gas Company. In most cases, utilities will not charge excavators for coating repairs.

11.2 If gas is escaping, shut off vehicles or equipment, remove or extinguish all ignition sources, barricade the area off, keep public and workers away. No attempt should be made to control the escaping gas.

11.3 Notify the Fire Department, Police and Gas Company.

12.0 Acts and Regulations

A copy of the relevant sections of the *Technical Standards and Safety Act* and the Ontario Regulation on Oil and Gas Pipeline Systems are attached as Appendix 1.

Appendix 1

Sections of the *Technical Standards and Safety Act*:

Offences

37. (1) Every person who,

(a) contravenes or fails to comply with any provision of this Act, the regulations or a Minister's order;

(b) knowingly makes a false statement or furnishes false information under this Act, the regulations or a Minister's order;

(c) contravenes or fails to comply with a term or condition of an authorization;

(d) contravenes or fails to comply with an order or requirement of an inspector or obstructs an inspector,

is guilty of an offence and on conviction is liable to a fine of not more than $50,000 or to imprisonment for a term of not more than one year, or to both, or, if the person is a body corporate, to a fine of not more than $1,000,000. 2000, c. 16, s. 37 (1).

Duty of director or officer

(2) Every director or officer of a body corporate has a duty to take all reasonable care to prevent the body corporate from committing an offence under subsection (1). 2000, c. 16, s. 37 (2).

Offence

(3) Every director or officer of the body corporate who has a duty under subsection (2) and who fails to carry out that duty is guilty of an offence and on conviction is liable to a fine of not more than $50,000 or to imprisonment for a term of not more than one year, or to both. 2000, c. 16, s. 37 (3).

Separate offence

(4) Where a person contravenes any of the provisions of this Act, the regulations, a Minister's order or any notice or order made under them on more than one day, the continuance of the contravention on each day shall be deemed to constitute a separate offence. 2000, c. 16, s. 37 (4).

Administrative penalty

(5) A person against whom an administrative penalty has been levied by a designated administrative authority or, in the absence of such authority, by the Minister does not preclude a person from being charged with, and convicted of, an offence under this Act for the same matter. 2000, c. 16, s. 37 (5).

Time limit

(6) No proceeding in respect of an alleged offence under this Act may be commenced after two years following the date on which the facts that gave rise to the alleged offence were discovered. 2000, c. 16, s. 37 (6).

41. Every contractor and employer shall take all reasonable precautions to ensure that they and their agents and employees comply with this Act, the regulations or a Minister's order.

Sections of the Oil and Gas Pipeline Systems Regulation:

Ascertaining pipeline locations

9. (1) No person shall dig, bore, trench, grade, excavate or break ground with mechanical equipment or explosives without first ascertaining from the licence holder the location of any pipeline that may be interfered with.

(2) The licence holder shall provide as accurate information as possible on the location of any pipeline within a reasonable time in all the circumstances.

No interference with pipeline

10. No person shall interfere with or damage any pipeline without authority to do so.

Appendix 2

Procedures for using hydro-excavation machines to locate and expose pipelines as an alternative to hand digging.

The following procedures shall be followed at all times when excavating with hydro-excavation technology within 1 m of gas plants.

1. Obtain locates prior to commencement of work. Only a competent, qualified worker shall operate hydro-excavation equipment.

2. The maximum water pressure to be used at any time during excavation shall be 17250 kPa (2500 psi). Below a depth of 45 cm (18") the water pressure shall be reduced to a maximum of 10350 kPa (1500 psi).

3. The wand shall never remain motionless during excavation. Aiming directly at the plant shall be avoided at all times.

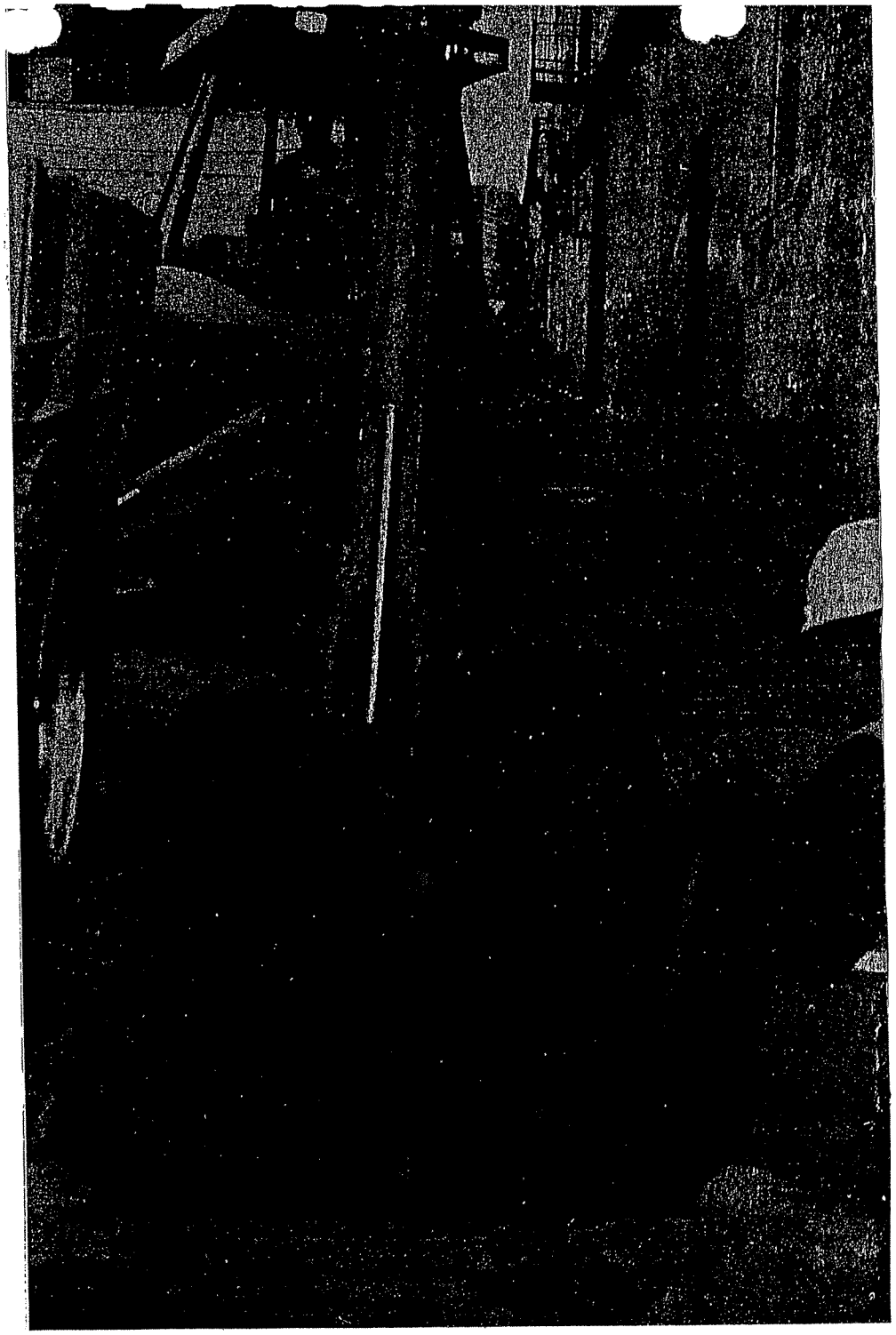
4. A distance of 20 cm (8") shall be maintained between the end of the pressure wand nozzle and the plant and/or the subsoil. The nozzle shall never be inserted into the subsoil while excavating above the plant.

5. Only use hydro-excavation equipment and nozzles that have been specifically designed for use around buried gas lines or other reasonably expected underground gas plant.

6. A device capable of stopping the excavation on demand, such as a trigger or valve, shall be installed on the wand.

7. If heated water is used during excavation, the temperature of the water shall never exceed 115 F° (45 °C).

8. If damage to gas plant occurs while using hydro-excavation technology or any other method of excavation, the excavator shall contact the gas utility.



5

WEEKLY SAFETY MEETING

Purpose

To provide a uniform company wide policy for holding a reporting "tailgate safety meetings" as required.

Policy

1. Short tailgate safety meetings shall be held at least every ten working days by all crews.
2. A written record of these tailgate meetings shall be made on the attached "Employee Registration Form - Weekly Safety Meeting"

Procedure

- Supervisors of crews shall hold a tailgate safety meeting with their crews at least every ten working days.
- As a minimum, a record of the safety topic(s) discussed shall be made by the person in charge, using the Weekly Safety Meeting form. The form shall be completed by the end of each meeting. The original shall be posted in the crew area until the next tailgate meeting and then retained in the supervisors's files. A copy shall be sent to the Foreman for review.
- Any work-related safety matter may be discussed at tailgate safety meetings. It is recommended that the discussion be limited to one or two topics at each meeting.

Responsibility

- Superintendents are responsible for ensure that tailgate meetings are held and recorded, and retained for five years.
- Foremen shall review tailgate reports and take any necessary action to correct safety deficiencies which cannot be resolved by the Superintendent.

Superintendents shall :

1. Hold tailgate safety meetings at least every ten working days, and when there is a significant change in the type of work activity.
2. Record and report the meeting on the required form.
3. Take any action necessary to correct safety deficiencies or request assistance where the action necessary is beyond their control.

Health & Safety Department Personnel shall :

1. Make spot review of the tailgate safety meeting report for content.
2. Respond to suggestions and issues where appropriate.

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DUFFERIN CONSTRUCTION COMPANY

Tailgate Meeting Safety Topics

Overview of the Company's Policy Regarding Weekly 'Tailgate' Safety Sessions

Dufferin construction's policy regarding weekly 'tailgate' safety sessions is as follows:

- meetings ideally should be held weekly, but at least as often as once every 10 working days

- meeting topics should be selected in consultation with the project Superintendent and should be *relevar to the work, conditions, or hazards* present or anticipated on the project

- Weekly 'tailgate' safety sessions must be *properly documented* and all records maintained at the project

Objectives of Weekly 'Tailgate' Training Sessions

Weekly 'tailgate' training sessions are intended to provide workers with a better understanding of...

- your role as a *supportive and concerned Supervisor*
- the proper *equipment, materials and techniques* necessary to perform tasks effectively and above all, *safely*

Training sessions are not intended to.....

- *replace* formal training programs
- *take the place* of proper work practices
- *nor permit* your crew to perform work that they would not ordinarily perform

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Dufferin Construction Company

Tailgate Safety Training Log

Job Name & Number: _____

Name of Topic: _____

Topic #: _____

Date of Training: _____

Time of Training: _____

Print Name	Signature	Company	Badge Number

Comments/Recommendations: _____

Date Submitted: _____

Date Received: _____

.e Approved: _____

Foreman's Signature: _____

P.A./P.E Signature: _____

Superintendent Signature: _____

Tailgate Training Topics

Index #	Topic Classification	# of Topics
1	General Safety	26
2	Personal Protective Equipment	10
3	Material Handling	14
4	Powered Hand Tools	14
5	Backing Up Safely	9
6	Trenching and Excavating	19
7	Working with Concrete	12
8	Fall Protection	30
9	Signaling Equipment Procedure	9
10	Work Area Access	8
11	Working in Traffic/Traffic Control	8
12	Hoisting and Rigging	7
13	Welding and Cutting	17
14	Safety Procedures for Equipment Operators	10
15	WHMIS – **W**orkplace **H**azardous **M**aterial **I**nformation **S**ystem	12
16	Snow Removal at LBPIA	6
17	Scaffolds	6
18	Nighttime Operations	4
19	Propane in Construction	4
20	The Act	4
21	Confined Space	3
22	Utility Locates	1
23	Asphalt Paving	3
	Total	**236**

1. General Safety

Topic #	Topic Name
1.1	Reporting Procedures
1.2	Reporting Accidents to Supervisors
1.3	Moving Equipment
1.4	Housekeeping
1.5	Weather Conditions
1.6	Operator Training
1.7	Roll-Over Protective Structures (ROPS)
1.8	Seat Belt Requirements under ROPS Regulation
1.9	Working in Warm Weather
1.10	Working with Chemicals
1.11	First Aid Kits
1.12	Steel Strapping
1.13	Hard Hat Reflective Stickers
1.14	"Hydralock" Keys & Site Security
1.15	Towing Equipment
1.16	Fire Extinguishers - General
1.17	Fire Extinguishers – Use
1.18	Exercise – Before you start work
1.19	Asphalt Cement Burns – Treatment
1.20	Safe Use of Cell Phones
1.21	Lightning Safety
1.22	How to Prevent Cold Stress Injuries
1.23	West Nile Virus
1.24	Wasp, Hornet, and Bee Stings
1.25	UV Radiation
1.26	Ticks and Lyme Disease

2. Personal Protective Equipment

Topic #	Topic Name
2.1	Hard Hats
2.2	Safety Boots
2.3	Eye Protection
2.4	Safety Glasses with Side Protectors
2.5	The Effects of Sound on Hearing
2.6A	Types of Hearing Protection
2.6B	Hearing Protection Use and Care
2.7	Respirators – Types
2.8	Respirators – Fit Testing
2.9	Respirators – Maintenance

3. Material Handling

Topic #	Topic Name
3.1	General Overview
3.2	Proper Lifting Procedures
3.3	Handling Pipe Manually
3.4	Handling Pipe – Unloading Trucks and Storage
3.5	Handling Pipe – Using Power Equipment
3.6	Filling Metal Gasoline Cans Placed in Plastic Surfaces
3.7	Material Handling – Loading a Trailer Unit
3.8	Material Handling – Trailer Towing Driving Hazards
3.9	Material Handling – Trailer Towing Capacity
3.10	Material Handling – Press-seal Gasket Lift System
3.11	Material Handling – Swift Lift Installation
3.12	Material Handling – Pipe Handling with "Swift lift"
3.13	Material Handling – Pipe Homing with "Swift Lift"
3.14	Material Handling – Manual or Equipment?

4. Powered Hand Tools

Topic#	Topic Name
4.1	Ground Fault Circuit Interrupters
4.2	Proper Use of Chainsaws
4.3	Pneumatic Breakers and Drills
4.4	Air Hoses
4.5	Changing Points and Bits on Pneumatic Breakers and Drills
4.6	Basic Electrical Safety
4.7	Circular Saws
4.8	Belt Sanders
4.9	Jigsaws and Reciprocating Saws
4.10	Drills
4.11	Explosive Actuated Fastening Tools
4.12	Air Powered Tools
4.13	Pneumatic Nailing and Stapling Tools

5. Backing up Safely

Topic#	Topic Name
5.1	Back-up Warning on Equipment
5.2	Site Planning
5.3	Working Signal Person
5.4	Back-up Signal Person – Hand Signals
5.5	Back-up Signal Person – Protective Clothing
5.6	Blind Spot Awareness
5.7	Methods of Backing Trucks up Long Distances
5.8	Operator's Responsibilities
5.9	Worker's Responsibilities

6. Trenching and Excavating

Topic#	Topic Name
6.1	Soil Classification
6.2	Trenching and Slope
6.3	Housekeeping around Trenches and Excavations
6.4	Trench Access / Egress
6.5	Operating Equipment near Trenches and Excavations
6.6	Causes of Cave-ins
6.7	Confined Spaces
6.8	Protecting the Health & Safety of Workers
6.9	Trench Boxes
6.10	Trench Box inspection
6.11	Shoring
6.12	Shoring Inspection
6.13	Injuries in Sewer and Watermain Construction
6.14	Trenching and Excavating – Emergency Procedures
6.15	Working near Underground Utilities
6.16	Breaks in Underground Utilities
6.16B	Securing the Scene after a Gas Line Struck
6.17	Material Handling
6.18	Trenching and Excavating – Stockpiles
6.19	Lasers in Construction

7. Working with Concrete

Topic#	Topic Name
7.1	Personal Protective Equipment
7.2	Skin Protection
7.3	Hand Protection
7.4	Foot Protection
7.5	Eye Protection
7.6	Personal Protection through Hygiene
7.7	Concrete Splatter Protection
7.8	Concrete Bucket Hazards
7.9	Hazards with Concrete Truck Chutes
7.10	Propane Heaters
7.11	Curing Compounds and Form Release Agents
7.12	Hazards with Concrete Pumps

8. Fall Protection

Topic#	Topic Name
8.1	Guardrails and Fall Hazard Elimination
8.2	Guardrail Construction
8.3	Travel Restraint System
8.4	Fall Arrest System
8.5	Moving from one Level to another
8.6	Components of a Static Line
8.7	Moving Along a Static Line
8.8	Anchorages in Fall Protection
8.9	Location of Fall protection Attachment – Travel Restraint System
8.10	Location of Fall protection Attachment – Fall Arrest System
8.11	Components of a Harness
8.12	Location of D-ring on a Harness
8.13	Full Body Harness – Putting it on
8.14	Harnesses over Clothes
8.15	Prohibited Uses of Safety Harness
8.16	Waist Belt Disadvantages
8.17	Lanyards
8.18	Shock Absorbers
8.19	Securing Lanyard while Not in Use
8.20	Knotting Lanyards
8.21	Prohibited Use of Lanyards
8.22	Full Body Harness Inspection
8.23	Inspection of Lanyards
8.24	Inspection of other Lanyard Attachments
8.25	Reporting Inspection Damage
8.26	Rope
8.27	Uses of Kernmantel Rope
8.28	Rope Grabs
8.29	Snap Hooks, Ladder Hooks and Carabiners
8.30	Figure Eight Knots

9. Signaling Equipment Procedures

Topic#	Topic Name
9.1	Signaling Cranes, Backhoes and other Heavy Equipment
9.2	Signaling Equipment Working Near Overhead Powerlines
9.3	Powerline Contact
9.4	Site Planning
9.5	Worker's Responsibilities
9.6	Operator's Responsibilities
9.7	Requirement for Signal Persons
9.8	Casualty Contact with Powerlines
9.9	Hand Signals for Hoisting Operations

10. Work Area Access

Topic#	Topic Name
10.1	Vertical Access Ladders
10.2	Runways
10.3	Ramps
10.4	Platforms
10.5	Job-built Wooden Ladders
10.6	Proper Set-up of Ladders
10.7	Methods of Securing Ladder Bases
10.8	Climbing Up and Down Ladders – 3-point Contact

11. Working in Traffic & Traffic Control

Topic#	Topic Name
11.1	Personal Protective Equipment (Traffic Control)
11.2	Components of a Temporary Work Zone
11.3	Traffic Control Preparation
11.4	Entering & Exiting Highway Construction
11.5	Closing a Lane or Ramp
11.6	Opening a Lane or Ramp
11.7	Inspection and Maintenance (Signs and Delineators)
11.8	Traffic Control Safety

12. Hoisting and Rigging

Topic#	Topic Name
12.1	Inspection of Synthetic Web Slings
12.2	Inspection of Wire Rope Slings
12.3	Inspection of Chain Slings
12.4	Inspection of Rigging Hardware
12.5	Safe Working Loads (SWL)
12.6	Installing Cable Clips
12.7	Hoisting and Rigging Tips

13. Welding and Cutting

Topic#	Topic Name
A.	**Gas Welding and Cutting**
13.A.1	Rigging Inspection
13.A.2	Cylinder Handling
13.A.3	Set-up
13.A.4	Regulator Set-up
13.A.5	Leaking and Overheating Cylinders
13.A.6	Leak Test
13.A.7	Lighting up
13.A.8	Shut Down
13.A.9	Operating Faults
B.	**Electric Welding**
13.B.1	Maintenance and Inspection
13.B.2	Installation
13.B.3	Set-up Checklist
13.B.4	Equipment Use Check-list
C.	**General Welding**
13.C.1	Ergonomics
13.C.2	Ventilation
13.C.3	Protective Clothing
13.C.4	Eye and Face Protection

14. Safety Procedures for Equipment Operators

Topic#	Topic Name
14.1	General
14.2	Operation
14.3	Signaling
14.4	Articulated Dump Trucks
14.5	Mobile Cranes and Power Lines
14.6	Unattended Equipment
14.7	Mounting and Dismounting Construction Equipment
14.8	Ballast for Truck Boxes
14.9	Refueling Vehicles and Electrostatic Discharge/Cell Phone Use
14.10	Operators – Reporting Equipment Defects

15. WHIMS (Workplace Hazardous Materials Information System)

Topic#	Topic Name
15.1	WHIMS – The Right to Know
15.2	Hazardous Materials Symbols used in the WHIMS System
15.3 a)	Supplier Product Information Labels
15.3 b)	Workplace Information Labels
15.4	Material Safety Data Sheets (MSDS)
15.5	Physical Statues of Hazards
15.6	How Hazardous Substances get into the Body
15.7	Diseases and Disease Sites Caused by Hazardous Substances
15.8	Acute and Chronic Effects of some common Workplace Hazards
15.9	Control of Hazards
15.10	Identifying Workplace Hazards
15.11	Site-specific, Material-specific Training

16. Snow Removal at LBPIA

Topic#	Topic Name
16.1	Equipment Maintenance
16.2	Push-back Check List
16.3	Escorting Requirements
16.4	Jet-blast Hazards
16.5	Terminal 3 Parking Garage
16.6	Cleaning of Loader Cylinders

17. Scaffolds

Topic#	Topic Name
17.0	Location and Inspection
17.1	Foundation and Support Surfaces
17.2	Scaffold – Legal Requirements
17.3	Tie-in Requirements
17.4	Scaffold Requirements
17.5	Access and Egress

18. Night-time Operations

Topic#	Topic Name
18.1	Fatigue
18.2	Anchor Sleep Period
18.3	Occasional Nights
18.4	Napping Strategies

19. Working with Propane

Topic#	Topic Name
19.1	Storing Propane Cylinders
19.2	Handling Propane Cylinders
19.3	Construction Heaters & Torches
19.4	Cylinder Exchange (Lift Trucks)

20. The Act

Topic#	Topic Name
20.1	Worker's duties
20.2	Right to refuse work
20.3	Supervisor's, foreman's duties
20.4	Employer's duties

21. Confined Space

Topic#	Topic Name
21.1	Confined Space Defined
21.2	"Low Hazard" Confined Space Procedures
21.3	Confined Space Emergency Planning "Low Hazard"

23. Asphalt Paving

Topic #	Topic Name
23.1	Asphalt – PPE
23.2	Asphalt – Health Effects of Asphalt Fumes
23.3	Asphalt – Accident Review

22. Utility Locates

Topic#	Topic Name
22.1	Proper use of Locates

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Vehicle Backup Safety

Awareness Training Program

Instructor's Guide

2001

Contents

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Details of the Training Program

Purpose:

Past and present experience within the construction industry shows evidence of high frequency and even higher loss potential accidents resulting from vehicles and equipment travelling in reverse. Both the financial losses and more importantly the tragic deaths and injuries caused by vehicles and equipment backing up unsafely, have raised major concerns in the Construction Industry. This training program is designed to raise awareness of vehicle and equipment back up hazards to workers, equipment operators, truck drivers and supervisors, including foremen and field engineers. Methods of preventing vehicle and equipment back up accidents will be presented and discussed so that the participants can safeguard themselves against this very common hazard.

Description:

This training program consists of 58 slides (PowerPoint), detailed instructor guide notes, a participant questionnaire and a training log.

Target Audience:

The program is targeted towards all workers, equipment operators, truck drivers and supervisors who are working in the Construction Industry and are at risk of exposure to vehicle and equipment back up hazards.

Suggested Procedure:

Following the presentation of the introductory section, 6 further sections relating to methods of preventing back up accidents are to be covered and then summarized in the final slide. The entire presentation should last between 45 minutes to an hour and concludes with a short participant's questionnaire (10 questions). After completion of the questionnaire, the Instructor should review the answers to the questions with the participants to ensure that they have understood the key topics discussed. The participants are then required to print their names and sign both the questionnaire and the Training Log for record keeping purposes.

Description of the Training Program

Section

1 *Introduction to the Vehicle Backup Safety awareness Program.* – This section introduces the training program and states its objective to raise awareness of the hazards associated with vehicles and equipment travelling in reverse. Emphasis is put on the high frequency and loss potential of back up accidents (average of two per year since 1981).

2 *Methods of Preventing Vehicle & Equipment Back up Accidents.* – This section very briefly presents the 6 methods of preventing back up accidents and stresses the fact that the methods must be practiced in unison if the back up accident prevention program is to be effective.

3 *Warning Devises on Equipment.* – This section describes the advantages and limitations of using back up beepers on construction equipment.

4 *Site Planning.* – This section is directed towards the supervisors or foremen and describes how they can organize site conditions and traffic patterns to best control back up hazards. Topics discussed are: drive-through operations, coordinating workers on foot away from mobile equipment and the use of signs and barricades.

5 *Backup Signal Person or Spotter.* - This section describes where a signal person is required and the responsibilities of the signal person and operator under the Occupational Health & Safety Act & Regulation. Also described are: requirements for backing trucks a through long distances, Personal Protective Equipment, standard traffic control hand signals and how the signal person should be positioned.

6 *Operator Blind Spot Awareness.* - This section illustrates the blind spot areas for typical construction equipment and advises the worker to avoid entering or standing near these operator blind spots.

7 *What Operators Should Do.* – This section points out to equipment operators and truck drivers that they must obey the signal person while backing up. Emphasis is put on the general rule when no signal person is available; the equipment operator should get out and quickly walk around the vehicle (circle check).

8 *What Workers Should Do.* – This section describes the precautions a worker on foot should take when working around mobile equipment.

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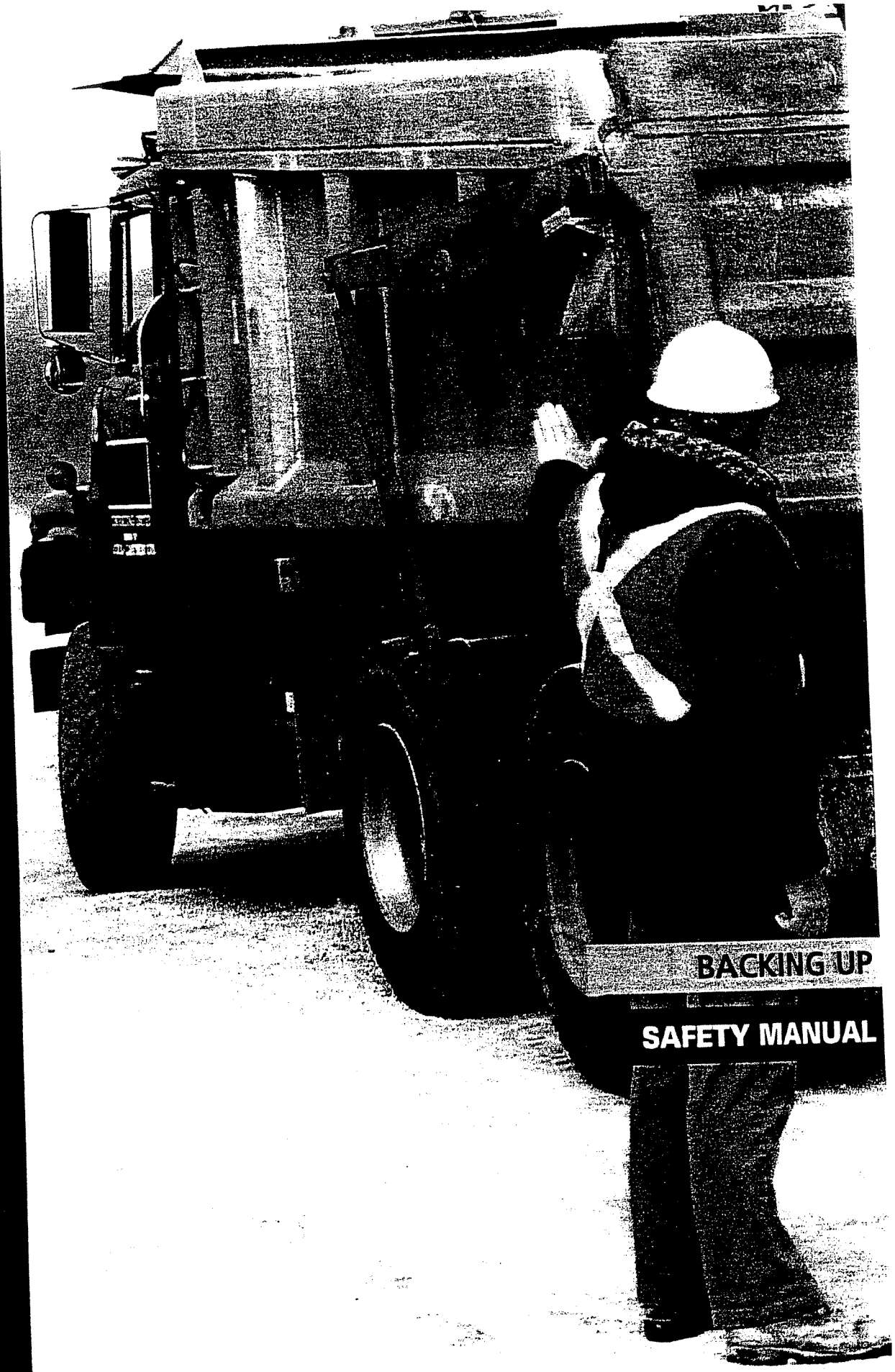

BACKING UP

SAFETY MANUAL

This manual has been reviewed and endorsed by the Provincial Labour-Management Health and Safety Committee and is fully a document of accord between labour and management authorities.

In the past, members of the public have used printed information that was outdated by subsequent improvements in knowledge and technology. We therefore make the following statement for their protection in future.

The information presented here was, to the best of our knowledge, current at time of printing and is intended for general application. This publication is not a definitive guide to government regulations or to practices and procedures wholly applicable under every circumstance. The appropriate regulations and statutes should be consulted. Although the Construction Safety Association of Ontario cannot guarantee the accuracy of, nor assume liability for, the information presented here, we are pleased to answer individual requests for counselling and advice.

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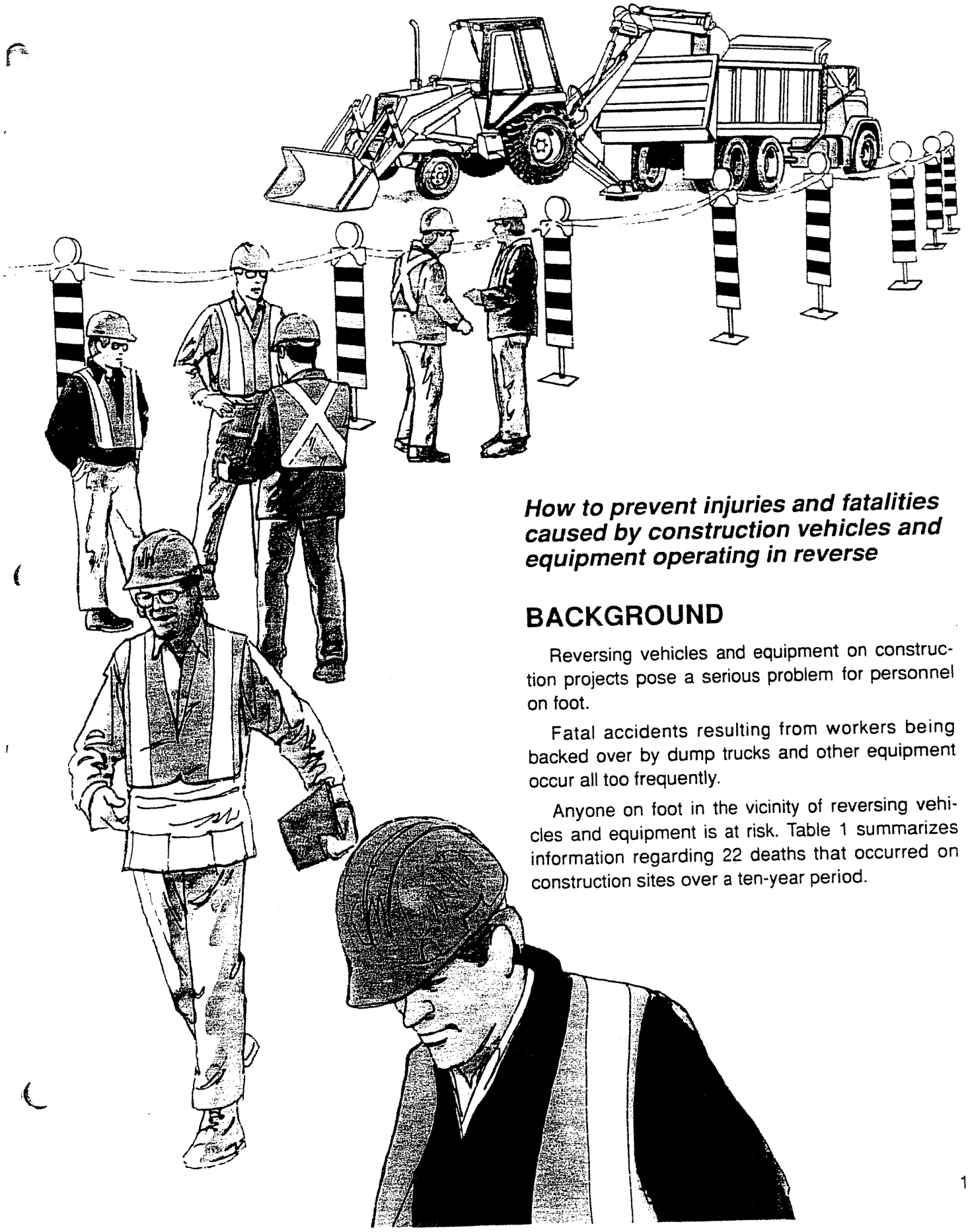
2nd Printing, October, 1997
3rd Printing, April, 1999
4th Printing, May, 2002

ISBN 0-919465-55-2

BACKING UP



How to prevent injuries and fatalities caused by construction vehicles and equipment operating in reverse

BACKGROUND

Reversing vehicles and equipment on construction projects pose a serious problem for personnel on foot.

Fatal accidents resulting from workers being backed over by dump trucks and other equipment occur all too frequently.

Anyone on foot in the vicinity of reversing vehicles and equipment is at risk. Table 1 summarizes information regarding 22 deaths that occurred on construction sites over a ten-year period.

TABLE 1: FATALITY CASE HISTORIES

Victim	Activity	Vehicle
Backhoe Operator	Victim was greasing the bucket on his backhoe when he was crushed between the backhoe and a dump truck that had backed into the area.	Dump truck
Labourer/ Survey Assistant	Victim was bent over setting a survey stake when he was struck by a reversing dump truck.	Dump truck
Labourer	Victim was assisting in a paving operation when he was struck by a reversing dump truck.	Dump truck
Survey Assistant	Victim was run over by a reversing dump truck.	Dump truck
Signaller	Victim was attempting to direct a reversing concrete truck when he fell and was run over by the truck.	Concrete truck
Asphalt Spreader Operator	Victim was oiling the rollers on the spreader when he was struck by a dump truck which was backing up to the spreader.	Dump truck
Dozer Operator	Victim was attempting to direct a reversing dump truck when it backed over him.	Dump truck
Supervisor	Victim was checking grade when a reversing dump truck ran over him.	Dump truck
Labourer	Victim was taking delivery tickets when he walked behind a reversing dump truck.	Dump truck
Labourer	Victim was walking to a trailer when he was struck by a dump truck.	Dump truck
Surveyor	Victim was checking for reference marks on a road project when he was struck by a reversing dump truck.	Dump truck
Labourer	Victim was cleaning up around a garbage bin when he was crushed between the building and another bin off-loaded by truck.	Garbage truck

Victim	Activity	Vehicle
Labourer	Victim was assisting in levelling fill when he was struck by the dozer spreading the fill.	Tracked dozer
Signaller	Victim was assigned to coordinate construction traffic on a haul road when he was struck and run over by a scraper backing up.	Scraper
Signaller	Victim was directing reversing truck when it ran him over.	Semi-tractor with trailer
Labourer	Victim was struck while walking away from a dump truck which had started to back up.	Dump truck
Labourer	Victim was assisting in road repair when he was struck by a reversing dump truck.	Dump truck
Dozer Operator	Victim went to direct a reversing dump truck and was struck by the truck.	Dump truck
Labourer/Grademan	Victim was checking grade on a road project when he was struck by a reversing bulldozer.	Tracked dozer
Labourer	Victim was walking back to his work area when he was struck by a reversing tractor loader/backhoe.	Tractor loader/backhoe
Signaller	Victim was assisting a cold-planing repair job when the machine backed over him.	Cold-plane road grinder
Soil Testing Technician	Victim was struck by a reversing dump truck.	Dump truck

BLIND SPOTS

The main problem with reversing vehicles and equipment is the driver or operator's lack of visibility.

Around dump trucks and heavy equipment such as bulldozers and graders there are blind spots where the operator has no view or only a very limited view.

The operator may not see someone standing in these blind spots. Anyone kneeling or bending over in these areas would be even harder to see.

Consequently the driver or operator must rely on mirrors or signallers to back up without running over someone or into something. Figure 1 shows the blind spots for common types of construction equipment.

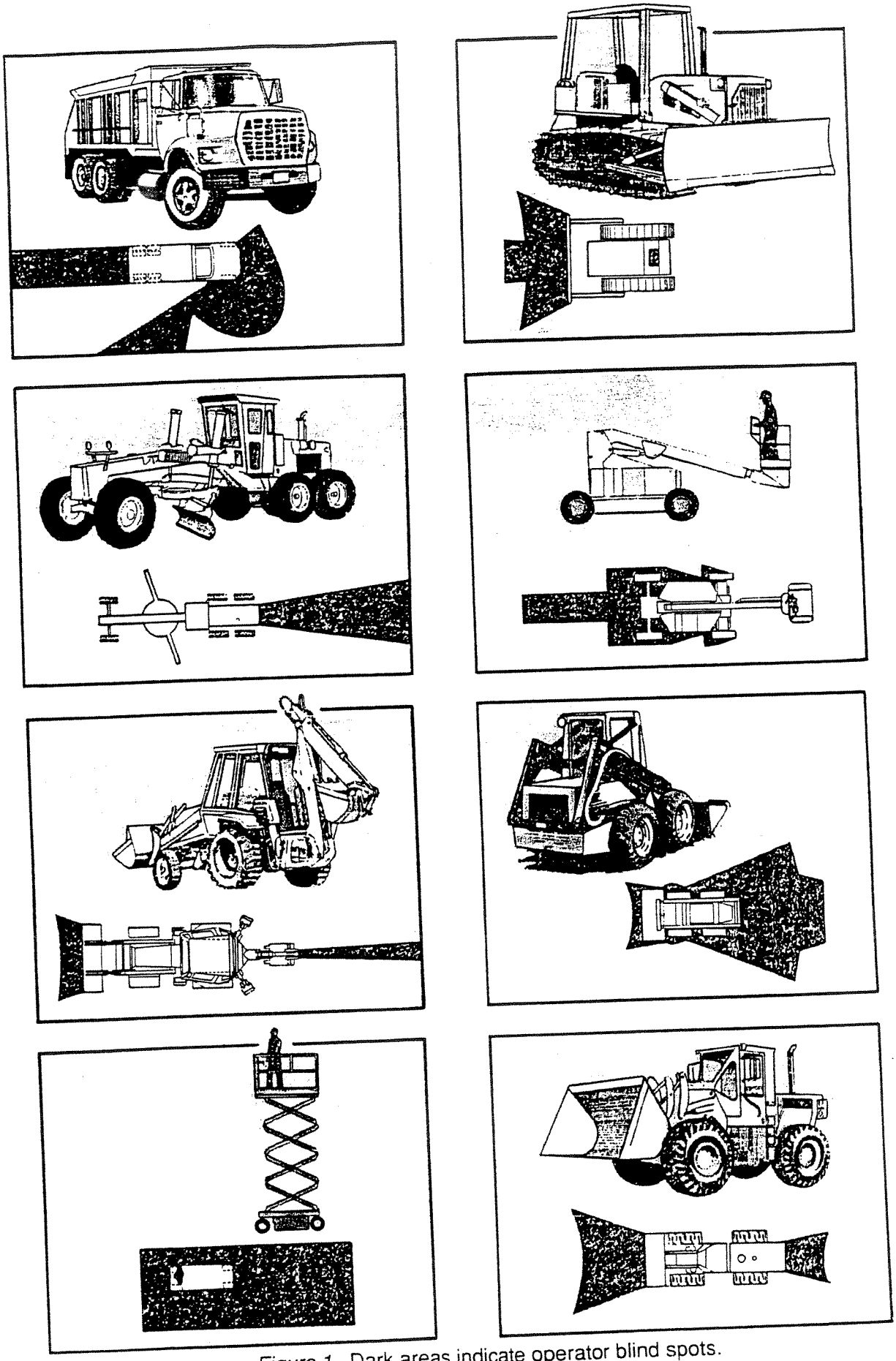


Figure 1. Dark areas indicate operator blind spots.

ACCIDENT PREVENTION

To prevent injuries and deaths caused by vehicles and equipment backing up, there are four basic approaches:

1) site planning
2) signallers
3) training
4) electronic devices.

SITE PLANNING

Wherever possible, site planners should arrange for drive-through operations to reduce the need for vehicles to back up (Figure 2).

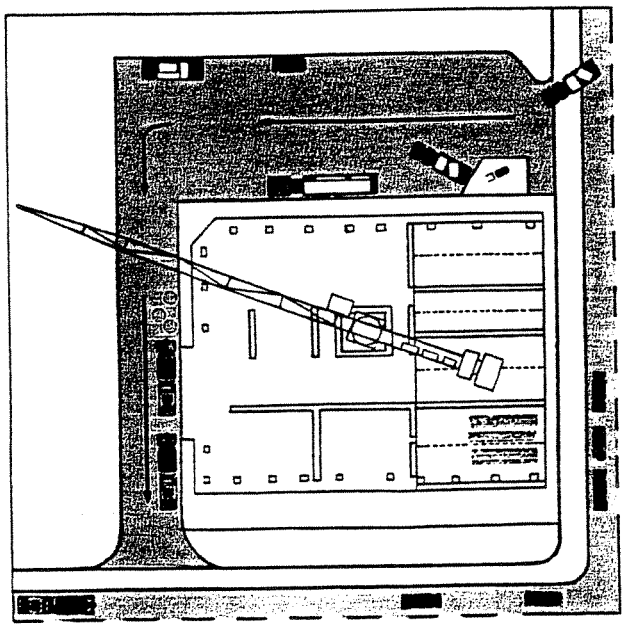


Figure 2

Foot traffic should be minimized where trucks and equipment operate in congested areas such as excavations. Where feasible, a barricade can help to protect workers: for example, by keeping excavation work separate from forming operations (Figure 3).

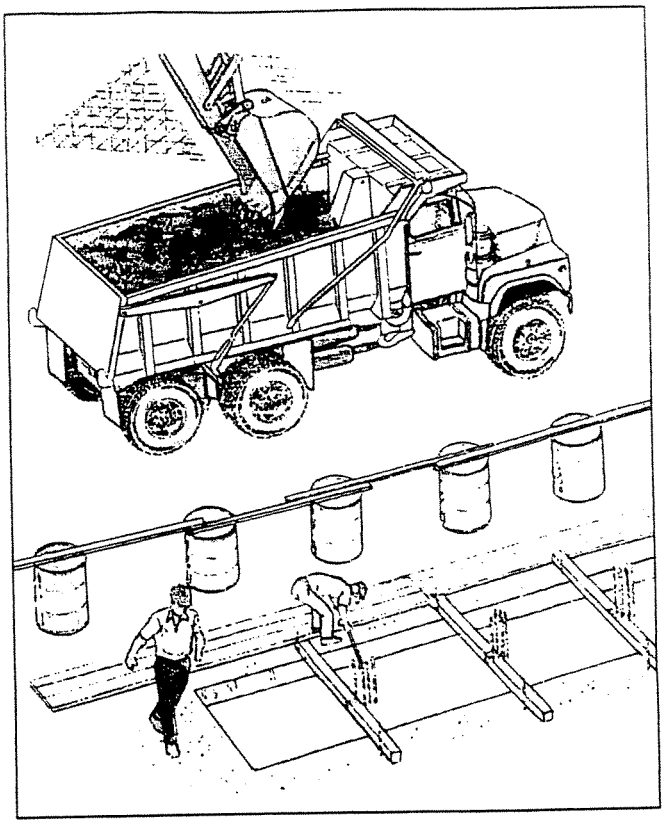


Figure 3

The hazards of reversing vehicles can also be reduced through separate access for workers on foot. Where possible, for instance, a scaffold stair system should be provided for worker access to deep excavations (Figure 4).

Near loading and unloading areas, separate pedestrian walkways can be roped off or barricaded.

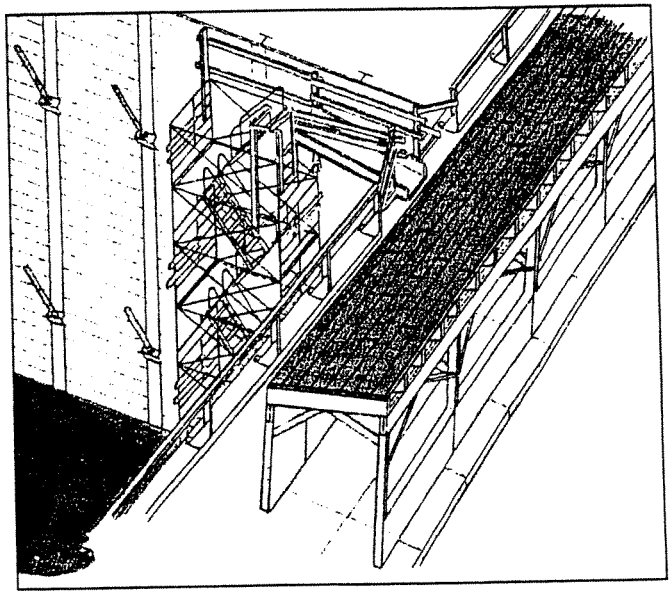


Figure 4

SIGNALLERS

On some projects, you cannot avoid having reversing vehicles or equipment on site. Often, they must share an area with other vehicles and operating equipment – as well as workers on foot.

You must have a signaller or spotter when

a) a vehicle or equipment operator's view of the intended path of travel is obstructed

b) a person could be endangered by the operation of the vehicle or equipment, or by its load.

A signaller must be a competent worker and must not have any other duties to fulfill while acting as a signaller.

Before a worker can act as a signaller, the employer must ensure that the worker has been given adequate oral and written instructions in a language that he or she understands. The employer must keep, on site, a copy of the written instructions and a record of the training.

A signaller must wear a garment – usually a nylon vest – that is fluorescent blaze or international orange, with 2 vertical 5-centimetre-wide yellow stripes on the front and 2 similar stripes forming a diagonal "X" pattern on the back. These stripes must be retro-reflective and fluorescent. The vest must have an adjustable fit and have a front and side tear-away feature.

If a signaller has to work during the night, he or she must wear retro-reflective silver stripes around each arm and leg.

The signaller must maintain a clear view of the path that the vehicle, machine, or load will be travelling and must be able to watch those parts of the vehicle, equipment, or load that the operator cannot see. The signaller must maintain clear and continuous visual contact with the operator at all times while the vehicle or equipment is moving (Figure 5), and must be able to communicate with the operator using clearly understood, standard hand signals (Figure 6). The signaller must warn other workers on foot of the approaching vehicle or equipment, and must alert the operator to any hazards along the route.

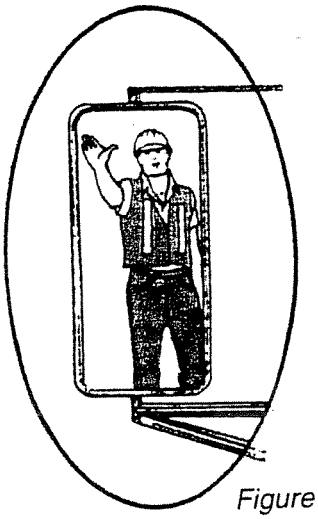
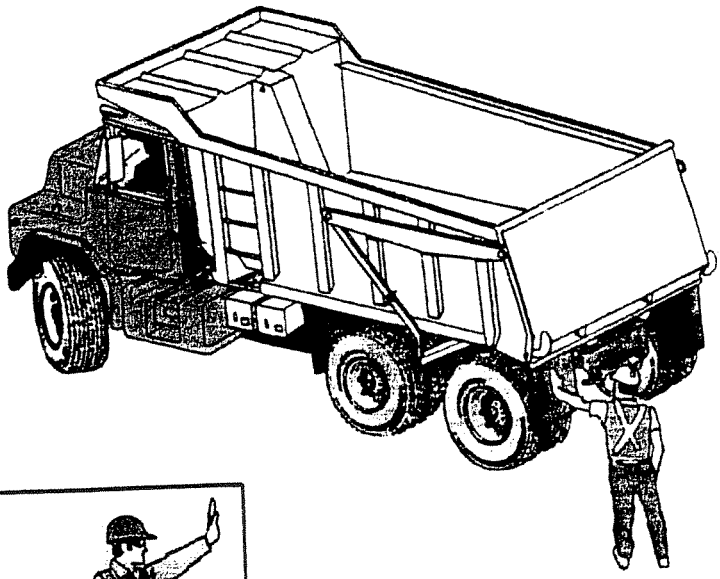


Figure 5



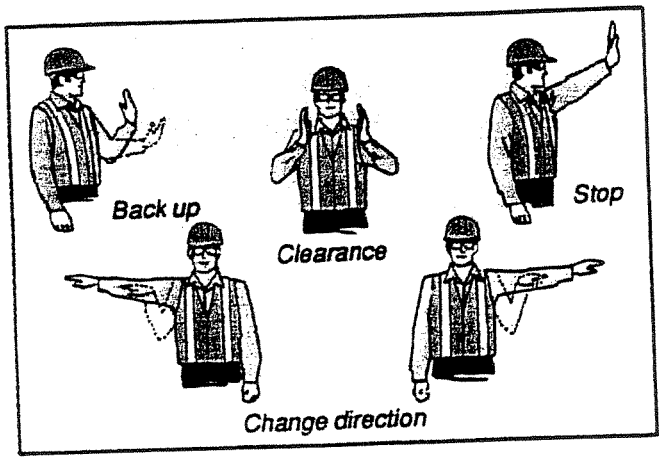


Figure 6

TRAINING

Instruction for drivers, operators, signallers, and workers on foot is essential to reduce the hazards created by reversing vehicles and equipment.

All construction personnel must be made familiar, for example, with blind spots—the areas around every vehicle that are partly or completely invisible to the operator or driver, even with the help of mirrors (Figure 1).

Specific training can then focus on the following points.

Workers on Foot

- Know how to work safely around trucks and operating equipment.
- Understand the effect of blind spots (Figure 7).
- Avoid entering or standing in blind spots.
- **Make eye contact with the driver or operator before approaching equipment.**
- Signal intentions to the driver or operator.
- Where available, use separate access rather than vehicle ramps to enter and exit the site.
- Avoid standing and talking near vehicle paths, grading operations, and other activities where heavy equipment is moving back and forth.

Drivers and Operators

- Always obey the signaller or spotter. If more than one person is signalling, stop your vehicle and determine which one to obey.
- Remain in the cab if possible in areas where other equipment is likely to be backing up.
- Make sure that all mirrors are intact, functional, and properly adjusted for the best view.

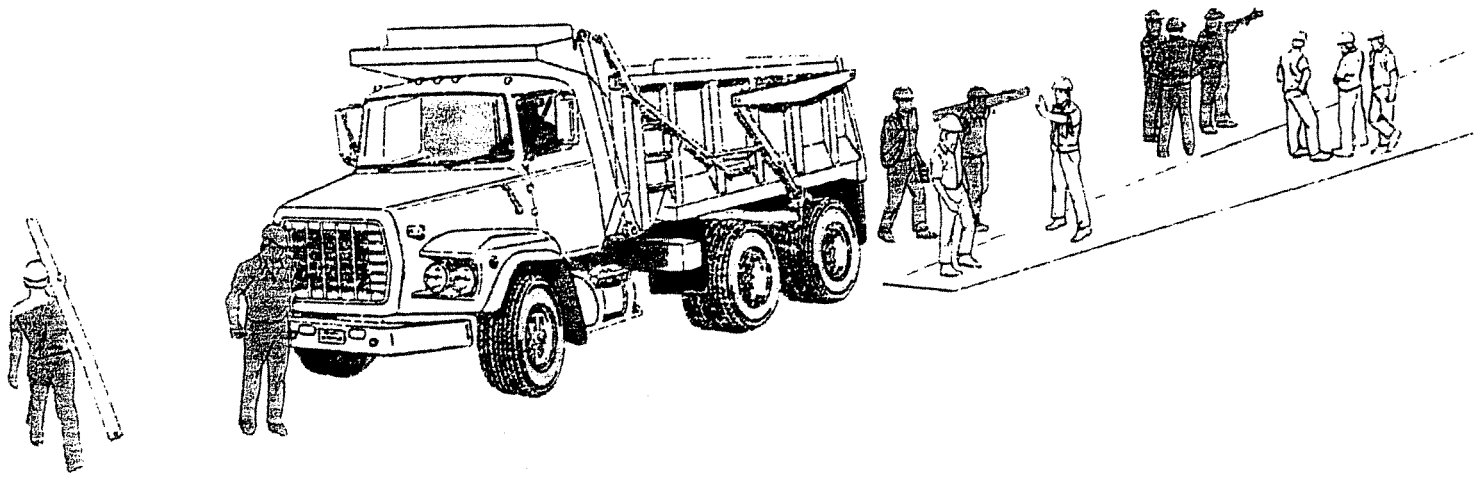


Figure 7. This illustration shows how some personnel on foot are visible to the driver while others are not. The driver cannot see the dark figures because they are passing through blind spots at the front and rear of the truck. The other figures are visible to the driver.

- Blow the horn twice before backing up.
- When no spotter is present, get out and quickly walk around your vehicle. If the way is clear, back up at once (Figure 8).
- Stop the vehicle when a spotter, worker, or anyone else disappears from view.

Signallers

- Stay alert to recognize and deal with dangerous situations.
- Know and use the standard signals for on-site traffic (Figure 6).

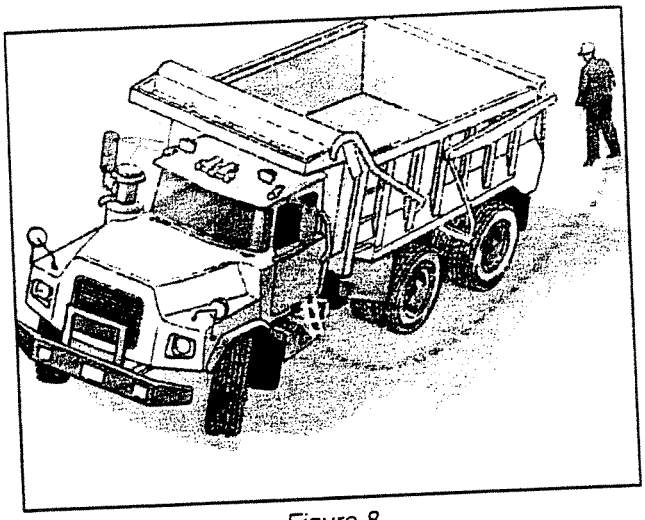


Figure 8

- Wear a reflective fluorescent blaze orange vest and bright hard hat for high visibility.
- Use a signalling device such as a bullhorn in congested excavation areas.
- Understand the maneuvering limitations of vehicles and equipment.
- Know driver and operator blind spots.
- Stand where you can see and be seen by the driver or operator.
- Make eye contact with driver or operator before signalling or changing location.

ELECTRONIC EQUIPMENT

Since 2000, automatic audible alarms that signal when a vehicle is being operated in reverse have been required on dump trucks.

Alarms offer the greatest benefit when traffic is limited to only one or two vehicles. The warning effect of the alarm is greatly reduced, however, when it simply becomes part of the background noise on-site.

This is a common shortcoming with devices that sound continuously when the transmission is put in reverse, especially in areas where several vehicles are operating at once.

Newer devices using a type of radar to sense objects or people within a pre-set radius appear to be more effective but are not readily available or widely used.

Other technologies such as infrared or heat sensors and closed-circuit television are limited by the effects of vibration, dust, and dirt—conditions all too common on construction sites.

SUMMARY

Several different approaches are required to reduce the injuries and deaths caused by backing vehicles and equipment on construction projects.

You need a sensible site layout, sound work practices, signallers, and traffic control in order to reduce or eliminate hazards.

Even more important is training in hazard awareness and in the safeguards outlined by this manual.

DUFFERIN CONSTRUCTION COMPANY

DUFFERIN
FOUNDED 1912

FALL PROTECTION TRAINING PROGRAM

INSTRUCTOR'S GUIDE

A DIVISION OF ST. LAWRENCE CEMENT INC.

Details of the Training Program

Purpose:

Past experience within the construction industry shows evidence of extremely high loss potential accidents resulting from workers who fall from heights. Both the financial losses and more importantly the tragic deaths and injuries caused by workers falling from heights have raised major concerns in the construction industry. This training program is designed to educate workers and supervisors in the area of fall protection with specific emphasis on equipment and applications.

Description:

This training program consists of 220 colour slides, detailed instructor's guide notes, a participant questionnaire, a training log and a participant handout. The handout is available in three languages (i.e.: English, Italian and Portuguese).

Target Audience:

The program is targeted toward all workers and supervisors who are working in the construction industry and are at risk of exposure to falls from heights.

Suggested Procedure:

The program is comprised of six sections. Following the presentation of the introduction, the next four sections will cover Equipment, Inspection and Maintenance of Equipment, Applications and lastly, Rescue Procedures. The presentation will conclude with the Summary section. The slide presentation should last between 50 and 70 minutes and concludes with a short participant questionnaire. After completion of the questionnaire, the instructor should review the answers to the questions with the participants to ensure that they have understood the key topics discussed. The participants are then required to print their names and sign both the questionnaire and the training log for the instructors record keeping purposes.

Description of the Course

Section

I **Introduction to Fall Protection** - This section introduces the training program by listing the three generic types of fall protection and briefly discusses each.

II **Travel Restraint and Fall Arrest Equipment** - This section covers in detail the different pieces of equipment used by Dufferin Construction Company. It also addresses the reasons why Dufferin has selected these pieces of equipment. Lastly, government approval of the equipment is addressed.

III **Inspection and Maintenance of Fall Arrest Equipment** - This section instructs the participants on the procedures of inspecting and maintaining the various pieces of equipment. Additionally, it emphasizes the fact that each worker is responsible for inspecting and maintaining their own equipment each time it is used. Lastly, this section explains what to do with equipment that fails inspection or arrests a workers fall.

IV **Applications** - This section discusses travel restraint systems and fall arrest systems and explains the difference between these two types of fall protection. The area of fall arrest systems is further broken down into horizontal lifelines, vertical lifelines, and static lines. This section shows specific examples of the above applications and provides step-by-step instruction on the set-up of each of these systems.

V **Rescue Procedures for Fall Arrest Systems** - This section emphasizes the fact that preplanned rescue procedures are an important part of a fall arrest system. This section also informs the participant that rescue procedures will be covered in a separate training module.

VI **Summary** - This section summarizes the key points of the training program.

ST. LAWRENCE CEMENT

ST. LAWRENCE CEMENT

GUIDELINES FOR THE SAFE CONTROL OF TRAFFIC

I. PERSONAL PROTECTIVE EQUIPMENT

- Required at all times: approved hard hat, safety boots, and a fluorescent blaze orange vest with yellow retro-reflective stripping.
- During nightwork, retro-reflective silver stripes are required for each arm and leg.
- Visibility may be further improved by:
  - A) Wearing white or light coloured clothing.
  - B) Wearing blaze orange coveralls with reflective striping.
  - C) Applying red and silver reflective tape to hard hats.

II. PLANNING THE TRAFFIC CONTROL OPERATION

The following steps should be followed when planning the traffic control operation:

1) The superintendent or project engineer arranges to close a lane or roadway with the proper authority. All parties who will be working within the traffic-controlled zone must be notified of the date and time. It is important that no one enters the zone while it is being set-up, other than those performing the work.

2) The Traffic Control Specialist under the direction of the superintendent or project engineer will determine the typical plan to be implemented, based on the contract and road authority requirements (e.g. M.U.T.C.D. and Book 7)

3) The Traffic Control Specialist, project engineer and/or superintendent will meet to review the typical plan. Details such as times, locations, sequencing, pace vehicles, and police requirements should be discussed.

4) The Traffic Control Specialist should drive through the area where the traffic control is required, to identify any possible hazards and/or problem areas that may require changes to the typical plan.

5) When necessary changes have been made to the plan, the foreman completes a TRAFFIC CONTROL DEVICE INVENTORY SHEET (APPENDIX B). This involves counting the devices that are available on-site, compared to that which is required, and ordering additional devices. The Inventory Sheet also acts as a good checklist during set-up, to ensure all required devices have been used.

6) The Traffic Control Specialist instructs his crew on the traffic control requirements and assigns tasks to workers based on their experience working in traffic.

7) Crews load traffic control devices into the trucks. Devices must be loaded in a manner so that the first device required is the last to be loaded.

8) If paid duty police officers are being used; they must be given instructions by the Traffic Control Specialist, regarding their responsibilities on site. The foreman will take the police officers on a tour of the job-site to acquaint them with the environment and make them aware of dangers and potential hazards.

III. DESCRIPTION OF WORK

3.1 DURATION OF WORK

Determining the quantity and type of devices and signs required in a temporary workzone, and the appropriate channeling to be used will be influenced by the duration of work category. Four categories are outlined:

1. MOBILE OPERATIONS

- Refers to work conducted while moving continuously at a low rate of speed (25 km/hr).
- Or, to work that is conducted with periodic stopping not exceeding a few minutes.
- A buffer vehicle equipped with a flashing arrow board must follow the mobile operation on high volume/high speed freeways.

2. VERY SHORT DURATION WORK (VSD)

- Very Short Duration work refers to work which occupies a fixed location for up to 30 minutes (this includes the set-up and takedown times).
- The work site may be moved along the roadway and make short stops.
- Active devices such as flashing lights and TC-12 flashing arrow boards are used to ensure adequate traffic control, notify travelling public and reduce worker exposure to traffic.

3. SHORT DURATION WORK (SD)

- Short Duration Work requires traffic control for more than 30 minutes and less than one 24-hour period.
- Be aware that Short Duration work conducted during the nighttime must address certain requirements that during daylight hours are optional.

4. LONG DURATION WORK (LD)

- Long Duration Work requires a separate work area, for longer than one 24-hour period.
- Temporary roadways and barriers may be required, and temporary markings might be necessary.

3.2 COMPONENTS OF THE WORKZONE (APPENDIX G)

There are six components necessary for a well designed workzone:

Advanced Warning Area
Approach Area
Transition Area
Longitudinal Buffer Area
Work Area
Termination Area

If physical spacing is permitted, each of these components should be present in most work zones. During the layout of workzone components, attention must be given to allowing for safe access to and egress from the workzone for all construction and supply vehicles.

IV. DEVICE SUPPORT REQUIREMENTS

Traffic control devices must be adequately supported and weighted down. When devices are permitted to fall over, two major problems arise:

1) Important information concerning the workzone is not transmitted to motorists.

2) Fallen signs and other devices become hazardous obstacles.

Both problems can lead to accidents between motorists and between motorists and workers.

4.1 BALLAST

- Sandbags are commonly used as a form of ballast. In winter months the sand may be mixed with salt to prevent freezing.
- TC-54 traffic control delineators use a tire base as ballast. It is important than an adequate number of tire rings be used to ensure the delineator is not easily blown over by passing vehicles and windy conditions.
- NEVER use concrete, rocks, asphalt, or other solid objects as ballast.
- NEVER place ballast on top of delineators. The ballast could easily fall off or become a projectile if the delineator is struck.
- The size of the device will dictate the amount of ballast required. For example, a large sign (120cm x 120cm) will require more sandbags than a smaller sign (75cmm x 75cm).
- A minimum of 4 sandbags should be used as ballast for small signs. Larger signs should use 6 sandbags.
- Barricades such as the TC-53A also require ballast. Sandbags may be placed on the crossbar and propped against each leg.

4.2 SUPPORTS

- Sign supports must not be split, cracked, rotten, or damaged in any other way.
- Sign bases must also be maintained in a good condition.
- Signs must be securely fastened to the sign supports. Preferably bolts should be used, for both ease of removal and preservation of the device.

V. SET-UP AND REMOVAL OF TRAFFIC CONTROL DEVICES

5.1 GENERAL PROCEDURES (APPENDIX C)

5.1-a) Definitions

- *Upstream*: with reference to work location, is the direction from which traffic is approaching.

- *Downstream*: is the direction to which the traffic is travelling.

- *Taper*: is the beginning portion of a lane closure, which consists of delineators positioned at an angle across the lane being closed.

- *Tangent*: is the portion of a lane closure which follows the taper, and consists of delineators positioned along the lane line.

5.1-b) Direction of Set-up and Removal

- Closures must be set-up in the direction of traffic flow. In this manner, workers are protected by the devices that are upstream from their position.

- Devices must be removed from the roadway in the direction opposite to traffic flow. In this manner workers will be protected while removing the devices.

5.1-c) Worker Positioning

- Workers **MUST ALWAYS** face traffic, whether setting up or removing traffic control devices.

5.1-d) Buffer Vehicles

- A Buffer Vehicle is a vehicle that is placed in the workzone or used in mobile operations to provide protection to workers and equipment downstream.

- A Buffer vehicle serves as a warning to motorists that work is taking place ahead while also providing a buffer between workers and errant vehicles intruding into the workzone.

- There are two types of Buffer Vehicle, they are commonly known as a Blocker Truck and Crash Truck.

- A Blocker Truck, is a Buffer Vehicle with a minimum mass of 6800kg but not equipped with a TMA (truck mounted attenuator). The Blocker Truck must be equipped with a TC-12 arrow board and a 360-degree flashing amber light.

- A Crash Truck, is a Blocker Truck equipped with a Truck-Mounted Attenuator (TMA).

- When stationary or moving, the Buffer Vehicle must maintain a safe distance upstream from the workers. This is to prevent workers being injured by the Buffer Vehicle when impacted by an errant vehicle. However, the distance must not be so far that vehicles can easily intrude into the workzone laterally. Recommended distances for the LIDG (Lateral Intrusion Deterrence Gap) are:

  a) Freeway Conditions - 70 m

  b) Urban Conditions - 50 m

- These distances are guidelines only, and should be adjusted accordingly depending on weather, actual traffic speed, and site conditions.

5.1-e) Shadow Vehicles

- A Shadow Vehicle is a vehicle that provides protection to workers downstream.

- Shadow Vehicles are usually pick-up trucks with a TC-12 arrow board.

5.1-f) Improper Procedures

- **NEVER** "leap-frog" or pass other construction vehicles during traffic control operations, especially if it requires entering and exiting live traffic.

- During nighttime operations, never park or drive within a closure facing traffic with headlights turned on. This may confuse and/or startle motorists. Use beacon lights and hazard lights only, or "block out" headlights with manufacturer approved blinders.

5.2 FREEWAY CONDITIONS – LANE CLOSURE PROCEDURES

5.2-a) Pre-set-up of Devices (APPENDIX C)

- Pre-set-up involves the placement of devices such as signs and TC-54s on the shoulder or off the roadway, so that they may be moved into position quickly when a lane reduction or closure is required.

- A Crash Truck is required to protect workers during the pre-set-up operation. When working along the freeway shoulder the arrowboard must be in CAUTION mode.

5.2-b) Taper Set-up (APPENDIX C)

- Setting-up a taper is the most dangerous part of closing down or reducing a lane of traffic.

- A Crash Truck must be suitably positioned upstream of the operation with the truck mounted arrowboard engaged and indicating the proper arrow mode to warn motorists of the work ahead.

- A Paid Duty Police cruiser should be used to slow or stop traffic upstream of the start of the taper. The cruiser would travel in the lane being closed with lights activated.

- A Dufferin truck should NOT attempt to slow or stop traffic unless it is being used in conjunction with other vehicles as part of a Rolling Closure.

- A Dufferin truck with a trailer mounted arrowboard should follow the installers inside the lane closure until the taper in complete.

- An appropriate taper length for a 100km/hr freeway is 300m with a TC-54 delineator spacing of approximately 18-24m. These distances are a guide only and may vary depending on weather and site conditions.

- If there is no shoulder available for the Crash Truck to work from when setting up the taper section of a lane closure, a Rolling Closure is an acceptable means of worker protection (REF. 5.2-f).

5.2-c) Tangent Set-up (APPENDIX C)

- Once the taper has been completed, the Dufferin vehicle will set the TC-12 arrowboard in position at the end of the taper and ensure that all lights are functioning properly.

- The Dufferin vehicle may continue to act as a shadow vehicle within the closure as the installers continue to place the TC-54 delineators along the tangent section.

- The Crash Truck will continue to follow the installers inside the closure and maintain a LIDG (Linear Intrusion Deterrence Gap) of 70m.

- If traffic speed continues to be a concern, a Paid Duty Police cruiser may be used to slow the traffic in the adjacent "live lane".

5.2-d) Additional Lanes

- To close additional lanes, the procedure for the taper and tangent set-up should be repeated.

- Each lane should have a Dufferin vehicle acting as shadow vehicle. The vehicle in the lane closest to traffic must be a Crash Truck.

- The police cruiser should remain during the set-up of the tangents if the travelling speed of the traffic is a concern.

5.2-e) Ramp and Transfer Lane Closures (APPENDIX C)

- A Crash Truck must be positioned in the exit/transfer lane as protection for the workers installing the signage and TC-54 delineators.

- Motorists may attempt to exit, cutting in front of the workers installing the delineators. To avoid this problem, a Paid Duty Police cruiser should be used in the adjacent lane to make it more difficult for motorists to exit.

- After the closure is completed, the ramp should be barricaded using TC-53As and a "ROAD CLOSED" sign. The police cruiser could also be left stationary in the closed lane with lights flashing.

5.2-f) Rolling Closure Set-up (APPENDIX E)

- The most effective way to ensure the safety of workers when performing traffic control operations or making changes to traffic control configurations is to perform a Rolling Closure upstream of the operation.

- The Rolling Closure requires a vehicle for each traveled lane of the freeway. Although not required, one of these vehicles should be a Paid Duty Police cruiser.

- Once each company vehicle participating in the Rolling Closure has successfully entered the freeway and is travelling with the flow of traffic, they should begin to move so that one vehicle is travelling in each live lane.

- When a company vehicle or police cruiser has successfully filled each live lane and they are travelling adjacent to one another, the traffic should be brought under control and slowed down gradually.

- All vehicles participating in the Rolling Closure must have 360-degree amber beacon lights and four-way flashers engaged. Crash Trucks must have the truck mounted arrowboard engaged in "Caution Mode".

5.3 FREEWAY CONDITIONS – LANE OPENING PROCEDURES

5.3-a) Tangent Removal (APPENDIX D)

- Tapers must be removed from the downstream end of the closure, proceeding against traffic.
- Each closed lane should have a shadow vehicle, which reverses through the closure while workers remove delineators. Ensure that 360-degree beacon lights and four-way flashers are on.
- A Crash Truck is required for the closed lane nearest to the live traffic lane. The truck mounted arrowboard must be operating and flashing in "Arrow Mode".

5.3-b) Taper Removal (APPENDIX D)

- Before tapers are removed, a Paid Duty Police cruiser should stop or slow the flow of traffic upstream of the start of the taper in the lane being opened.
- As the delineators are being removed, the Crash Truck must continue to reverse up the shoulder to provide protection for the workers removing the TC-54s and the TC-12 arrowboard.
- If shoulders are narrow or unavailable, a Rolling Closure is an acceptable means of protecting workers while the taper is being disassembled.
- The above procedures for tangents and tapers may be repeated when multiple lane closures are being disassembled.

5.3-c) Ramp Closure Removal (APPENDIX D)

- A crash Truck must be used to protect the workers as signs, barricades, and TC-54 delineators are removed.
- Barricades and "ROAD CLOSED" signs must be removed first while delineator protection is still in place.
- If the speed of adjacent traffic or vehicles "cutting in" is a concern, a police cruiser should be used to assist with the removal of the closure.

5.4 FREEWAY CONDITIONS – SWITCHING LANE CLOSURES

5.4-a) Procedure (APPENDIX F)

- Switching a lane closure involves changing a right lane closure configuration to a left lane closure configuration, or vise versa.
- A Rolling Closure must be used to perform this type of operation.
- One of the vehicles participating in the Rolling Closure should be a police cruiser, although this is not a requirement.
- Dufferin vehicles must also be positioned on all applicable on-ramps, in order to prevent motorists from entering the freeway during the lane switching procedure.
- Ensure appropriate signs have been changed (i.e. LANE CLOSED and TC-12 Arrowboards).

- Once the delineators have been moved and the closure has been re-configured, the Traffic Control Specialist must inspect the site to ensure the closure will not be hazardous or confusing to motorists.

VI. MAINTENANCE OF TRAFFIC CONTROL DEVICES

6.1-a) Items Requiring Care

- Devices must be kept clean from dust, snow, and mud. This requires that delineators, signs, reflectors, and lights are washed regularly.
- Badly damaged and/or non-reflective TC-54 barrels must be replaced.
- Repair or replace damages sign supports and bases.
- Badly scratched, faded, damaged or illegible signs must be replaced immediately.
- Burst sandbags used as ballast on sign bases, must be replaced.
- Burnt out lights on TC-12 arrowboards and Crash Trucks must be replaced immediately.
- Arrowboards require maintenance, batteries on solar boards should be tested regularly, and diesel powered TC-12's must have regular servicing.
- Delineator spacing on the project is crucial to provide adequate channeling for motorists entering the construction zone, spacing will be verified periodically.
- Site conditions and/or Book 7 will determine delineator spacing, unless otherwise dictated by the contract.

6.1-b) When To Perform Inspection and Maintenance

- Maintenance inspections must be performed prior to commencing traffic control procedures.
- Periodic inspections should be performed throughout the duration of the shift. The number of inspections will be dependent upon the specific job and location.
- During adverse conditions such as wind and rain inspections will be required more frequently.
- Extremely muddy or dusty sites will require cleaning of devices on a regular basis.
- Inspections and maintenance may be required during weekends and holidays, when dangerous conditions are present.
- Replacement of damaged signs and bases should be performed during non-peak traffic periods.
- A final maintenance inspection must be performed before daily shut down, to ensure nothing has been overlooked that might cause confusion to motorists.

6.1-c) Methods and Techniques

- Maintenance of traffic control devices if performed within 3m of traffic must be conducted under the protection of a Crash Truck, if no other approved protection is available.
- The maintenance route must be planned out in advance. Planning will help determine the fastest and safest route, minimizing the worker's exposure to traffic.
- The maintenance route should be planned to minimize the number of times the worker must exit and enter live traffic.
- The "Traffic Control Specialist" on the project will select workers to be responsible for the maintenance and inspection of the traffic control devices. The same workers should always conduct maintenance, as they will become familiar with the route and recurring problems.
- Repairs must **NEVER** be conducted adjacent to live traffic; instead the damaged device must be replaced and removed to a safe location for repair.
- When replacing TC-54's, the workers must ensure that he is always facing traffic.
- If a delineator is missing, the maintenance workers must replace it immediately, gaps in a lane closure is an invitation for motorists to enter.
- **NEVER** attempt to retrieve a delineator that has fallen into a traveled lane of traffic on a freeway. The device will eventually be blown off to the shoulder where it can be retrieved safety at a later time.

VII. IMPROVING DEVICE VISIBILITY

- The most important aspect of ensuring device visibility is keeping the devices clean.
- As of June 12, 2000, certain devices will be required to conform to Type III "Hi-Intensity" reflectivity (REF. MTO Temporary Conditions Manual Sec.3/Subsection.2/Page 30). This will significantly increase night visibility.
- As of January 01, 2003, certain devices will be required to conform to Type VII "Diamond Grade" reflectivity (REF. MTO Temporary Conditions Manual Sec.3/Subsection. 2/Page 31). This will further increase visibility for certain vital traffic control signs.
- On freeway construction projects oversize signage is required (i.e. TC-104 instead of TC-4).
- Reflective inserts or TC-54 saddle markers should be attached to concrete barriers that are being used to channel traffic.
- Delineator spacing along curves and tapers should be reduced. Reduction of delineator spacing will provide more visible and effective channeling.
- Additional warning signage may be advantageous in certain circumstances. However, the use of too many signs may cause motorists to be come confused and overwhelmed with information.

VIII. DOCUMENTATION OF TRAFFIC CONTROL WORK

- It is important to keep all records of traffic control activities pertaining to set-up, inspection, maintenance, and removal. Traffic control affects the general public, so if an accident occurs, we must be able to prove that all traffic control procedures were conducted in accordance with the appropriate standards.

- The Traffic Control Specialist should keep a diary on a daily basis, outlining the specifics of the traffic control operation from start to finish. Important points to include are taper lengths, stations, duration of closures, and devices used.

- As an aid to the Traffic Control Specialist and workers, a Traffic Control Report Form (APPENDIX A) should be used.

- If changes to the original traffic control plan are made during set-up, these changes must be noted on the report and/or traffic diary. The reason for the change should be explained and signed by the Traffic Control Specialist who authorized the change.

- All maintenance records should be kept and noted, even if no problems were identified.

- Have the contract inspector review your notes and sign that he is in agreement with the information. If possible, the Traffic Control Specialist should review any notes that the contract inspector has made regarding the traffic control operation.

- At the end of each traffic control operation the Traffic Control Specialist must file all reports in the site office.

Revised Edition

CONSTRUCTION SAFETY

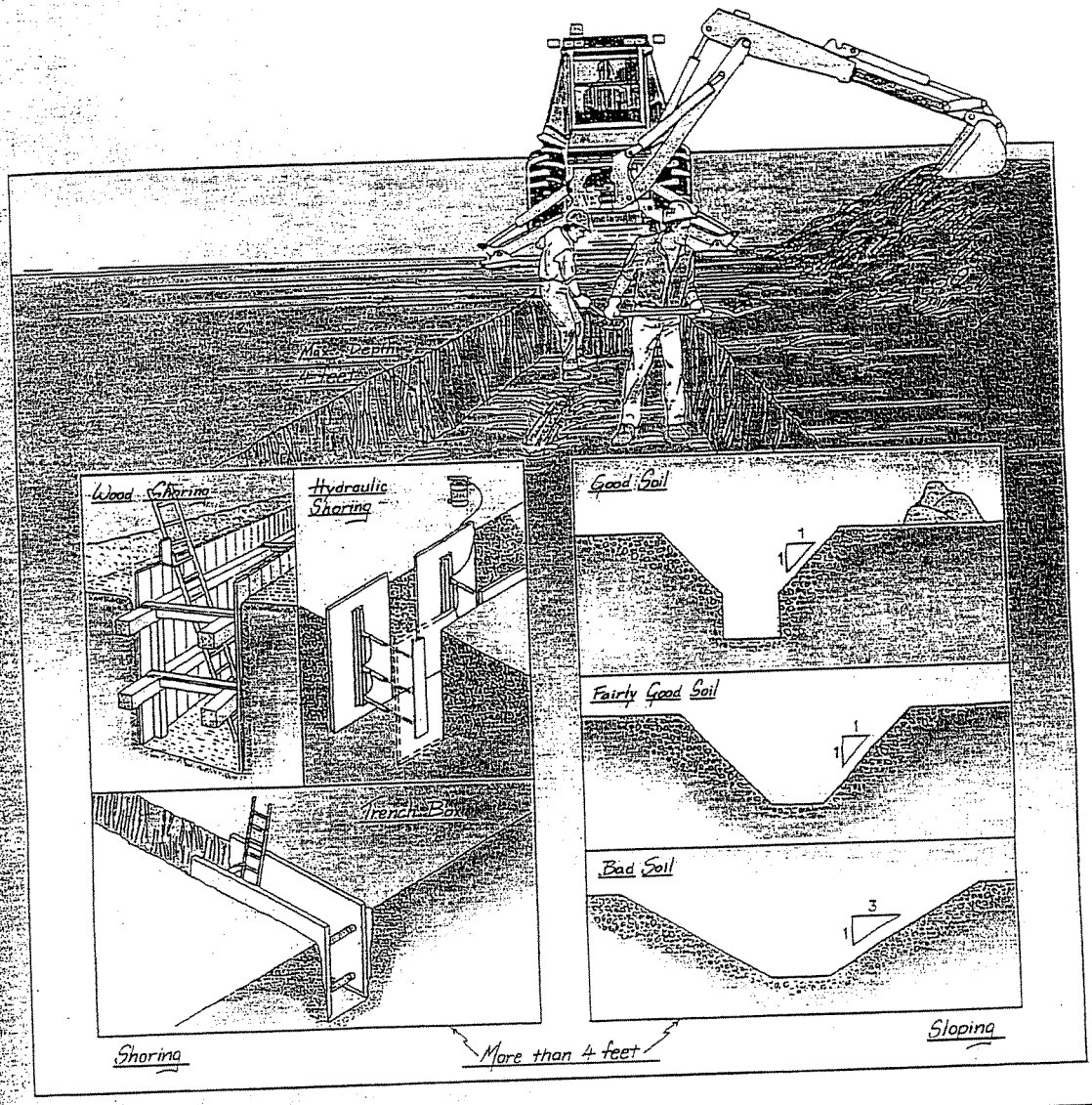
GUIDELINES FOR TRAINING TRAFFIC CONTROL PERSONS

WHMIS in Construction

Workplace Hazardous Materials Information System

Construction Safety Association of Ontario
74 Victoria Street, Toronto, Ontario, Canada M5C 2A5
Telephone: (416) 366-1501

CONSTRUCTION SAFETY



TRENCHING SAFETY

6

MINIMUM AGE OF WORKERS

Purpose

To provide a uniform company wide policy for hiring young workers.

Policy

1. Minimum age of workers on Ontario construction projects is 16 under the current OH&SA and Regulations for Construction Projects.
2. A minimum age of 18 must be attained by those individuals wishing to seek employment with Dufferin Construction Company and work in the field as a unionized labourer or summer student performing duties such as traffic control person, back-up signal person, or other tasks exposing the worker to the hazards associated with a construction project.
3. A minimum age of 16 must be attained by those individuals wishing to seek employment with Dufferin Construction Company and work away from the hazards associated with a construction project such as QCT lab assistant, office clerk, scale house attendent or yard clerk.
4. Senior Management will make the final decision on new worker placement and ensure that new workers are not placed with their father or mother who is the acting supervisor.

Procedure

- No new hires under 18 years of age working in the field.
- No new hires under 16 years of age for non-field related areas of operation.
- This applies to all union and non-union positions.
- The Health, Safety and Environmental Manager must meet with the potential candidate and provide the necessary training courses specific to each jobsite location prior to the young worker starting their first shift.
- All young workers will receive and wear a blue hard hat identifying them as summer students. Whenever possible, a young worker will be paired with an experienced worker who will act as a mentor.

Responsibility

- Superintendents are responsible to ensure that all new hires meet the minimum age requirement as outlined in this policy.

Superintendents shall :

1. Provide a request to the Human Resources Manager or District Manager outlining the number of young workers required for the upcoming construction season.
2. Provide the young worker with the required New Worker Orientation training program either personally or delegating this task to the Project Engineer on the project. The training will be site-specific detailing the potential hazards on the project and safe work procedures to be implemented to ensure worker safety.
3. Ensure that formal training programs are provided to young workers where required under OH&SA legislation. IE – traffic control, back up awareness, fall arrest and others.

Health & Safety Department Personnel shall :

1. Make spot reviews of the new hire listing produced by the Payroll Department to ensure compliance for training and minimum age requirements.
2. Meet with all new workers prior to arriving on the site to verify understanding of Company policies, rules and procedures.
3. Ensure required training programs are conducted in a timely manner as new young workers are hired.

EMPLOYEE PERSONAL CELLULAR PHONE AND OTHER ELECTRONIC EQUIPMENT USE ON PROJECTS

CONTENTS

1.0 Purpose
2.0 Hazard Analysis and Responsibilities

- **Appendix A - "Cell Phone Safety" tailgate topic 1.20 and 14.9 DCC Tailgate Training Binder**

1. PURPOSE

This section of the Divisional Loss Control Manual is provided in order to establish the control measures necessary to limit the exposure to workers who carry personal cellular phones and other electronic equipment while at the workplace. This may include pagers, blackberries, palm pilots, hand held game units and personal music devices or any type of CD/MP3/Radio units.

The goals of the policy are to ensure :

- Workers are protected from injury or harm as a result of distraction while talking on cell phones or other electronic equipment during working hours;
- Workers are protected from the dangers of moving equipment and other hazards while using a cell phone or other electronic equipment; and
- The project/workplace and Company are in compliance with all statutory and regulatory requirements.

2.0 HAZARD ANALYSIS

2.1 RESTRICTED CELLPHONE and OTHER ELECTRONIC EQUIPMENT USE BY EMPLOYEES ON DCC PROJECTS, YARDS AND PLANTS

2.1.1 Purpose

The purpose of the policy is to reduce workers' risk to the hazards associated with unauthorized use of personal cell phones and other electronic equipment while performing work on DCC projects, yards and plants. Unauthorized use of cell phones and other electronic equipment can contribute to inattention and cause accidents and incidents.

2.1.2 Scope

All health, safety and environmental systems procedures shall be affected by this policy. The policy will cover all hourly Dufferin Construction employees, subcontractors' employees, hourly rental employers and/or independent operators.

2.1.3 Responsibility

The site superintendent is responsible for communicating the policy to all subcontractors, supervisors and workers on the project. The superintendent will ensure the policy is delivered during a weekly safety meeting and monitor compliance with all personnel on the site. Senior Management and the Health and Safety Department will monitor compliance during routine site visits and inspections. Disciplinary action will be brought against any person failing to abide by the policy. The disciplinary action will be as follows: The first offence will require the Superintendent to give a verbal warning to the worker and ensure this action is documented with copies to the District Manager. The second offence will be in the form of a written warning advising the worker of the non-compliance with Company policy. The third offence will be an automatic one day suspension without pay. The fourth offence will be a three day suspension. The fifth and final offence is termination. The disciplinary action covers the employee's entire work term while employed with Dufferin Construction Company, A business unit of St. Lawrence Cement Inc.

EMPLOYEE PERSONAL CELLULAR PHONE AND OTHER ELECTRONIC EQUIPMENT USE ON PROJECTS

2.1.4 Procedure for Receiveing and Making Cellular Calls

Workers are permitted to bring their personal cell phone to the workplace. Cell phones must be turned off during working hours. Permission must be granted by the worker's immediate supervisor prior to any personal calls being made or received during normal working hours. Personal calls can be made during scheduled breaks or prior to the worker beginning his shift. However, if there is an urgent call needed to be made by the worker, the worker must request permission from his supervisor prior to making any call. The worker will be granted permission on a case by case basis and requested to exit the immediate work area. A safe zone will be identified by the supervisor to ensure the worker's safety and allow the call to be made without placing the worker in danger or undue harm.

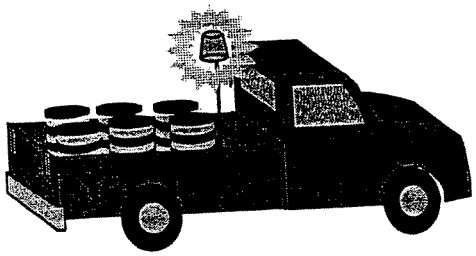
2.1.5 Company Issued Cell Phones and MIKE Units

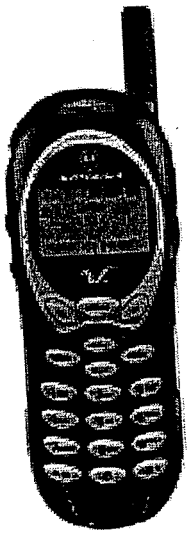
Supervisors and Lead Hands who have been assigned a Company issued cell phone or MIKE unit are excluded from this policy. Supervisors and Lead Hands using a cell phone at the project must be aware of their surroundings and only utilize the phone when it is safe to do so. The Company has made every effort to install in-car kits to allow operators of vehicles "hands-free" access. It is highly recommended that drivers let the cell phone ring and allow the message center to take the call. See tailgate topic 1.20 for additional safety measures for Safe Use of Cell Phones.

Tailgate Topic No: 1.20
Safe Use of Cell Phone

This tailgate topic is based on recommendations from Traffic Safety magazine. The following tips on cell phone use are meant to protect you, your family and everyone else on the road. Cell phones are a great tool when used properly.

- Only use your cell phone when parked or let your passenger use it
- Never dial the phone or take notes while driving
- If your phone rings while driving, let your voice mail take the call and listen to your message later, when you are parked
- If you must answer a call while driving, let the person you are speaking to know you're driving; SUSPEND the call until you can pull over





nmary:

OW, TALK LATER!

Tailgate Topic No: 14.9
Refueling Vehicles and Electrostatic Discharge/Cell Phone Use

Static charges can be generated when refueling your vehicle, locking the nozzle and leaving the gasoline running while returning to the vehicle could produce a static charge that may ignite the gasoline fumes. Never leave the nozzle when fueling your vehicle and never open the vehicle door when fueling you vehicle.

The use of cell phones is prohibited while fueling your vehicle because they may produce a spark; turning the phone on or off and changing the battery have been associated to service center fires. The "Mike" phone/two-way radio systems have mechanical switches that can cause sparks. The Gasoline Handling Code states that no gas will be dispensed when an ignition source is within 3 meters.

DIVISIONAL & PROJECT SPECIFIC, JOINT HEALTH AND SAFETY COMMITTEES

PURPOSE

This chapter contains policies and procedures for the administration of a Project Joint Health and Safety Committee.

POLICY

Establishment of The Joint Health and Safety Committee

A Joint Health & Safety Committee should be established on all construction projects where the numbers regularly employed exceeds twenty (20) and where the expected duration of the project is to exceed three (3) months.

Structure of the Joint Health & Safety Committee

The Joint Health and Safety Committee shall consist of equal numbers of members representing employers and workers. Worker members shall be selected by the workers, or, if there is a trade union representing the workers, by the trade union.

The Joint Health and Safety Committee have a minimum of two (2) members on projects employing twenty (20) or more workers or a minimum of four (4) members on projects employing fifty (50) or more workers.

The membership of the Joint Health and Safety Committee shall be ideally made up of workers from the different trades employed on the project. Management members shall ideally represent the different employers on the project, as well as, a designate from the constructor.

Worker members shall e employed on the project and not be in a supervisory capacity. Efforts should also be made to encourage attendance of management members of the Joint Health and Safety Committee who are regularly employed on the project.

There shall be two Co-chair persons appointed, one (1) representing management and one (1) representing workers on the project, who shall alternate the chair at the Joint Health and safety Committee meetings.

The names and locations of the Joint Health and Safety Committee members shall be posted in conspicuous locations.

The Joint Health and Safety Committee shall have a minimum of two certified members, one representing workers and one representing management. Certified members are required on projects with 50 or more regularly employed persons and with an expected duration of at least three (3) months.

Note: The section of the Occupational Health and Safety Act will not be applicable until training program and requirements are established and approved by the Workplace Health and Safety Agency.

Frequency of the Joint Health and Safety Committee Meetings

The Joint Health and Safety Committee shall meet at least once every three months.

Meetings of the Joint Health and Safety Committee shall be held at a designated place on the project.

Meeting Agenda

An agenda will be prepared and will contain the minutes of the previous meeting for approval, and other item(s) pertaining to the occupational health and safety on the project including new business.

All items raised from the agenda will be dealt with on the basis of consensus. Formal motions will not be used.

Minutes of the Joint Health and Safety Committee

The Joint Health and Safety Committee shall maintain and keep minutes as a record of its proceedings and make the minutes available for review an examination by a Ministry of Labour inspector and/or post as required for personnel on a project to read.

A recording secretary shall be designated by the Joint Health and Safety Committee to record, prepare and distribute the minutes.

Meeting minutes will represent business transacted at the Joint Health and Safety Committee meeting. Minutes shall record situations and issues discussed, and identify corrective action and recommendations to the constructor if any.

Quorum

A Quorum for the Joint Health and Safety Committee meeting shall consist of at least one (1) member representing management and one (1) member representing workers. One Co-chair person must be in attendance in order to conduct business.

Functions of the Joint Health and Safety Committee

The Joint Health and Safety Committee shall identify, evaluate and recommend resolutions with respect to matters pertaining to occupational health and safety in the workplace to the constructor and/or appropriate contractor.

The Joint Health and Safety Committee members representing workers hall designate a member or members to, in the accompaniment of a management representative(s) inspect the physical condition of the workplace if practical, or a part of the workplace, at least monthly. Where possible the worker representative should be a certified member.

Accidents and Accompaniment

The Joint Health and Safety Committee may designate equally from labour and management two members and/or their alternates if required, to investigate an accident where a worker is killed, or critically injured.

Reporting Procedures

Any individual on-site who discovers a safety-related problem shall immediately report it to their supervisor; or correct it if in their power to do so and if the safety-related problem poses an immediate danger to the health and safety of a worker.

The supervisor shall take action if necessary to correct the safety-related problem or inform the constructors' superintendent if assistance or direction is required.

The constructor who receives written recommendation from a committee shall respond to the Joint Health and Safety Committee within twenty days.

All employees will discuss occupational health and safety concerns with their immediate supervisor before raising it with a member of the Joint Health and Safety Committee.

Payment for Attendance at the Joint Health and Safety Committee Meetings

Time spent by the Joint Health and Safety Committee members attending meetings and otherwise engaged in activities related to the Joint Health and Safety Committee shall be deemed work time and payable at the member's current rate of pay by the member's employer.

The Joint Health and Safety Committee members shall be allowed one (1) hour preparation time prior

to each meeting or longer if the Committee determines it necessary.

GENERAL

All members of the Joint Health and Safety Committee will carry-out their duties and responsibilities under the Occupational Health and Safety Act R.S.O. 1980, in good faith and in accordance with the spirit of this Act.

Any amendments to these guidelines must be approved by consensus of the Joint Health and Safety Committee for recommendation to the constructor.

All employees are encourage to discuss their health and safety problems with their immediate supervisor before bringing it to the attention of the Committee.

All problems brought to the attention of the Joint Health and Safety Committee shall be dealt with on the basis of fact. All problem resolutions will be reported in the minutes.

WORK REFUSAL POLICY

CONTENTS

1.0 Purpose
2.0 Policy
3.0 Procedures for a Safety Related Work Refusal
4.0 Employer Reprisal Prohibited

- **Appendix A DCC, Report of Safety Related Work Refusal**

1.0 PURPOSE

To establish policy and procedure regarding employee communications relating to unsafe working conditions. This policy will be used only for addressing safety and health problems.

2.0 POLICY

It is the department's policy to provide a place of employment which is safe and healthful. Employees are encouraged to report unsafe conditions so that they can be corrected before an accident occurs.

2.1 UNSAFE CONDITIONS

Each employee has a moral obligation to protect him/herself and co-workers by immediately reporting safety problems.

Unsafe conditions may be reported through:

1. Communication with the immediate supervisor (e.g., informal discussions, tailgate safety meetings, work planning sessions, etc.). This is the first communication contact the employee should make since the supervisor is in the best position to take corrective action. Other secondary communication channels would include the local safety committee or safety and health officer.
2. Use of the Health and Safety Grievance Process which speeds response time.

2.2 HEALTH AND SAFETY GRIEVANCE

- If an employee believes that he/she is working in an unsafe condition (e.g., violation of a safety law, policy, or practice, etc.) the employee shall notify his or her supervisor of the unsafe condition.
- If, after investigation, the supervisor disagrees that it is an unsafe condition, the employee shall identify the unsafe condition(s) in writing and deliver the statement to the supervisor for further consideration by higher level management.
- If the supervisor determines the alleged hazardous condition is safe, the employee will continue to work unless he/she exercises the option to refuse to work, which is described in the following , and his/her request will continue through the Health and Safety Grievance Process.

3.0 PROCEDURES FOR A SAFETY-RELATED WORK REFUSAL

- Under the *Occupational Health and Safety Act,* a worker may refuse to work or do particular work if he or she has reason to believe that:
- Any equipment, machine, device or thing he or she is to use or operate is likely to endanger himself/herself or another worker.
- The physical condition of the workplace in which he or she works or is to work is likely to endanger himself/herself.
- Any equipment, machine, device, or thing he or she is to operate or the physical condition of the workplace in which he or she works is in contravention of the Act and such contravention is likely to endanger himself/herself or another worker.

3.1 PROCEDURES

WORK REFUSAL POLICY

1. Upon refusing to do unsafe work, the worker must immediately report the circumstances of the refusal to the employer or supervisor.
2. The employer or supervisor must immediately investigate the report in the presence of the worker and a worker representative. The worker representative must be made available and must attend the investigation without delay; time spent by this representative is deemed to be work time, for which the person shall be paid at his/her regular or premium rate, as may be proper. The worker representative should be a member of the health and safety committee who represents workers, the workplace health and safety representative or a worker selected by the workers because of his or her knowledge, experience and training.
3. Until the investigation is completed, the worker must remain in a safe place near the work station.
4. During the investigation, supervisors must record as many details as possible regarding the refusal. They should include:
   - Date and time of refusal
   - Name and position of refusing worker(s).
   - Specific hazard alleged by the worker, including his/her concerns and when the condition was first noticed.
   - Decision of the employer and when it was given to the worker.
   - Any remedial action taken.
5. If the worker is dissatisfied with the results of the investigation and has reasonable grounds to believe that the circumstances are still such that the work is dangerous, then he/she may continue to refuse work.
6. Upon the continuance of the worker's refusal to work, the supervisor or employer's representative must immediately notify a Ministry of Labour Inspector. Until the ministry is notified, the work cannot be reassigned to another worker and the worker must remain near the work station.
7. The Ministry of Labour Inspector will investigate the work refusal in the presence of the employer, the worker and the worker's representative.
8. Pending the investigation and decision of the inspector,
9. The worker must continue to remain at a safe place near the work station during his/her normal working hours unless:
10. The employer assigns the worker reasonable alternative work during those hours.
11. If such an assignment is not practicable, gives the worker other directions (which may include being sent home).
12. No other worker shall be assigned to the work that is being investigated unless that worker has been advised of the other worker's refusal and the reasons for it.
13. Supervisors must take great care that they do not intentionally penalize any worker for exercising, or seeking to exercise their rights under the Act.
14. After the investigation, the inspector will decide whether the machine, device, thing or workplace is likely to endanger the worker or another person. This decision will be given in writing, as soon as practical, to the employer, the worker and the worker's representative.
15. If the inspector does not consider the refusal to be based on reasonable grounds, the worker is expected to return to work. If, however, the worker maintains he/she has reasonable grounds for refusing such work, the inspector cannot order a return to work. If, however, no reasonable grounds exist for such further refusal, t he worker may be subject to disciplinary action by the employer.

4.0 EMPLOYER REPRISALS PROHIBITED

If a worker has acted in compliance with the Act, its regulations or an order made under them, the employer (or any person acting on its behalf) may not, because the worker so acted,

- Dismiss or threaten to dismiss the worker.
- Discipline or threaten to discipline the worker.
- Impose any penalty on the worker.
- Intimidate or coerce a worker.

If a worker complains that the employer (or a person acting on its behalf) has improperly taken any of these actions, he or she may file a grievance or make a complaint to the Ontario Labour Relations Board.

Employer's Report of Safety-Related Refusal To Work

Name and position of employee(s)(attach separate list as appropriate :

Date :

Time refusal reported :

Reasons reported for refusal (include ~~full details of nature of alleged hazard and when first noticed; attach~~ statements of supervisor and workers) :

Supervisor receiving report (name) :

Name of worker representative called (or reasons for nonavailability) :

First-stage ~~investigation results~~ ~~(include full details of conditions observed, concerns noted and steps taken to~~ remedy) :

Time second-stage refusal reported :

Reasons reported for second-stage refusal (full details) :

Time ministry inspector contacted (include office contacted, what advised) : _____

Alternative work or other directions given refusing employee(s) (include results) : _____

Ministry inspection details (full details of ministry findings -- attach report or orders issued, and any remedial action taken) : _____

Other employee offered the same work (attach the worker's signed statement of being advised of the refusal) : _____

Details of any continuing refusal (include reason given) : _____

Details of any discipline imposed :

- Employee Name : _____
- Discipline imposed (attach any letters or notes) : _____
- Reasons for discipline : _____

Note: Copy to be placed in employee's file.
No disciplinary action to be taken without approval of Operations Manager/Health & Safety Administrator

OCCUPATIONAL HYGIENE TESTING & MONITORING

PURPOSE

The purpose of this policy is to establish that reasonable standards and methodology are employed during industrial hygiene surveys; and that the Joint Health and Safety Committee is appropriately consulted and appraised of the results.

POLICY

- All occupational hygiene tests shall be conducted in consultation with the company Joint Health and Safety Committee.
- Occupational hygiene tests will be conducted, recorded, interpreted and reported by or under the supervision of the Health, Safety and Environment Manager.
- Equipment shall be appropriate in consideration of the circumstance being monitored or measured; and testing equipment shall be calibrated and properly maintained.
- Records of all occupational hygiene test shall be kept in a central location and made available
- (within reason) upon request.

EMPLOYEE DISCIPLINE - HEALTH & SAFETY NON-COMPLIANCE

PURPOSE

This section of the Divisional Loss Control Manual is provided in order to establish a standardised, progressive disciplinary policy.

POLICY

Request Sequence

An evaluation to determine the appropriate level of discipline action will be undertaken upon the request of a Superintendent or Manager.

Investigation Sequence

An investigation will be conducted upon receipt of a valid recommendation to initiate discipline action. An investigative review will not be conducted when the recommended level of disciplinary action warrants a verbal correction.

Subsequently, the information shall be employed to establish the appropriate level of discipline (if any), consistent with the two disciplinary assessment factors and any prior occurrences which resulted in discipline action, as prescribed by this policy.

A formal recommendation to initiate disciplinary action shall be submitted to senior management for review, modification or endorsement subsequent to an investigation which confirm:
a) that disciplinary action is warranted; and
b) establishes the appropriate level of discipline action.

Administration and Implementation

Administration of the employee discipline program with reference to health & safety non-compliance shall be performed by the Health and Safety Department.

Implementation and discharge of appropriate disciplinary action shall be undertaken by the Operations or Plants & Equipment Department.

Disciplinary Assessment Factors

As a general guide, disciplinary action will be determined with reference to the following two factors:

Factor 1

The extent to which the employee knowingly performed, permitted or contributed to cause a substandard practice and/or condition. The applied definitions of a substandard practice or condition as well as employee knowledge is stated in the appendix to this policy.

Factor 1 determinants are characterised as:

i) Unwitting: This subfactor shall be applied when it is established that an employee **without knowledge** performed, permitted or contributed to cause a substandard practice or condition.

ii) Inadvertent: This subfactor shall be applied when it is established that an employee **with knowledge, but as a result of momentary inattention or oversight** performed, permitted or contributed to cause a substandard practice or condition.

iii) Wanton: This subfactor shall be applied when it is established that an employee with **knowledge and not as a result of momentary inattention or oversight** performed, permitted or contributed to cause a substandard practice or condition.

EMPLOYEE DISCIPLINE - HEALTH & SAFETY NON-COMPLIANCE

Factor 2

The actual, potential or probable outcome or severity of an accident, incident, occurrence or loss resulting from a substandard practice and/or condition. The applied definitions of incident and loss are stated in the appendix to this policy. Factor 2 determinants are established with reference to Figure la **(Factor 2 Assessment Chart.)** Individual component point rating scores are summated to establish the total points. Total point ranges and their corresponding Factor 2 Severity Ratings are indicated in Figure lb.

Levels of Disciplinary Action (Minimum)

An assessment of the two factors shall be used to establish relative position within the discipline matrix. (See Figure 2) Numbers contained within the matrix corresponds to the **minimum** level of disciplinary action commensurate with consideration of the two factors.

Level and Corresponding Disciplinary Action

1. **Verbal Correction.** The superintendent will provide a verbal correction to the employee. A written record of this correction will be placed in the employee's personnel file and the employee advised accordingly. An extensive investigation is not required at this level.

2. **Written Correction.** A written correction notice will be prepared and presented to the employee. The employee will be asked to sign, indicating receipt of a copy of the written correction, and a copy will be placed in the employee's personnel file. A copy of a written correction notice will be forwarded to the employee's Union Business Agent, if applicable.

3. **Suspension Without Pay.** An employee will be suspended without pay for a minimum of 3-, and a maximum of 10-working days.

   The specific duration of suspension shall be established by evaluating the total pint score obtained from the Factor 2 Assessment Chart, prorated to the relative position within the applicable total range (figure 1b). The upper and lower limit of each range shall correspond with the upper and lower duration of suspension respectively. The employee will be asked to sign an acknowledgement of suspension, specifying the reason for this level of disciplinary action. A copy of a written suspension notice shall be forwarded to the employee's Union Business Agent, if applicable.

4. **Termination.** A request to terminate an employee, will be thoroughly investigated and reviewed to determine if termination is warranted. An employee shall be suspended without pay pending the investigation, evaluation and review of circumstances which have warranted the request for termination of employment. This period of time shall not exceed 3 working days. Upon senior management endorsement of a resolution to terminate, the employee shall be asked to sign an acknowledgement of termination of employment, which shall specify the reason(s) for this level of discipline action. A copy of a written termination notice shall be forwarded to the employee's Union Business Agent, if applicable.

Prior Occurrences Warranting Disciplinary Action

Increasing levels of discipline shall be applied in the event that additional occurrences warranting discipline take place within 2 years from the anniversary date of a prior occurrence.

EMPLOYEE DISCIPLINE - HEALTH & SAFETY NON-COMPLIANCE

* **Important Note:** Successive occurrences resulting in disciplinary action within 2 years shall have a **cumulative effect.** e.g. First incident resulting level "1" disciplinary action; a second incident within 2 years warranting level "2" disciplinary action would result in a cumulative (additive) effect necessitating the imposition of level "3" disciplinary action for the second occurrence.

Additional Disciplinary Provisions

Management reserves the right to enter into any level of discipline action including termination based upon the severity of the occurrence requiring disciplinary action, prior occurrences and the employee's employment history.

Furthermore, management reserves the right to unilaterally reduce the duration of a suspension without pay as prescribed by policy when the reduction is combined with other appropriate disciplinary sanctions. Sanctions will be considered on their rehabilitative merit.

The level of discipline action (if any) will be discretionary when it is directed at an employee who has suffered an injury as a result of an accident warranting discipline.

Appendix

Definitions:

Substandard Practice or Condition: A substandard practice or condition is any deviation from an accepted standard or practice. The deviation could involve both acts of people and conditions related to physical things.

Employee Knowledge: The confirmation of prior training, licenser, certification, signed receipt of policy or instruction which had or should have addressed the issues related to the substandard practice or condition.

Incident: An undesired event which, under slightly different circumstances, could have resulted in harm to people, damage to property or loss to process.

Loss: An undesirable event that may result in one or more of the following affects:

-harm to people
-harm to property or processes
-performance interruptions
-profit reduction

EMPLOYEE DISCIPLINE - HEALTH & SAFETY NON-COMPLIANCE

Employee Discipline - Health and Safety Noncompliance
Letter of Disciplinary Action

This form should be used for all levels of disciplinary action except a verbal correction.

Name and particulars of applicable employee

_____	_____	_____	_____
(Employee)	(Badge Number)	(Applicable Union)	(Union Local)

Name(s) of all Supervisors who have recommended the initiation of disciplinary against the above noted employee.

_____	_____	_____
(Immediate Supervisor)	(Superintendent)	(Manager)

Details of the occurrence warranting disciplinary action:

Management Acknowledgment of Undertaking

In response to the recommendation of the above noted Supervisor(s) and/or Management members, St. Lawrence Cement has investigated the details of the occurrence warranting disciplinary action; and applied the procedures prescribed in the attached chapter of the Divisional Health & Safety Manual, Employee Discipline-Health and Safety Noncompliance.

Assessment Factor 1
As a result of the investigation, it was established that the above noted employee performed, permitted or contributed to cause a substandard practice and/or condition, with knowledge characterized as:

Assessment Factor 2
Additionally, it was established that the actual, potential, or probable outcome or severity of the accident, incident, occurrence or loss resulting from a substandard practice or condition was:

As a result of the application of this policy and in consideration of any prior occurrence(s) resulting in disciplinary action, Management of St. Lawrence Cement has resolved to impose the following disciplinary action toward the above noted employee.

€Post Script No. 2

Continued on reverse.....

EMPLOYEE DISCIPLINE - HEALTH & SAFETY NON-COMPLIANCE

Employee Acknowledgment

....Continuation of previous page.

I, the undersigned employee, acknowledge having been advised of the intent of St. Lawrence Cement to undertake the following level of disciplinary action against me:

I further acknowledge the following:

- that a representative of St. Lawrence Cement has thoroughly reviewed the details relating to the occurrence which has warranted disciplinary action being undertaken against me.
- receipt of a copy of the Company's Divisional Health & Safety Manual with reference to Employees Discipline - Health and Safety Noncompliance (June 2003) and that the policy has been thoroughly explained to me.
- that a representative of St. Lawrence Cement has reviewed the policy with reference to any prior discipline within the past two years, as well as the methods and procedures employed to determine the level of discipline deemed appropriate with regard to the assessment factors prescribed by policy.
- that except in the event of termination of my employment, increasing levels of disciplinary action shall be applied against me in the event that an additional occurrence warranting discipline occurs within 2 years of this date, as prescribed by policy.
- that St. Lawerence Cement reserves the right to enter into any level of disciplinary action against me, including termination of my employment based on the severity of the occurrence or any prior occurrence(s), as well as my work performance and employment history.
- a copy of this letter of disciplinary action shall be retained in my personnel file and except in the case of a verbal correction, a copy of this letter along with the attached policy will be sent by registered mail to my union business agent, if applicable.

(Employee's Signature)		(Date)
(Signature of Employer Representative who discharged disciplinary action)	(Position)	(Date)
(Witness)	(Position)	(Date)

EMPLOYEE DISCIPLINE - HEALTH & SAFETY NON-COMPLIANCE

(Figure 2)

Health and Safety - Disciplinary Matrix

Re:

	Factor 2			
Factor 1	**Minor**	**Significant**	**Serious**	**Major**
Unwitting	1 Verbal Correction	1 Verbal Correction	2 Written Correction	2 Written Correction
Inadvertent	1 Verbal Correction	2 Written Correction	3 Suspension-No Pay	4 Termination
Wanton	2 Written Correction	3 Suspension-No Pay	4 Termination	4 Termination

- Numbers within the matrix corresponds to the minimum level of disciplinary action deemed appropriate with respect to Factors 1 and 2.

EMPLOYEE DISCIPLINE - HEALTH & SAFETY NON-COMPLIANCE

(Figure 1a)

Factor 2 Assessment Chart

Re:

Components	9 - 10 Points	6 - 8 Points	3 - 5 Points	0 - 2 Points	Point Rating
Resultant Injury (Actual)	Critical Injury as defined by Regulation resulting in injury but not death - 10 Requires permanent modified duties or Long term disability (more than 60 days) - 9	Loss of lesser member or permanent impairment of minor function - 8 Requires extended modified duties - 7 Extended lost time (more than 30 days) - 6	Lost time accident up to 30 days - 5 Lost time accident up to 5 days or medical aid accident with up to 10 days restricted duties - 4 Lost time accident 1 day or medical aid accident with up to 5 days of restricted duties - 3	Medical aid accident with up to 2 days of restricted duties - 2 Minor medical (First aid or one doctor treatment- 1 No visible injury- 0	
Personnel Involvement	Manager - 10 Superintendent - 9	Junior Foreman - 6 Senior Foreman - 7 Key Staff Employee- 8	Journeyman Labourer - 4 Specialty Operator- 5 Semi-Skilled Labour - 3	All other employees-2 Subcontractor employee and other 3rd party personnel - 1	
Injury Potential by Energy Level (Actual or Probable)	Contact with a level of energy that threatens survivability of the body or its part.	Contact with a level of energy well beyond the threshold limits of the body.	Contact with a moderate level of energy, but beyond the threshold limit of the body.	No visible evidence of contact with energy. Contact with very low level of energy	
Equipment Type	Production machines mobile powered equipment, or other energized or pressurized equipment		Hand Tools Non-powered equipment Portable electric or air operated tools Ladders & Stairs	No equipment involved Incidental Tools	
	Power Transmission Point of operation Electrical apparatus	Moving equipment Elevating or conveying equipment			
Material Type	Highly corrosive Lethally toxic Absence of or low level of oxygen	High thermal Mildly corrosive Mildly toxic	Sharp Rough Pointed Slippery (include floors) Overexertion	Non -hazardous Nominally-hazardous	
Sustained Damage or Loss $ (Actual or Probable)	7,500 - 10,000	2,500 - 7,499	500 - 2,499	0 - 499	
				Total Points	

Fatality or permanent total disability (60)

(Figure 1b)

Total Points Range	Factor 2 Severity Ratings
0 - 10	Minor
11 - 25	**Significant**
26 - 40	Serious
41 - 60	Major

WORKING IN CONFINED SPACES - *"Special Conditions"*
Low Hazard Confined Spaces

Objective

Provide Supervisors, including Superintendents, Project Engineers and Foremen with guidelines to enable them to identify confined space work for which they can act as the competent worker, implement the appropriate control measures and document pertinent information regarding the confined space work.

Outline

1. Definition of Confined Space
2. Examples of Confined Spaces in construction.
3. Confined space work in which Operations personnel (Superintendent, Project Engineer, Foreman) may act as the Competent Worker.
4. Confined Space Work in which the Health and Safety Department MUST be involved prior to allowing work to commence.

1. *Confined Space Defined:*

A confined space is any area that is not designed for continuous human occupancy. It has limited access and ventilation. It is also susceptible to hazards such as in-flow of water, gas, or solid particulate. A confined space may have sloping sides such as a bin or hopper that lead to a crusher, auger or restriction. Other hazards include, but are not limited to, bridging of material, electrical hazards, oxygen deficiency, falling from heights, radiation, toxic gas or vapour, and fire or explosion.

The definition of "Confined Space" as per the Occupational Health and Safety Act and Regulations for Construction Projects, is as follows:

- means a space to which or from which access or egress is restricted and in which, because of its construction, location or contents or the work activity therein, a hazardous gas, vapour, dust or fume or an oxygen-deficient atmosphere may occur

2. *Examples of "Confined Spaces" in Construction:*

The following are a few examples of typical "confined spaces" in construction. There are numerous other "confined spaces" in construction; always consult with the Health and Safety Department if you are unsure whether a work area should be considered a confined space.

- new and existing manholes or maintenance holes
- sewer or watermain pipe in which a worker can enter
- culverts in which a worker may enter
- voids of a bridge in which a worker may enter, i.e., tubs, box beam etc.
- formwork in which a worker may enter
- concrete drum mixer on concrete plant
- silos for cement or other material storage

- bins and hoppers of an asphalt plant, concrete plant, paving equipment or aggregate crushing plant
- a concrete mold in which a worker may enter

3. ***Allowable "Confined Space" Work (without consulting with H&S Dept.):***

Work may occur in a confined space under the supervision of a competent worker without the involvement of the Health and Safety Department in the following circumstances when the conditions and procedures set out in this section are followed:

General Requirements:

- there is a means of egress from the parts of the confined space that are accessible to workers
- all mechanical equipment in the confined space is disconnected from its power source and locked out
- all pipes and other supply lines in the confined space whose contents are likely to create a hazard are locked out, blanked off and tagged appropriately.
- a competent worker tests and documents the air quality in an open space to ensure the gas monitor is working properly. Immediately thereafter, the competent worker tests and evaluates the confined space before a worker enters it to confirm the space is free from hazard to a worker while the worker is present in it and as often as necessary to ensure that it remains free from hazard.
- the competent worker completes a Confined Space Entry Permit on which the results of the tests are documented, special requirements are stipulated, and any other instruction for confined space entry are noted and communicated to the workers who will conduct the work in the confined space. The competent worker and workers entering the confined space sign the Confined Space Entry Permit confirming acknowledgment of the criteria to enter. A copy of the document must be retained on the site files.
- **No entry allowed in confined space where there is or is likely to be a hazardous gas, vapour, dust, mist, smoke or fume, an oxygen content of less that 18 or more than 23 per cent; or contains or likely to contain explosive or flammable gas, dust, mist, or vapour; the Health and Safety Department must be notified and will supervise the work.**

Specific Requirements and Procedures:

The following procedures are specific to the confined space. These procedures must be used in addition to the GENERAL CONDITIONS outlined above.

a) Manholes and Sewers (new and existing):

- gas monitor to be used to test open air outside of manhole for oxygen level, gas and explosives levels as indicated on the monitor for control

purposes and documented on the Confined Space Entry Permit. Subsequently, the Gas Monitor is to be lowered to the work level, or a sampling tube is to be lowered and air pumped into the monitor; and all levels are to be recorded on Confined Space Entry Permit form.

- identify any other potential sources of hazards to be controlled such as fall hazards, deficient lighting, etc.
- if all factors indicated are within acceptable limits, competent worker to complete and sign Entry Permit allowing workers to enter.

b) hoppers and bins of equipment:

- power source for operating mechanisms to be locked and tagged out prior to workers entering equipment as per specific equipment procedures.
- if working in bins or hoppers, signs are posted to warn the operator normally feeding the bins that work is being conducted
- all material stored to fill bins or hoppers are to be emptied or locked out or blanked to prevent material from entering the bin or hopper (if a hatch opens accidentally)
- adequate ventilation and illumination be provided for the workers

c) drum mixer for concrete plant:

- power to equipment is turned off, locked out and tagged out
- drum is equipped with appropriate ventilation and lighting
- adequate access and egress from the mixer is provided i.e., portable ladder or work platform.
- worker to use appropriate personal protective equipment dependent on the activity to be undertaken; for cleaning and chipping concrete, respiratory protection, hearing protection, metatarsal protection, eye protection (possibly shield) and skin protection
- NO WELDING in drum without prior approval by the Health and Safety Dept.
-

d) culverts:

- air quality test must be conducted using air monitor as stipulated above in New and Existing Sewers/Maintenance holes
- adequate ventilation and lighting to be provided
- if motorized equipment used and ventilation is not adequate, scrubbers may have to be used on equipment to reduce hazards associated with carbon monoxide
- there must be no hazard of deep water or sudden in-rush of water into culvert.

e) bridge tubs and voids:

- air quality must be verified as per procedure outlined in (a) above.
- adequate ventilation and lighting to be provided
- identification and control of potential hazards with task to be undertaken inside bridge, i.e. chipping or patching of concrete presenting nuisance to skin or, more severely, burns to skin
- adequate access and egress from the bridge voids or tubs i.e., ladder, suspended scaffold etc.

- plan for escape or extraction of workers communicated to workers.

f) formwork

-

g) concrete molds

4. ***Confined Space Work in which Health and Safety Department Personnel must be notified and involved in:***

a) confined space in which the air sampling/testing indicates a hazardous environment such as low or high oxygen level, toxic gas, or high explosives level.

b) confined space where there is or is likely to be a hazardous gas, vapour, dust, mist, smoke or fume, an oxygen content of less that 18 or more than 23 per cent; or contains or likely to contain explosive or flammable gas, dust, mist, or vapour

c) confined space in which welding is to be conducted

d) confined space in which there exists or likely to exist high water levels or sudden in-rush of water or other liquid

e) confined spaces in which solvents or other chemicals may be used

f) confined spaces in which mechanical equipment introduces hazardous gases.

LOCKOUT AND TAG PROGRAM

CONTENTS

1.0 Introduction
2.0 Applicability
3.0 Regulatory Summary
4.0 Lockout and Tagging Procedures
5.0 Responsibilities
6.0 Training
7.0 SLC Contacts

- **Appendix A Terms and Definitions**
- **Appendix B Lockout and Tag Procedure Self-Assessment Checklist, and Lockout and Tag Inspection Form**

1.0 INTRODUCTION

1.1 PURPOSE

This policy describes St. Lawrence Cement (SLC) Lockout and Tag Program. The Program establishes minimum requirements for the lockout and tag of energy-isolating devices whenever servicing and maintenance activities are performed on equipment. Where "unexpected" energization or startup of the equipment or the release of stored energy could occur and possibly result in injury, these requirements shall be applied to ensure that the equipment is stopped, isolated from all potentially hazardous energy sources, and locked out and tagged before employees begin servicing and maintenance activities. Note that the term "equipment" as used in this policy to refer to machines, facilities, equipment, and equipment components.

- Appendix A of this policy contains terms and definitions;
- Appendix B contains a Lockout and Tag Procedure Self-Assessment Checklist and a Lockout and Tag Inspection Form.

Supervisors shall use the checklist to ensure compliance with the requirements of the SLC Lockout and Tag Program. The form shall be used to document the equipment on which lockout and tag procedures (described in Section 4 of this policy) were performed and to identify any discrepancies uncovered.

1.2 COMPLIANCE

All personnel shall comply with the requirements of the Lockout and Tag Program. Failure to comply with this program may result in disciplinary action, as described in Chapter 10 of the Divisional - Loss Control Manual.

2.0 APPLICABILITY

The Lockout and Tag Program applies to all SLC personnel (see Appendix A for definition). It also applies to contractor and subcontractor personnel who do not have an equivalent lockout and tag program that satisfies regulatory requirements and St. Lawrence Cement. Section 4.4.4 provides further details on contractor/subcontractor personnel.

In addition, the program applies to servicing and maintenance activities (including lock out and tag) that are part of a facility or program's normal operations.
These include:

- The removal or bypass of a guard or other safety device.
- Activities that require a person to place his/her body into an area of the equipment where work is being performed on material (point of operation) or where an associated danger zone exists during a machine-operating cycle.

The Lockout and Tag Program does not apply to:

- Minor tool changes, adjustments, and other minor servicing activities that take place during normal operations provided that such activities are routine, repetitive, and integral to the use of the equipment

and the work is performed using alternative measures that provide effective personnel protection.

- Work on cord and plug-connected electric equipment if exposure to the hazards of unexpected energization or start up of the equipment is controlled by unplugging the equipment from the energy source or if the plug is under the exclusive control of the employee performing the servicing or maintenance activity. Pneumatic tools may also fall into this category provided that they can be completely isolated from their energy source.
- Hot tap operations that involve transmission and distribution systems for electricity or substances (e.g., gas, steam, water, or petroleum products) when these activities are performed on energized electrical systems or pressurized pipelines, provided that the supervisor can demonstrate:

  ⇒ Continuity of service is essential.
  ⇒ Shutdown of the system is impractical.
  ⇒ Documented procedures are followed and special equipment that will provide proven, effective protection for employees is used.

A wide variety of energy sources that may need to be locked out and tagged during servicing or maintenance of the equipment is covered under this Program. These include, but are not limited to:

- Electrical
- Hydraulic
- Pneumatic
- Mechanical
- Gravity
- Thermal
- Chemical
- Fluids and gases
- Water under pressure
- Steam

3.0 REGULATORY SUMMARY

The SLC Lockout and Tag Program meets regulatory requirements of the OHSA and safety regulations.

4.0 LOCKOUT AND TAG PROCEDURES

This section contains procedures to properly lock out and tag equipment when performing servicing and maintenance activities. Section 4.3 describes the procedure for equipment that does not require written lockout and tag procedures. Section 4.4 describes activities that require written procedures. The other sections provide supporting information.

A lockable energy-isolating device shall be installed on equipment before personnel begin any servicing or maintenance activity that might result in the unexpected release of hazardous energy. Non-lockable energy-isolating devices shall be designed or modified to accept a lockout device whenever equipment is replaced, new equipment is installed, or a major modification is performed. In addition, personnel must use personal protective equipment (PPE) when performing these activities. See Appendix A for the definition of PPE.

4.1 REQUIRED DOCUMENTATION

No written procedure is required if the equipment meets all the criteria in Section 4.3, "Single-Point Lockout and Tag." If the equipment does not meet these requirements, however, a written lockout and tag procedure will be required as described in Section 4.4. The procedure shall describe controls for potentially hazardous energy when personnel are engaged in the activities covered by the

Lockout and Tag Program. It shall also include:

- A specific statement of the intended use of the procedure.
- Specific steps for shutting down, isolating, blocking, and securing machines or equipment to control hazardous energy.
- Specific steps for the placement, removal, and transfer of lockout devices and associated tags and the person responsible for these devices.
- Specific requirements for testing the equipment to determine and verify the effectiveness of the lockout and tag, and other energy control measures.

The procedure may be included in an OSP or FSP or may be a separate procedure maintained by the equipment supervisor. The procedure shall be readily available to any authorized employee and for periodic inspection.

A single, generic procedure may be developed for facilities that have more than one example of a specific type of equipment (e.g. water pumps, air conditioning units) provided that each of the following elements is clearly identified:

- Types and locations of equipment operating controls.
- Types and locations of energy-isolating devices.
- Types of stored/residual energies and methods to dissipate or block those energies.
- Method of verifying isolation of the equipment.

4.2 PROTECTIVE MATERIALS AND HARDWARE

The functional supervisor or the equipment supervisor shall provide authorized employee(s) the appropriate PPE, including locks and tags. The functional supervisor shall also provide any additional locks and tags that other authorized SLC employees may need while working in a facility. The equipment supervisor normally shall provide any special chains, wedges, key blocks, adapter pins, self-locking fasteners, or other hardware required for isolating, securing, or blocking the equipment from energy sources.

The lockout devices and associated tags shall be singularly identified, durable, standardized, and substantial. To meet this requirement, only the following locks and tags shall be used at St. Lawrence Cement:

- Standard Master keyed locks. These locks shall be the only device used to lock out and tag equipment; when labeled with "***Danger***" stickers, they shall not be used for any other purpose. The locks shall have approved "***Danger***" stickers. Use of the "***name***" and "***department***" sections of these stickers is optional.

Lockout tags. These tags are to be used for all personnel safety-related lockouts. They shall have the name of the employee applying them. All other applicable information on the tag shall be supplied by that authorized employee. Each tag shall be used only once.

NOTE: Equipment may be locked for administrative or operational purposes. A lock of suitable size (with no danger sticker attached) shall be used with the yellow CAUTION tag if appropriate.

4.3 SINGLE-POINT LOCKOUT AND TAG

When performing servicing and maintenance on equipment that meets the criteria below, a written procedure is not required. A laminated sign, painted sign, or

similar durable device shall be placed next to the equipment indicating the location of the single energy-isolating device, so long as:

- The equipment has no potential for stored or residual energy or re-accumulation of stored energy after shutdown that could endanger employees.
- The equipment has a single energy source that can be readily identified and isolated.
- The isolation, lockout, and tagging of the energy source will completely de-energize and deactivate the equipment.
- The equipment is isolated from the energy source and locked out and tagged during servicing or maintenance.
- A single lockout device and tag will achieve a locked out and tagged condition.
- The lock is under exclusive control of the authorized employee performing the servicing or maintenance activities. If the lock has two keys, the second key shall be under the positive control of the authorized employee. At the discretion of the authorized employee, the functional supervisor may have custody of the second key. Under no circumstances shall there be more than two keys for a lock.
- Servicing or maintenance does not create hazards for other personnel.
- The equipment has no record of incidents involving unexpected activation or re-energization of the equipment during servicing or maintenance.

4.4 GENERAL LOCKOUT AND TAG PROCEDURES

NOTE: The process of locking out and tagging complicated electrical systems is considered work on energized equipment and is therefore classified as a Class 3 or Class 4 hazard until the sequence of lockout and tag described in Section 4.4.1 is complete. As a minimum, such operations require an authorized employee and a co-worker to perform the work.

4.4.1 Sequence of Applying Lockout and Tag

The following procedure shall be used to lock out or tag equipment during servicing or maintenance activities:

1. The equipment supervisor shall notify all affected employees that servicing or maintenance is required on the equipment and that it must be shut down, locked out, and tagged.
2. The authorized employee shall refer to the equipment supervisor's procedure to identify the type and magnitude of the energy that the equipment utilizes, understand the hazards of the energy, and know the methods for controlling the energy sources.
3. If the equipment is operating, shut it down using the normal shutdown procedure (e.g., depress the stop button; open the switch; and close valve).
4. De-activate the energy-isolating device(s) to isolate the equipment from the energy source(s).
5. Lock out the energy-isolating device(s) with the authorized employee's lock(s) and attach a completed tag to each lock.
6. Stored or residual energy (such as that in capacitors, springs, elevated machine members, rotating flywheels, hydraulic systems, and air, gas, steam, or water pressure) must be dissipated or restrained by methods such as grounding, repositioning, blocking, or bleeding down.
7. Ensure that the equipment is disconnected from the energy source(s). First check that no one is exposed, then verify that the equipment is isolated by pressing the push button or operating other normal control(s), or by testing the equipment to make certain it will not

operate. Use of appropriate test equipment may be required to verify that the equipment is de-energized. Whenever the authorized employee will be working near normally energized equipment or parts, these must be verified as de-energized using appropriate test equipment. Test equipment shall be verified as operational prior to use.

CAUTION: Return operating control(s) to the neutral ("off") position after verifying that the equipment is isolated.

CAUTION: Ensure the integrity of the lockout and tag procedure following any extended absence of the authorized employee.

4.4.2 Group Lockout and Tag Procedures

When servicing or maintenance activities are performed by a crew, department, or other group, the procedures used shall afford these personnel a level of protection equivalent to that provided by the implementation of a personal lockout device and associated tag. Group lockout and tag procedures must include, but are not necessarily limited to the following specific requirements:

- One authorized employee, designated by the group's supervisor, shall have primary responsibility for a defined number of other personnel working under the protection of a group lockout and tag;

OR

- One authorized employee shall be designated to ascertain the exposure status of individual group personnel with regard to the lockout and tag procedure for the equipment. When more than one crew, craft, or department is involved, that designated authorized employee shall be responsible for the overall job-associated lockout and tag procedure and shall coordinate the affected work forces and ensure continuity of protection. Each authorized employee shall affix a personal lockout device and associated tag to the group's lockout device, lock box, or comparable mechanism when he/she begins work and shall remove those devices when he/she completes work.

4.4.3 Lockout and Tag During Shift or Personnel Changes

To maintain continuity in the protection provided for those involved in the lockout and tag procedure, and for the orderly transfer of the lockout and tag device, the steps below are necessary when personnel or shifts change:

- ***Personnel Change*** - The arriving authorized employee's lock and tag shall be applied before the departing authorized employee's lock and tag are removed.
- ***Shift Change*** - The lock and tag of at least one authorized employee on the arriving shift shall be applied before any locks and tags of the departing shift are removed. The departing crew will inform the arriving crew of the status of the equipment and the work in progress.

4.4.4 Outside Contractor's & Subcontractor's Lockout and Tag Procedures

Whenever outside servicing personnel (i.e., independent contractors, subcontractors, service vendors) are to be engaged in activities covered by the scope and application of the SLC Lockout and Tag program, the on-site supervisor and the outside contractor/subcontractor supervisor shall inform each other of their respective lockout and tag procedures. The on-site

equipment supervisor shall ensure that his/her employees understand and comply with the requirements of the outside supervisor's procedures. Note that this may include the use of locks and tags that are similar but not identical to those used with the SLC Lockout and Tag Program. Outside contractors/subcontractors who do not have a lockout and tag program shall be required, by terms added to the (sub)contract, to comply with SLC's program. In such cases, the SLC department using the contractor or subcontractor shall furnish the required locks and tags.

4.5 ENERGY-ISOLATING DEVICE LIMITATIONS

If the energy-isolating devices cannot be locked out:

- Have a qualified person install a suitable lockout attachment on the energy-isolating device, then proceed with the lockout and tag procedure in Section 4.4.1.

OR

- If approved by the equipment supervisor and facility management, locate a lockable energy-isolating device (e.g., a panel board or switch board feeding the unlockable device) that will effectively isolate the device. Properly isolate, lock, and tag the device.

OR

- Have a qualified person open (or close) the energy-isolating device (i.e., circuit breaker or valve), disconnect the wiring or piping (or insert a blank flange) from the device, tag the wiring or piping (or blank flange), tag the energy-isolating device, then proceed with the lockout and tag procedure in Section 4.4.1.
- **NOTE**: Any tag used with disconnected wiring, as described above, or any tag used with a blank flange or physically disconnected piping shall indicate the point of disconnect or the location of the blank flange.

OR

- Open (or close) and tag the energy-isolating device. Assign a person as a safety watch to ensure that the energy remains isolated for the duration of servicing or maintenance, then proceed with the lockout and tag procedure in Section 4.4.1.

4.6 SEQUENCE OF REMOVING LOCKOUT DEVICES AND ASSOCIATED TAGS

4.6.1 Removal of Lockout Devices and Associated Tags by Authorized Supervision

Lockout devices and their associated tags shall be removed from each energy-isolating device only by the authorized employee who applied them.

Exception: When the authorized employee who applied the lockout devices and associated tags is not available to remove them, the lockout devices and associated tags may be removed by the authorized employee's functional supervisor in coordination with the equipment supervisor if:

- The authorized employee's functional supervisor and the equipment supervisor verify that the authorized employee who applied the lockout devices and associated tags is not at the workplace.
- All reasonable efforts have been made to contact the authorized employee to inform him/her that the lockout devices and associated tags have been removed.
- The functional supervisor determines that the equipment or area is safe before the lock is removed.
- The authorized employee is informed that the lockout devices and associated

tags were removed before he/she resumes work.

4.6.2 Requirements for Testing or Repositioning Equipment

If the lockout devices and associated tags must be temporarily removed from the energy-isolating device and the equipment that is energized to test or position any of its components, follow the sequence of actions below:

- Clear the equipment of tools and materials and have employees leave the equipment area.
- Remove the lockout devices and associated tags from the energy-isolating devices in accordance with Section 4.7.
- Energize the equipment, then proceed with testing or positioning the equipment.
- De-energize all systems and reapply the energy control measures in accordance with Section 4.4.1. Continue servicing and/or maintenance activities.

4.7 SEQUENCE OF RESTORING THE EQUIPMENT TO SERVICE

When servicing or maintenance is completed and the equipment is ready to be returned to a normal operating condition, follow the sequence of actions below:

1. Check the equipment and the immediate area to ensure that nonessential items have been removed, that all components are operationally intact, and that all guards or other protective features are restored.
2. Check the work area to ensure that all personnel are safely positioned away from the equipment.
3. Verify that the controls are in the neutral position.
4. Remove the lockout devices and associated tags, then re-energize the equipment. Note that removal of some forms of blocking devices may require re-energizing the machine before the blocking device can be safely removed.
5. Notify affected employees that servicing or maintenance is completed and the equipment is ready for use.
6. Complete the lockout and tag log entry.

4.8 PERIODIC INSPECTIONS

Functional supervisors shall periodically (at least annually) inspect the lockout and tag procedures conducted by authorized employees to ensure that these procedures and the requirements of the SLC Lockout and Tag Program are being followed. Periodic inspections shall include a review of the responsibilities (as defined in the lockout and tag procedures being inspected) of the authorized employees assigned to work on the equipment.

Functional supervisors shall perform periodic inspections or they may designate an authorized employee (other than the employee being inspected) to perform the inspections. If another authorized employee performs the inspection, the functional supervisor shall accompany him/her and observe the procedures.

The functional supervisor shall certify that the inspection was performed by identifying on the Lockout and Tag Inspection Form (Appendix B) the equipment for which the lockout and tag procedure was being utilized, the date of the inspection, the names of the employees included in the inspection, and that of the person who performed the inspection. Any deviations or inadequacies identified during the inspection shall be corrected before further lockouts are performed.

4.9 MAINTAINING LOCKOUT AND TAG LOGS

Lockout and tag logs shall be maintained in accordance with SLC administrative procedures. As a minimum, lockout and tag logs shall include the name of the authorized employee, the name of the equipment, the date the lock(s) and tag(s) were installed, and the date when they were removed. The functional supervisor is responsible for ensuring that authorized employees complete the required logs and records.

4.10 DEACTIVATION AND MOTHBALLING

During de-activation or mothballing of a plant, facility or building, it may be necessary to secure, lock, and tag electrical, compressed air, water, or other utility or programmatic services but no maintenance is to be performed. Locks and tags may be installed by the facility manager, building coordinator, or by someone designated by facility management if that individual is an authorized employee.

5.0 RESPONSIBILITIES

5.1 SUPERVISORS

5.1.1 Equipment Supervisors

Equipment supervisors are responsible for:

- Notifying affected employees when the equipment will be locked out for maintenance or other purposes. Notification may include methods such as:
  - ⇒ Contacting each affected employee on a list of those involved with specific equipment.
  - ⇒ Posting notices at the entrances to work areas.
  - ⇒ Making announcements at meetings, over building address systems, or through electronic distribution.
  - ⇒ Fixed status boards.
- Maintaining specific steps for shutting down, isolating, locking, tagging, blocking, or relieving stored energy for the equipment in their area of responsibility.
- Ensuring that procedures clearly and specifically outline the scope, purpose, authorization, rules, and techniques to be utilized to lock out and tag sources of hazardous energy for equipment in their area of responsibility, and for making these procedures available for periodic inspection.
- Exchanging information with outside contractor and subcontractor supervisors about their respective lockout and tag procedures.
- Ensuring that their personnel understand and comply with the requirements of outside subcontractors' lockout and tag procedures.
- Ensuring that appropriate training has been conducted for those affected employees working in the facility.
- Providing PPE (including locks and tags) for authorized employees if it is not provided by the functional supervisor.
- Providing any special chains, wedges, blank flanges, key blocks, adapter pins, self-locking fasteners, or other hardware required for isolating, securing, or blocking energy sources.

5.1.2 Functional Supervisors

Functional supervisors are responsible for:

- Ensuring and certifying that periodic inspections of the lockout and tag procedures used by authorized employees are conducted.
- Providing PPE, including locks and tags, to authorized employees.
- Removing lockout and tag devices, in accordance with the procedure in Section 4.6, when the authorized employee who applied them is not available.

- Ensuring that authorized employees complete the required logs and records.
- Ensuring that personnel understand the purpose of the SLC Lockout and Tag Program and that they have the knowledge and skills required for the safe application, usage, and removal of energy controls.

5.2 EMPLOYEES

5.2.1 Affected Employees

Affected employees are responsible for:

- Obtaining the training and retraining specified in Section 6.0 of this policy.
- Complying with all requirements of the SLC Lockout and Tag Program. In particular, affected employees shall not attempt to start or energize equipment or systems that are locked out and tagged.

5.2.2 Authorized Employees

Authorized employees are responsible for:

- Performing lockout and tag procedures in accordance with the SLC Lockout and Tag Program.
- Coordinating with other authorized employees when using the procedures in Section 4.4.2 for groups and during personnel and shift changes.
- Referring to the equipment supervisor's procedure to identify the type and magnitude of the energy that the machine or equipment utilizes, understanding the hazards of the energy, and knowing the methods to control the energy.
- Performing periodic inspections of the lockout and tag procedures in use when designated by the functional supervisor.
- Obtaining the training and retraining specified in Section 6.0 of this policy.

5.3 HEALTH & SAFETY DEPARTMENT

Health & Safety Departmental personnel are responsible for providing or recommending appropriate "Lock and Tag Program." training.

6.0 TRAINING

6.1 EMPLOYEE TRAINING

6.1.1 Authorized Employees

Each authorized employee shall receive training in the recognition of applicable hazardous energy sources, the type and magnitude of the energy available in the workplace, and the methods and means necessary for energy isolation and control. This training shall include a combination of formal training offered by the Health & Safety Department and on-the-job training (OJT) for the specific equipment.

In addition, the functional supervisor shall ensure authorized employees understand the purpose of the SLC Lockout and Tag Program and that they have the knowledge and skills required for the safe application, use, and removal of energy controls.

6.1.2 Affected Employees

The equipment supervisor is responsible for ensuring that each affected employee working in the area is instructed in the purpose and use of lockout and tag procedures, including test procedures. The equipment supervisors shall ensure the training is completed prior to authorizing lockout and tag procedures for their equipment.

6.1.3 Others

All other employees whose work operations are or may be in an area where energy control procedures may be utilized shall be informed of the SLC Lockout and Tag Program, and that they shall not attempt to restart equipment that is locked out and tagged.

6.2 RETRAINING

Retraining shall be provided as necessary for all authorized and affected employees whenever there is a change in job assignments, when a change in the equipment or processes present a new hazard, or when there is a change in the energy control procedures.

Additional retraining shall be conducted whenever a periodic inspection reveals, or the supervisor has reason to believe that there are deviations from the lockout and tag procedures or inadequacies in the employee's knowledge. Retraining shall re-establish personnel proficiency and introduce new or revised control methods and procedures, as necessary.

6.3 TRAINING RECORDS

Training records shall be maintained in accordance with DCC administrative procedures. Some training records may be entered into a SLC Health & Safety training data base. Other training records are maintained locally (i.e., in the employee's department).

Appendix A

Terms and Definitions

affected employee - A person whose job requires him/her to operate or use a machine or equipment on which servicing or maintenance is to be performed under lockout and tag, or whose job requires him/her to work in an area in which such servicing or maintenance is being performed.

authorized employee - A person who locks out and tags machines or equipment to perform servicing or maintenance. An affected employee becomes an authorized employee when that employee's duties include performing servicing or maintenance covered under the Lockout and Tag Program.

capable of being locked out - An energy-isolating device is capable of being locked out if it has a hasp or other means of attachment to which, or through which, a lock can be affixed or if it has a locking mechanism built into it. Energy-isolating devices are capable of being locked out if lockout can be achieved without having to dismantle, rebuild, or replace the energy-isolating device or permanently alter its energy control capability.

energized - Connected to an energy source, or containing residual or stored energy.

energy-isolating device - A mechanical device that physically prevents the transmission or release of energy, including but not limited to a manually operated electrical circuit breaker, a disconnect switch, a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors and no pole can be operated independently, a line valve, a block, and any similar device used to block or isolate energy. Push buttons, selector switches, interlocks, and other control circuit-type devices are not energy-isolating devices.

energy source - Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.

hot tap - A procedure used during repair, maintenance, and servicing activities that involves welding on a piece of equipment (pipelines, vessels or tanks) under pressure, or tapping into an energized electrical circuit, in order to install connections or appurtenances. It is commonly used to replace or add sections of pipeline without the interruption of service for air, gas, water, steam, and petrochemical distribution systems; or to obtain electrical service from an energized electrical distribution system.

installed real property - Equipment including building air conditioners, substations, and building power and distribution systems.

SLC personnel - The term includes all personnel, including full and part time employees.

single point lockout and tag - A specific procedure for a machine tool or other piece of equipment with only one energy-isolating device that can be readily identified and isolated. For some equipment with only one energy-isolating device, a detailed written lockout and tag procedure is not required. For a detailed discussion, see Section 4.3.

lockout and tag - The placement of a lockout device and associated identifying tag on an energy-isolating device, in accordance with an established procedure, to ensure that this device and the equipment being controlled cannot be operated until the lockout device and associated tag is removed.

lockout device - A device that utilizes a positive means such as a lock to hold an energy-isolating device in a safe position and prevent a machine or equipment from energizing. Included are blank flanges and bolted slip blinds.

normal production operations - Utilization of a machine or equipment to perform its intended production function.

outside contractor/subcontractor - Service and maintenance contractors, construction contractors, salvage contractors, and labor-only contractors.

other employees - Personnel other than authorized or affected employees whose work is or may be in an area where lockout and tag procedures may be used.

personal protective equipment (PPE) - Appropriate protective equipment, including personal protective equipment for eyes, face, head, and extremities; protective clothing; respiratory devices; and protective shields and barriers. Such equipment shall be provided, used, and maintained in a sanitary and reliable condition wherever it is necessary by reason of hazards of processes or environment, chemical hazards, electrical hazards, radiological hazards, or mechanical irritants encountered in a manner capable of causing injury or impairment in the function of any part of the body through adsorption, inhalation or physical contact.

safety watch - A person designated and assigned by the functional supervisor to assist an authorized employee in performing maintenance or servicing on equipment that has no lockout attachment. This person shall be posted at an unlocked energy-isolating device to ensure that the device is not operated for the duration of the operation. The safety watch shall have no other duties.

servicing and/or maintenance - Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining and/or servicing machines or equipment. These activities include lubricating, cleaning, or unjamming machines or equipment and making adjustments or tool changes where

personnel may be exposed to the unexpected energization or startup of the equipment or release of hazardous energy.

setting up - Any work performed to prepare a machine or equipment for its normal production operation.

supervisor, equipment - The person designated by line management to be in charge of a piece of equipment. This person may be a shop, plant or yard Foreman, Superintendent or Engineer. The equipment supervisor may not "own" the equipment, but is the responsible user or caretaker of the equipment. The equipment supervisor would usually be the first person to notice (or have reported to them) that a piece of equipment was not working properly.

supervisor, functional - The person designated by management to be the day-to-day supervisor of an authorized employee. Authorized employees assigned duties in more than one area may have more than one functional supervisor. The functional supervisor shall ensure that the authorized employee is trained and qualified to perform assigned tasks.

tag - An approved SLC form (see details in Section 4.4) that can be securely fastened to an energy-isolating device with a lock and in accordance with procedures established in the SLC Lockout and Tag Program. This tag indicates that the energy-isolating device and the equipment being controlled shall not be operated until the lock and tag is removed.

testing - Determination that machinery, equipment, or equipment parts are de-energized. This involves the use of approved, properly operating test equipment designed for and capable of determining if any energized conditions exist.

verification - Operating equipment controls for the purpose of determining that equipment cannot be restarted after an energy-isolating procedure has been performed and before maintenance or repair work is initiated.

LOCKOUT AND TAG PROGRAM

Appendix B
Lockout and Tag Procedure Self-Assessment Checklist, and Lockout and Tag Inspection Form

Supervisors shall use this checklist as a guide to ensure that authorized employees adhere to the requirements of the SLC Lockout and Tag Program before completing the Lockout and Tag Inspection Form.

B.1 Authorized Employee Knowledge

* Can the authorized employee demonstrate knowledge about the Lockout and Tag Program?

* Can the authorized employee demonstrate knowledge about the appropriate lock and tag devices?

* Can the authorized employee demonstrate knowledge about the location of all energy-isolating devices?

* Can the authorized employee demonstrate knowledge about any (or all) secondary or residual energies?

* Can the authorized employee demonstrate knowledge about the energy-isolation verification procedures?

* Can the authorized employee demonstrate knowledge about the necessary procedures if the equipment does not have a lockable energy-isolating device?

* Can the authorized employee demonstrate knowledge about the log-keeping requirements?

* Has the authorized employee received the required training?

B.2 Lock and Tag Devices

* Is there an adequate number of locks and tags?

* Are the locks properly labeled?

* Are the SLC danger tags the correct version?

* Is a lockout and tag log available and current?

* Are copies of the applicable energy control procedures available?

B.3 Equipment

* Are energy-isolating devices properly labeled?

* Are energy-isolating devices lockable?

LOCKOUT AND TAG PROGRAM

* Are energy-isolating devices (other than electrical) required for lockout and tag (e.g., valves)?

* Are valves adequately identified, and are suitable locking devices available?

* Are other devices (e.g., blank flanges, blocks, chains) required for lockout and tag, and are these devices available?

Lockout and Tag Inspection Form

PERSONAL PROTECTIVE EQUIPMENT (PPE)

CONTENTS

1.0 Introduction

2.0 Garments

3.0 Protective Footwear

4.0 Hand Protection

5.0 Respiratory Protection

6.0 Head Protection

7.0 Eye Protection

8.0 Hearing Protection

9.0 Fall Protection

1.0 INTRODUCTION

Personal protective equipment is not a substitute for adequate engineering or controls, which are always the first levels of protection from hazards. Where a need for personal protective equipment is identified, Dufferin Construction Company (DCC) provides suitable equipment to protect personnel from hazards in the workplace. The ***Health & Safety Department*** shall suggest the type of protective equipment required for the task. The supervisor of the operation shall obtain the equipment, and see that it is used properly.

2.0 GARMENTS

In addition to protective garments, employees shall wear appropriate personal clothing for the work they have been assigned to perform. Protective garments may be necessary to protect employees who handle hazardous materials. When a need for such a garment is identified, it shall be furnished at the discretion of DCC Management.

The type of garment that will provide the best protection for a job will depend on the nature of the job and the physical and chemical hazards associated with the job. For example, where toxic or highly corrosive materials are to be used, disposable protective clothing shall be worn rather than reusable clothing. The ***Health & Safety Department*** shall be contacted for assistance in determining the protective garment best suited to an operation. It is the responsibility of the supervisor of an operation to provide the protective garments specified for a job and enforce their use.

3.0 PROTECTIVE FOOTWEAR

3.1 SAFETY BOOT POLICY

Appropriate protective footwear shall be worn by employees who work in the following areas:

- Construction project sites and affiliated operations;
- Plant and Yard Compounds;
- Maintenance facilities;
- Other locations where a foot hazard exists;
- Where otherwise required by regulation or policy

Supervisors are responsible for evaluating job assignments to determine the type of foot protection appropriate with consideration of all anticipated hazards (impact, hazardous materials, thermal, etc.). DCC or employee supplied protective footwear shoes shall be replaced if, in the supervisor's opinion, the footwear are unserviceable as a result of excessive wear or extreme conditions in the work environment. The ***Health & Safety Department*** may be contacted for assistance in evaluating the need for foot protection.

Protective footwear furnished for contamination control/remediation shall be appropriate for the intended use; and the ***Health & Safety Department*** will provide guidance in the selection. Supervisors are responsible for enforcing the rules controlling the use of protective footwear in contaminated areas.

4.0 HAND PROTECTION

Hand protection may be required for the safe performance of a job. The type of hand protection required depends on the hazards associated with the job; i.e., whether the potential hazard is exposure to chemicals, flame, heat, abrasives, cuts, electrical devices, etc. When protection from chemicals is required, the type of protection required will depend on the chemicals being used. Contact the ***Health & Safety Department*** for assistance in selecting the best hand protection for your particular job.

4.1 GLOVES FOR PROTECTION FROM CHEMICAL HAZARDS

Table 1 is a guide for selecting a glove material that will serve as an effective barrier against many of the substances commonly found around DCC operations. Each glove material has its limitations and, therefore, shall be carefully matched to the substance that will be encountered.

Research on glove materials shows that:

1. each glove material temporarily resists solvent breakthrough, but eventually some permeation will result;
2. the same glove material from different suppliers may vary in its permeation characteristics; and
3. a glove that swells indicates excessive permeation has occurred. Disposable gloves shall be discarded after each use. Reusable gloves shall be inspected regularly for damage and replaced when necessary. They shall be stored in a protected location away from chemical exposure when not in use. Avoid wearing contaminated gloves outside the immediate operation area to prevent spreading contamination.

4.2 THERMALLY-RESISTANT GLOVES

Asbestos gloves are not permitted for general use. When protection from thermal hazards is required, the type of protection required will depend on the temperature as well as other factors. Contact the ***Health & Safety Department*** for assistance in selecting the best hand protection for your particular job.

4.3 BARRIER CREAMS

Gloves are usually the method of choice for protecting hands from chemical hazards. However, under some circumstances, properly used protective hand creams are also effective barriers against skin irritants. Frequent application and removal ensure the most effective results. Washing with soap and water, which removes both the cream and whatever may be dissolved in it, shall always be done before eating and smoking to prevent hand-to-mouth contamination. Two types of creams are available from DCC:

- Water-repellent cream--protects skin from water and chemicals dissolved in water.
- Water-miscible cream--protects skin from dry substances and non-aqueous materials.

Contact the ***Health & Safety Department*** for assistance in selecting the best barrier cream protection for your particular job.

5.0 RESPIRATORY PROTECTION

Various forms of airborne contaminants are generated by many DCC operations. The incidence of occupational illnesses caused by toxic dusts, fumes, mists, gases, and vapours is best controlled using accepted

engineering control methods to prevent the air from becoming contaminated. However, there will always be circumstances in which engineering methods will not be practical or sufficient. In such cases, respiratory protective equipment shall be used.

A summary of the respiratory protection program is given below.

5.1 DCC RESPIRATORY PROTECTION PROGRAM

To ensure that respirators are used effectively to reduce exposure, supervisors and employees shall contact the ***Health & Safety Department*** for assistance. Use of respirators requires prior assessment of need, proper fitting and training. All respirators used at DCC shall be approved by the National Institute for Occupational Safety and Health (NIOSH).

5.1.1 Need for Respirators

Contact the ***Health & Safety Department*** for assistance in all aspects of respirator use and selection. A member of the ***Health & Safety Department*** shall perform a hazard assessment and specify the type of protection needed for each type of operation.

5.1.2 Supervisor Approval

Supervisors are responsible for periodically monitoring the use of respirators to ensure that they are worn properly.

5.1.3 Medical Approval (optional)

When appropriate or as prescribed, potential users shall be approved for respirator use by a physician.

5.1.4 Fitting and Training

The ***Health & Safety Department*** or its designate is responsible for fitting employees with the right masks and training them in the proper use of the equipment.

5.1.5 Supervisors

Supervisors of employees who use respirators are required to attend appropriate training to ensure the proper use of respirators. Contact the ***Health & Safety Department*** for information on supervisor training.

Supervisors are responsible for ensuring that employees are provided with information concerning the hazards for which the respiratory protective equipment has been required in an area. Contact the ***Health & Safety Department*** to assist in providing information to employees.

Specific training in the hazards of particular operations and the protection factors of various respirators will be provided by a senior member of the ***Health & Safety Department***. Supervisors shall allow sufficient time for training to be completed before operations begin, especially for infrequently used respiratory protection equipment.

Supervisors are responsible for ensuring that each respirator stored for emergency use is inspected at least once a month. A record of the inspection shall be entered in a log book by the inspector and the entry verified by the supervisor.

5.1.6 Self-Contained Breathing Apparatus (SCBA)

Those requesting self-contained breathing apparatus (SCBA) shall contact the ***Health & Safety Department***. A senior member of the ***Health & Safety Department*** shall perform a hazard assessment and provide guidance and recommendations.

5.1.7 Employees

Users shall inspect the respirator before each use to ensure that it is in proper working condition. Facial hair (such as beards and mustaches) that comes between the sealing periphery of the face piece and the face or interferes with valve function is prohibited. Fitting and testing will not be performed on persons with such facial hair. Spectacles, goggles, face shields, or welding helmets shall not be worn in a way that

adversely affects the seal of the facepiece to the face.

5.1.8 Contract Workers
Contract workers who are under the direct supervision of a DCC employee shall be provided with respiratory protective equipment. DCC supervisors shall initiate the procedures described above to obtain hazard assessments, fitting, and training. This does not extend to independent contractors or subcontractor employees. Any questions on use of respirators by non-DCC employees should be referred to the ***Health & Safety Department***.

For information on any aspect of respiratory protection, consult the ***Health & Safety Department***.

6.0 HEAD PROTECTION

Employees working in areas where there is possible danger of head injury from impact, from falling or flying objects, when working with high-voltage equipment or as prescribed by regulation must wear approved and appropriate head protection. The supervisor is responsible for determining the need for such protection and ensuring that employees, contractors and subcontractors use it when required. Protective head gear can be obtained from the Oakville Shop. A sufficient supply of required protective head gear shall also be provided for visitors at the work site.

7.0 EYE PROTECTION

DCC provides appropriate eye protection in areas where hazards to the eyes exist. The supervisor is responsible for determining the need for eye protection, obtaining suitable protective devices, and ensuring that employees use them. The ***Health & Safety Department*** shall assist the supervisor in defining eye hazards and selecting appropriate eye protection.

Employees should not wear contact lenses if exposed to a eye hazard.

The standard sign "Caution--Eye Protection Required in This Area" shall be posted in all areas where eye protection is mandatory. Employees who work in these areas shall wear the eye protection issued to them. Visitors to the area shall also be provided with suitable eye protection.

Types of Eye Protective Equipment

Eye protection devices fall into the following four categories:

- Personal safety glasses--issued through the supervisor;
- Goggles, face shields, etc.--available from the Oakville shop;
- Temporary safety glasses for visitors; and

Table 2 is a guide for selecting the devices that will provide adequate eye protection for various operations. Table 3 lists the lens shades recommended for protecting the eye against glare and welding. If eye protection is needed for situations not listed in Table 10-3, consult the ***Health & Safety Department***.

8.0 HEARING PROTECTION

Dufferin Construction provides hearing protection for employees who may be exposed to excessive noise levels. Protective devices are used as an interim measure until an engineering solution is found to control the noise, unless the particular job is temporary or related to construction activities. The ***Health & Safety Department*** shall advise where hearing protection is necessary and the type of protective device needed. Ear muffs and foam plugs are available from the Oakville Shop.

9.0 FALL PROTECTION

PERSONAL PROTECTIVE EQUIPMENT (PPE)

DCC has available specialized protective devices for employees who work at elevated locations or in confined spaces. Fall arrest or travel restraint systems shall be worn when a fall hazard exceeds 8 ft. A full-body harness is required for all fall arrest or travel restraint systems. Safety belt are prohibited. Only equipment approved by the ***Health & Safety Department*** shall be used as part of a fall arrest or travel restraint system.

9.1 APPROVED FALL ARREST AND TRAVEL RESTRAINT SYSTEM COMPONENTS

- Harness -
- Carabiner -
- Shock Absorbing Lanyard -
- Lanyard -
- Locking Snap Hook -
- Ladder Hook -
- Rope Grab -
- Life Line -

Lifelines, full-body harnesses, lanyards and other hardware shall be used only for employee safeguarding. Any lifeline, full-body harness, lanyard or other hardware actually subjected to in-service loading, as distinguished from static load testing, shall be immediately removed from service and shall not be used again for employee safeguarding.

9.2 FALL PROTECTION PLANNING

Because of the potential for serious injury or death, work planning is vital in situations where fall protection is required. General guidelines for planning fall protection are listed below:

1. List each fall exposure.
2. Determine worker's vertical and horizontal movement.
3. Evaluate strength of anchor point.
4. Plan anchoring system.
5. Select and obtain correct equipment.
6. Train workers.
7. Maintain equipment.

Before performing work in these situations, contact the ***Health & Safety Department*** for assistance in evaluating the most effective type of fall protection system.

9.3 INSPECTION

Fall protection equipment shall be inspected before each use and every 6 months in accordance with the manufacturer's guidelines. The manufacturer's inspection guidelines may be a part of the literature enclosed with the fall protection equipment at the time of purchase. This information is also available from the ***Health & Safety Department.***

9.4 TRAINING

All users of fall protection equipment shall be trained in the proper selection, use, and maintenance of the equipment. The ***Health & Safety Department*** offers course (Fall Protection for Elevated Locations) to fulfill this requirement and provide further information on fall protection equipment, as well as possible solutions to fall hazards at elevated locations.

DESIGNATED SUBSTANCES

PURPOSE

This section of the Divisional - Loss Control Manual is intended to establish procedures to be employed in the event that a designated substance will be used or likely encountered on a project.

POLICY

1. Estimating personnel shall advise the health and safety department prior to establishing and submitting a tender for contract where a designated substance shall be employed or is likely to be encountered.

2. Marketing personnel shall provide contractors/subcontractors with a list of designated substances (if applicable) at the same time as tender documents are presented.

PERFORMING OPEN FLAME OPERATIONS

PURPOSE

This section of the divisional manual is provided in order to establish procedures for conducting "hot work" at projects or work sites.

POLICY

- All burning, heating, cutting or welding operations must be approved by project or work site supervision prior to commencing work.
- Permission to perform such operations will be provided by senior project/work site supervision. Permission to perform hot work will be granted if it can be established that this form of work will not contribute to cause further hazards; and that all safe working practices will be adhered to.

Additional Precautions

1. Suitable type of shields should be provided to protect project or work site personnel from welding flash or sparks
2. Appropriate and adequate fire extinguishes shall be positioned immediately adjacent to the "hot-work" process.
3. Compressed gas cylinders must be secured in position during transport, storage or use. The valve protection cap shall be in position when the cylinder is not in use. Cylinders containing acetylene must be secured in an upright position.
4. A fire watch shall be posted where necessary.

HEAVY EQUIPMENT MAINTENANCE

PURPOSE

This section of the Divisional Loss Control Manual is intended to establish minimum recommended safe job procedures to follow prior to performing repair or maintenance of heavy equipment.

POLICY

All heavy equipment should be locked-out (where available), de-energized, blocked or otherwise secured in order to protect workers form electrical or mechanical contact hazards prior to conducting repairs or maintenance.

Procedures

Lockout, De-energizing, Blocking or Securing Procedures - Heavy Equipment.

1. See that buckets, bowls, etc. are lowered. Verify that parking brake is set and controls are in the neutral or shutdown position.
2. Locate job site (if possible) in a safe and easily accessible location. Mobile equipment that can be moved should be repaired on level ground out of the way of other operations. Advise others of selected job site and work plans.
3. Reposition equipment as necessary to avoid working between equipment and the highwall or spoil bank where escape may be hindered. Special safety precautions must be taken when repair work is required between immobilized equipment and the highwall or spoil bank.
4. Block wheels securely, especially if on a grade or if maintenance operation could possibly cause release of brakes, transmission, etc. Keep yourself to the side when installing and removing wheel blocks.
5. Lower any raised parts which can be lowered. If necessary to work on or from equipment in the raised position, it must be blocked securely. Good blocking materials for most purposes include solid ground, berms, wooden crib blocks, solid concrete blocks, or specially designed locking devices, pins, etc. Cinder blocks are inadequate for many purposes.
6. Visually inspect work area for potential hazards. Remove debris and combustible material from job site.
7. If equipment must be running or moving to evaluate condition, or to complete certain portions of the repair, exercise extreme caution and be sure of good communications with anyone involved.
8. Obtain assistance as needed for towing. Be sure the vehicle used is large enough and powerful enough to handle the job.
9. Do not operate any towing equipment you are not trained and qualified to operate.
10. When towing requires disabling any failsafe brake system or other safety devices, be sure they are restored to operative condition before the equipment is returned to service.
11. Use a smooth steady pull when towing. Do not snatch and jerk equipment.
12. Carefully watch contour of ground when towing. Take precautions against the towed equipment overtaking the towing equipment on downgrade.
13. Place warning tags on steering wheel or other prominent location, and remove ignition key.
14. Equipment operators should not attempt repairs or maintenance they do not understand.
15. Ensure that pressure is relived from hydraulic systems before any attempt to disconnect or repair hoses, cylinders, motors, etc.
16. Use safety belt or harness and line where there is a danger of falling (when work must be done at an elevated location unprotected by railings).
17. Select, inspect, and use the proper tools for the job. Do not use tools with mushroomed heads, loose or cracked handles, etc.

18. Do not leave tools or other objects lying around loose where they could fall on someone. Rope off area, use screens, etc., if necessary for adequate protection of those working or passing below. Do not leave tools or other objects lying around in walkways.
19. Keep hands, fingers, and other parts of body out of pinch points.
20. Take care to avoid burns from hot bearings, hot hydraulic fluid, etc. Wear gloves where possible. Wear safety glasses.
21. When using a wrench, seat it firmly and use steady controlled force. Avoid jerking the wrench.
22. Always wear safety glasses when striking objects with a hammer.
23. Wear gloves to handle metal parts and when using tools.
24. Maintain good communication with all co-workers. Tell them what you're about to do if it could cause equipment movement.
25. Assume a safe position out of direct line of potential motion of parts. Do not position yourself in the inside radius of wire ropes being used for pulling.
26. Avoid excessive skin contact with lubricants, especially penetrating oil. Carry waterless hand cleaner or preferably soap and water, and use regularly.
27. Use extreme caution when working with tires and multipiece rims. Be sure components are properly matched and undamaged. Use inflation cages, long inflation hoses, adequate lifting and handling equipment and adequate mounting and dismounting tools.
28. Use proper lifting procedures. Obtain help when load may be too heavy.
29. Carry, inspect, and use lifting devices, jacks and hoists to the extent possible to avoid manual lifting.
30. Be sure component being removed is secured as last bolts or nuts are removed.
31. Before taking on the weight of a part being removed, be sure it is something you can handle. Stand in close to the part and be sure of good footing. Get help in advance if you think it may be needed.
32. Stay clear of suspended loads.
33. Use taglines when hoisted objects require steadying or guidance. Stay out of confined areas where you could be caught between a swinging load and a stationary object.
34. Keep hands and fingers clear of pinch points when lowering or placing parts.
35. Secure all guards, covers and shields which protect people and equipment.
36. Remove any accumulations of oil and grease.
37. Be sure tools, old parts, or other objects are returned to proper storage or disposed of. Be especially careful not to leave objects in walkways or at elevated locations. Keep tools clean.
38. Inspect completed work to ensure that all bolts are tightened, guards replaced, tools removed, etc.

Management

1. Establish an effective preventive maintenance program which minimizes the need for emergency repairs, and which emphasizes both the safety of the equipment and safety in the maintenance program itself.
2. Provide maintenance personnel with substantial hoists and slings and encourage their use to minimize manual lifting. When necessary to use the choker method, nylon slings are less likely to slip.
3. Provide substantial, permanently attached devices, where possible, for securing raised equipment (such as truck beds and loader buckets).
4. Purchase or fabricate substantial work stands and platforms of the type and size required for the equipment used. This will minimize reaching and lifting, and slip and fall accidents.
5. Use grip-strut grating on steps and platforms. Use nonskid paint or antislip strips on flat equipment surfaces.
6. Where access to service and inspection points is difficult, consider installation of oil sight guages, extended dipsticks, automatic lubrication systems, extended grease fittings, additional handholds, and/or additional steps.

7. Install pressure release radiator caps.
8. Provide and increase the use of gloves, and safety belts and lines. Purchase gloves which provide protection and yet allow good dexterity.
9. Provide and maintain proper tools for maintenance tasks.
10. Provide adequate tow ropes and connecting links to prevent the use of makeshift towing devices.

MATERIAL HANDLING

CONTENTS

1.0 Introduction

2.0 Responsibilities

3.0 Foot Protection

4.0 Manual Lifting and Handling

5.0 Mechanical Lifting and Handling

6.0 Mechanical Lifting Equipment

7.0 Suspended Loads

8.0 Material Storage

9.0 Storage Facilities

10.0 Truck Loading

SUPPLEMENTS

- **27B Fork Truck Safety**
- **27C Crane and Hoist Safety**

1.0 INTRODUCTION

Mechanical devices rather than manual effort should be used to lift and move objects whenever practical. The type of equipment used, however, must be appropriate for the task. Employees are always encouraged to use mechanical equipment to lift heavy or bulky objects. DCC policy requires that employees be properly trained and physically qualified--by medical examination (if necessary)--for any work assignment that involves lifting heavy objects.

2.0 RESPONSIBILITIES

The supervisor shall ensure that employees know how to safely move objects manually or with mechanical devices. Only those employees who have been trained and certified are permitted to operate fork trucks, cranes, or hoists. The supervisor shall enforce the use of safe lifting techniques and shall ensure that the equipment is kept in good mechanical condition.

Employees are required to observe all established safety regulations for lifting heavy objects; they shall never manually lift or move objects that exceed their physical limitations.

3.0 FOOT PROTECTION

Protective footwear shall be warn in materials handling environments. Supervisors shall evaluate job assignments and determine the need for foot protection. See Chapter 15 of the Divisional Loss Control Manual for additional information on foot protection.

4.0 MANUAL LIFTING AND HANDLING

When manually lifting and handling material, use only those methods that ensure your safety and that of the material. Never attempt to lift objects that are either too heavy or bulky to handle safely. Under no circumstances shall an individual push or pull a load that exceeds 275 kg (600 lb). Whenever possible, push rather than pull loads--pushing uses the strong leg muscles, whereas pulling uses the easily strained back muscles. The ***Health & Safety Department*** conducts a back-care workshop at which employees are taught proper and safe techniques for manually lifting and handling heavy objects; the workshop also identifies exercises to strengthen the back.

MATERIAL HANDLING

4.1 WEIGHT LIMITS

Although there are no legal maximum limits for weights that an employee may lift, the ***Health & Safety Department*** recommends a 23-kg limit (50-lb) for objects that are regularly lifted. The ***Health & Safety Department*** can assist you in assessing and calculating safe lift limits.

4.2 RULES FOR MANUAL LIFTING

The following rules shall be adhered to when lifting heavy objects:

1. Inspect the load for sharp edges, slivers, and wet or greasy spots.

2. Wear gloves when lifting or handling objects with sharp or splintered edges. To ensure a good grip on the object, the gloves must be free of oil, grease, or other slippery materials.

3. Inspect the route over which the load will be carried; the route should be free of obstructions or spillage that could cause tripping or slipping.

4. Consider the distance the load will be carried; your gripping power may weaken over long distances.

5. Size up the load and make a preliminary "heft" to be sure the load is within your lifting capacity; if it is not, get help or use a mechanical lifting device.

6. If team-lifting is required, the individuals involved should be similar in size and physique. One person should act as the leader and give commands as to when the object should be lifted or lowered.

7. Two persons transporting a piece of pipe or lumber should both carry it on the same shoulder and walk in step. Use shoulder pads to prevent the shoulders from being cut and to help reduce fatigue.

8. Grasp boxes, cartons, and stacks at the opposite top and bottom corners, drawing the bottom corner between the legs.

4.3 SAFE LIFTING PROCEDURE

To lift an object off the ground, use the following method adapted from the National Safety Council's booklet, "***A New Way to Lift***", which is available from the ***Health & Safety Department***:

1. Make sure your feet are firmly placed about 24-40 cm (10-15 in.) apart. Place one foot alongside the object being lifted and the other behind it (Fig. 1a).

2. Use the knee-bend or squatting position (Fig. 1b); keep the back straight, but remember that straight does not mean vertical. Tuck in the chin so the neck and head continues the straight back line.

3. Grasp the object using the palmer grip

4. (Fig. 1c); the fingers and the hand should be extended around the object to be lifted, using the full palm.

5. Tuck arms and elbows into the side of the body, and position the body so that your weight is centered over your feet (Fig. 1d).

6. Start lifting with a trust of the rear foot, keeping the object close to the body as you lift with your legs--not with your back

7. (Fig. 1e)

8. Carry the load close to your body--not on extended arms (Fig. 1f). To turn or change your position, shift your feet--do not twist your back.

To set an object on the ground, follow the above procedure in the reverse order.

5.0 MECHANICAL LIFTING AND HANDLING

Mechanical devices shall be used for lifting and moving objects that are too heavy or bulky for safe and manual handling; however, only employees who have been properly trained are permitted to operate such devices. Heavy objects that require special handling or rigging must be moved only by riggers or under the guidance of employees specifically trained to move heavy objects. The ***Health & Safety Department*** can assist in identifying appropriate training programs for operating fork trucks, cranes, hoists, etc.

All operators are required to use seat belts where provided.

See Supplement 27B of the Divisional Loss Control Manual for rules on the safe operation of fork trucks, and Supplement 27C for information on power-operated cranes and hoists.

6.0 MECHANICAL LIFTING EQUIPMENT

All mechanical lifting and moving devices shall be inspected periodically and shall be repaired when necessary. Under no circumstances shall defective equipment be used. Write the rated load capacity on lifting devices and ensure that the capacity is never exceeded. As a safety precaution, before lifting a load near the load capacity of the equipment, check for faulty or defective parts.

The following safeguards must be taken to prevent accidents when operating mechanical lifting and moving equipment:

- Drive fork trucks forward when going up a ramp and backward when going down.
- Do not allow anyone to walk under a raised load; call out a warning if necessary.
- Check the floor-load limits before mobile lifting equipment enters an area, and do not exceed those limits.
- Do not carry passengers on lifting equipment unless it is specifically equipped for that purpose.

7.0 SUSPENDED LOADS

Do not stand under a load suspended by mechanical devices. [In addition, an equipment operator shall plan the pathway that will be used to transport a load so that no part of the load passes over worker.] If this is not possible, check that the lifting device has a redundant supporting system that would prevent the suspended material from falling if the device fails. Never leave a suspended load unattended; lower the object to the floor or working surface, and secure the handling or lifting device before leaving.

8.0 MATERIAL STORAGE

Materials that are radioactive, fissile, flammable, explosive, oxidizing, corrosive, or pyrophoric shall only be stored under conditions that have been approved The ***Health & Safety Department***. Incompatible materials such as cartons, boxes, drums, lumber, pipe, and bark stock shall be segregated and stored in racks or stacked in appropriate stable piles. To prevent toppling, secure the racks with "tie-downs."

9.0 STORAGE FACILITIES

Materials to be stored shall not exceed either the rated floor capacity for the area or the weight capacity of the storage racks.

MATERIAL HANDLING

The load limit and the maximum height to which materials may be stacked shall be posted in a conspicuous location, and traffic lanes and loading areas shall be marked appropriately and kept clear. The floors in these areas shall be maintained in good condition at all times.

10.0 TRUCK LOADING

All objects loaded onto trucks shall be firmly secured to the truck to prevent them from shifting during transit. The wheels of trucks being loaded or unloaded at a loading dock shall be blocked to prevent movement.

FLEET SAFETY - REQUIREMENTS OF INDEPENDENT OPERATORS

Dufferin Construction Company - Health and Safety Policy

Dufferin Construction Company is committed to the protection from accidental injury and loss to its employees and property. In fulfilling this commitment, we will provide and maintain a safe work environment and we will strive to eliminate hazards which may result in injury and property damage. Accidental injury and loss can be controlled through good management in combination with active employee involvement. Supervision and Management will take all necessary action to eliminate or control hazardous working conditions and work in compliance with laws pertaining to occupational health and safety. All persons on a project are responsible for their own safety and that of their co-workers. They are expected to use the safest work methods to carry out their job and point out sources of danger and suggest means to remedy them. I trust that each of you will join me in a personal committment to enforce this health and safety policy as away of life.

Operator Policy

All drivers and operators of vehicles or equipment on Dufferin Construction Company (DCC) projects must comply with the Occupational Health and Safety Act and Regulations for Construction Projects, the Highway Traffic Act, the Environmental Protection Act as well as Dufferin Construction's, Divisional - Loss Control Manual.

Objectives

This subsection of the Fleet Safety Program is intended to be a general overview of safety policies and procedures applicable to all drivers and operators of vehicles or equipment on Dufferin Construction projects. Drivers and operators of vehicles or equipment should not rely on this subsection of the Fleet Safety Program exclusively. Reference to the Occupational Health and Safety Act and the Regulations passed pursuant thereto for Construction Projects and Industrial Establishments, as well as to Dufferin Construction Company's - Divisional Loss Control Manual is required to ensure compliance. The information contained in this subsection of the Fleet Safety Program is designed to provide assistance to all drivers and operators of vehicles or equipment in maintaining a safe working environment. In addition, each and every driver and operator of vehicles or equipment should be aware of his or her responsibilities, as prescribed by the Occupational Health and Safety Act, Section 28,

1. Work in compliance with the provisions of this Act and all health and safety regulations
2. Use or wear the equipment, protective devices or clothing required by the employer (or Dufferin Construction).
3. Report to the Company (Dufferin Construction) defective or dangerous equipment and hazards.
4. Do not remove any protective devices.
5. Do not operate equipment or machinery in a dangerous manner.
6. Do not engage in any horseplay or pranks in the workplace.
7. Report all accidents immediately.

Safe Operating Procedures

Drivers and operators must remain in their vehicles at all times unless authorized by a Dufferin Construction Company supervisor.

Personal Protective Equipment

Drivers and operators must wear approved hard hats, safety boots and reflective vests when exiting their vehicles or equipment. Eye protection may be required on certain projects. Seat belts must be worn at all times.

Operating Speeds

Equipment and vehicles shall not exceed 30 km/h unless otherwise posted. Operating speed should be reduced appropriately when traveling in the vicinity of construction processes.

Backup Procedures

Subcontractors and/or brokers must ensure that all drivers and operators receive backup hazard awareness training. Training can be obtained by contacting the Construction Safety Association of Ontario (CSAO) (416) 781-2726. All drivers and operators must alert a Dufferin Construction Company supervisor when first arriving on a project. The Dufferin supervisor will advise drivers or operators of the job specific backup procedures and the backup safety plan, if applicable. All drivers and operators must comply with the OHSA and Regulations for Construction Projects;

Sec. 104. No vehicle, machine or equipment or crane or similar hoisting device, or shovel, backhoe, or similar excavating machine shall be operated unless the operator is assisted by a signaller,

(a) where the operator's view of the intended path of travel of any part of it or its load is obstructed; or

(b) where it is in a location in which a person may be endangered by any part of it or its load.

Sec. 105. An operator of a vehicle, machine or equipment, or crane or similar hoisting device, or shovel, backhoe, or similar excavating machine who is required to be assisted by a signaller shall operate it as directed by the signaller.

Inspection And Maintenance

Drivers and operators must perform daily inspections and ensure that the vehicle/equipment is in a safe operating condition. The attached circle check and inspection record shall be completed daily.

Servicing Equipment

Drivers and operators must disengage power, stop the engine and remove and retain the ignition key before servicing equipment. Never oil or grease machinery while it is running. Dozer and grader blades, backhoe and loader buckets, scraper pans and dump truck boxes must be fully lowered when the machine is stopped.

Daily Vehicle Inspection Record

Name of the Driver (print):_____ vehicle no._____

Vehicle License No._____

Classification Code: Compliance (C) non compliance (NC)

C	NC		
		1	**In the engine compartment:**
☐	☐		check radiator for leaks, coolant level and proper locking cap
☐	☐		check fan for bend blades, loose mounting and belt tension
☐	☐		check oil level
☐	☐		check battery for electrolyte level, cracks, excessive corrosion
☐	☐		check air cleaner and proper attachments
☐	☐		check for obvious breaks or loose connections in electrical system, coolant hoses and vacuum hoses
☐	☐		check all drive belts
☐	☐		secure hood
		2	**With engine started:**
☐	☐		check engine for ease of starting and smooth operation
☐	☐		check operation of hand throttle, choke and accelerator pedal
☐	☐		check operation of air vacuum systems
☐	☐		check operation of all instrument panel gauges
☐	☐		check operation of windshield wipers, washers and defroster
☐	☐		check for unusual noise in clutch and transmission when clutch pedal is depressed and released, with engine running and transmission in neutral
		3	**In the cab:**
☐	☐		check operation of doors, door handles and latches
☐	☐		check feel and lash of brake pedal and clutch pedal (check all braking systems)
☐	☐		check hand brake for excessive travel and locking ability
☐	☐		check seat adjustment and safety belts
☐	☐		check fuel gauge and ammeter
☐	☐		check adjustment of rear view mirrors
☐	☐		check vehicle for registration, proof of insurance and driver's log book (where applicable)
☐	☐		check operation of horn and backup alarm
☐	☐		check adjustment of rear view mirrors
		4	**Around the vehicle:**
☐	☐		check for vehicle damage
☐	☐		check all tires for inflation and missing valve caps
☐	☐		check wheel lugs and nuts
☐	☐		check springs and U-bolts
☐	☐		check fuel tanks, fuel level and proper locking cap
☐	☐		check tarps, lashing, tailgates and rear doors
☐	☐		check operation of all lights
☐	☐		check air hoses and electric lines to trailer
☐	☐		check suspension and frame
☐	☐		clean windows and mirrors
		5	**Fifth Wheel:**
☐	☐		check fifth wheel mounting
☐	☐		check operation and position of fifth wheel locking handle
☐	☐		check locking devise to make sure it is engaged
☐	☐		check lower coupler plate for proper connection and condition
☐	☐		check brake hoses for proper connection and condition
☐	☐		check light cables for connection and condition
		6	**Extra Equipment:**
☐	☐		fire extinguisher, flares and reflectors
☐	☐		load securing devices and necessary markings
☐	☐		first aid kit
☐	☐		tools properly secured
☐	☐		spare tire
☐	☐		check light or indicator to show when the body is raised
☐	☐		check cab protector or canopy

··I have completed the vehicle inspection record and I hereby state that it is accurate.

.....

_____ Driver's signature

_____ Date

7

ACCIDENT/INCIDENT - NOTIFICATION, ANALYSIS & REPORTING

CONTENTS

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4.7.1 Project Engineer
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Appendix A A/O/I Response Plan; A/O/I incident questionnaire; Forms for personal interview; SCAT Chart; DCC Accident Report Form; Evaluation of Reports; WSIB Follow-up Questionnaire;

4.1 Purpose and Scope

An "incident" is a sequence of events or conditions that could result in an accident, injury, illness, and/or a reportable occurrence. The term "incident" is used to broadly encompass many types of events because numerous environment, safety, and health (ES&H) requirements for incident notification, analysis, and reporting do not allow for simple categorization or development of procedures for each type of incident.

The threshold response requirements for an incident vary by type (e.g., vehicle accident or chemical spill) and the severity (e.g., extent of injury or property damage). For example,

* For significant incidents, internal procedures usually specify notifying the Fire Department, the Ministry of Labour), the appropriate managers, and the General Manager. The HSE Manager will coordinate the investigation and report directly to the General Manager.

* It is DCCs policy that supervisors analyze all incidents, no matter how seemingly minor, to understand the causes and prevent a recurrence. The Ministry of Labour may also conduct its own analysis and develop a report of major incidents and request a written report to be submitted by DCC.

* Supervisors are expected to collect information and prepare reports on workers who have sustained occupational injuries and illnesses, as specified in Section 4.5.2.

In many cases, however, management's judgment and the information and processes described in this chapter are to be used to determine the appropriate response to an incident after emergency conditions are stabilized.

This chapter

* Focuses on the necessary management responsibilities for reporting and notification following an accident after emergency response and health care needs have been satisfied.

* Provides guidance on managing various responsibilities arising from ES&H incidents.

* Describes

-- The notification process for incidents.

-- The procedures for preserving the incident scene to retain pertinent information.

-- The incident analysis process.

-- Reporting procedures and the required reports following an incident.

Appendix A contains terms and definitions used in this chapter.

4.2 Requirements/Regulatory Summary

This chapter and its supplements conform to the requirements of Occupational Health and Safety Act and Regulations for Construction Projects. In addition, compliance with the Workplace Safety and Insurance Act is strictly maintained.

4.3 Applicability

Individuals involved in incident notification, analyses, and reporting at DCC must comply with all requirements specified in this chapter.

4.4 Incident Process

4.4.1 Initial Incident Notification and Management's Action

DCC employees are required to report all incidents that are neither planned nor typical of normal operations to their supervisors. Upon notification of an incident, the supervisor shall gather preliminary information to have a reasonably accurate picture of what happened, then notify management and the area ES&H team in the manner prescribed for the directorate. The environmental analyst on the ES&H team shall follow the Company's notification procedures for any incident involving an environmental issue (see Chapter 3 of the Environmental Compliance Manual).

When necessary, the HSE Manager (or his designee) will make the other required notifications to regulatory organizations. It is important to note that initial notification to the MOL must be made as soon as possible, and in some circumstances within one hour of an incident categorization.

NOTE: Care for injured personnel is the first priority following an incident. Contact the Health and Safety Dept after these personnel have received proper attention.

4.4.2 Preserving the Incident Scene

Emergency response personnel must be notified immediately (dial 911 ot 905-676-3033 at the GTAA) of any incident categorized as an emergency, as described in Chapter 3 of the Health & Safety Manual. The supervisor or senior person present at the scene of an incident is responsible for making the area safe and for preserving the scene. The incident scene must be preserved in a manner consistent with procedures for emergency control operations to retain valuable information for the incident analysis committee should one be appointed. This may include

* Preventing any physical items involved in the incident from being operated, moved, or otherwise altered; and impounding such items as necessary until the incident analysis is completed.

* Photographing (digital photographs are preferable) the scene soon after the incident, with particular emphasis on spilled materials and tire marks; check each photograph carefully to determine that it is properly classified. The area ES&H team or personnel can provide barriers, cameras, and other items if necessary.

If an incident analysis committee is appointed (see Section 4.4.4 for criteria), the chairperson shall arrange with the person in charge of emergency control activities (or the supervisor) to assume control of the scene as soon as it is safe to do so. The committee chairperson shall not release the incident scene for normal operations until

all relevant information has been obtained. If more than one incident analysis committee is involved, the chairperson of each committee must agree to release the area and the physical items involved.

4.4.3 Supervisor's Incident Analysis

All incidents involving injury, illness, property loss, transportation of materials, radiological and hazardous wastes above threshold limits, release of toxic or radiological materials to the environment, or vehicle damage shall be analyzed by management. The purpose of an incident analysis is not to place blame but rather to identify the operational system errors and omissions (root causes) that brought about the incident so that they can be corrected to prevent a recurrence of the incident. The degree of evaluation is dictated by the severity of the event, its likelihood of recurrence, and other factors. The Practical Loss Control "SCAT Chart" may be used for guidance.

The incident analysis must begin as soon as possible if all the facts that will help explain why and how the incident occurred are to be obtained free from excessive rationalization. An incident analysis conducted by the supervisor of the area involved usually gathers enough information to complete the required reports described in Section 4.5. However, one conducted by an incident analysis committee generally will be more detailed, independent, and thorough.

If preliminary information about the incident indicates that a formal committee analysis is not required, then an incident critique (as recommended by the Loss Control Manual) may be performed. This critique must never be performed before an incident analysis because it can destroy the privacy of those individuals involved in the incident and cause them to suppress facts that may reflect on their personal competence and judgment.

4.4.4 Incident Analysis Committee

Incidents of a more serious nature require a thorough evaluation to obtain a better understanding of the event and measures necessary to prevent a recurrence. The ES&H team leader will assist the supervisor in determining if a committee should be appointed to conduct a formal incident analysis. Project Engineers will have taken the Practical Loss Control course (Incident Analysis) and received training in DCC in-house accident investigation.

Further guidance on making appointments to the incident analysis committee, on incident analysis methodology, and on preparing incident analysis reports can be found in Supplement 4.08 of the Health & Safety Manual.

4.4.5 Management's Action Following an Incident Analysis

Responsible managers shall decide on the corrective actions necessary to reduce the likelihood of a recurrence of an incident, considering both the practicality of implementation and the cost benefit. If the request for corrective action is from a judgment-of-need in an incident analysis report (described later in this chapter), managers will have 30 days to inform the JH&SC co-chairs of their contemplated action and the estimated date of completion, or of their rejection of the recommendation. Copies of this document must be sent to their Health and Safety Representatives and posted as an Accident Summary Report.

The Safety Department maintains a permanent central archive of all incident analysis reports, including the status of all corrective actions whether they are completed, contemplated, or rejected.

4.5 Reporting Procedure

This section describes the reporting procedure for the incidents listed below.

Managers and/or employees may be expected to prepare the required reports.

* MOL reportable occurrences. (Contact the HSE Manager or Safety Advisor immediately)

* High-risk or significant loss incidents. Investigation to be conducted by Health and Safety Dept. in cooperation with the Senior Supervisor.
* Occupational injuries and illnesses reported to H&S Dept. immediately, WSIB Occupational Injury Form 7 are required.)

* Property loss or damage exceeding the reporting threshold limits

* Vehicle accidents causing damage in excess of any reporting threshold limits. Any incident involving personal injury to third parties must be reported to H&S Dept. The reporting threshold dollar amounts change periodically. Operators of DCC vehicles are required to report incident to Provincial Collision Reporting Centres within 24 hr.

4.5.2 Injuries/Illnesses

Any DCC employee who is injured or becomes ill as a possible result of a job-related condition or accident must notify his/her supervisor who must report the illness or injury to Health and Safety Department within one hour. For subcontractors and visitors, the supervisor must also contact the H&S Dept. ASAP. Emergency assistance for all cases may be obtained by dialing 911 or the GTAA emergency number. Supervisors will follow the DCC Emergency Response Plan.

If the injured or ill individual seeks care at Health Services, the health care provider will conduct a medical evaluation, provide the needed treatment, and initiate the OSHA and Workers' Compensation processes. If the injured or ill employee is not evaluated by Health Services, the employee's supervisor must complete the CSAO's Injury Treatment record in the first-aid kits.

MOL and WSIB Reporting. Once a supervisor, employee, subcontractor, or visitor notifies the Health & Safety Dept of an occupational illness or injury, an initial notification report is completed and copied to necessary individuals. If the onsite supervisor is an employee of a subcontractor firm, that subcontractor must report the accident in accordance with its contractual requirements. Reporting procedures for construction contractors are described in Supplement 1.11 of the Health & Safety Manual.

Workplace Safety Insurance Board Reporting. Upon notification of an illness or injury by an employee or a supervisor, the Health and Safety Dept will file the required WSIB form 7 within three working day of notification, as required by law.

4.5.3 Property Damage/Loss

Any person who damages or loses property assigned to the Company must notify his/her supervisor of the incident. The project having responsibility for the property shall be liable for all losses and reporting obligations

* Initiate an incident analysis to the extent necessary, as described in Section 4.4.3. Confirm the current DCC threshold reporting level requirements with the Loss Control Manual.

4.5.4 Vehicle Accident

Operators involved in an accident with a DCC vehicle must verbally notify their supervisors immediately after the accident. Operators shall also cooperate with law enforcement authorities involved, but should neither offer assumptions nor admit fault. If possible, operators should collect the following information from the incident

scene that may assist in preparing other reports:

* The other party's name, address, phone number, license number, and insurance number.

* The names, addresses, and telephone numbers of all witnesses.

* Local police department reports including badge numbers and incident numbers.

* Reports made to rental vehicle companies and a copy of their damage report.

Vehicle operators shall also

* Obey all applicable Provincial and local regulations concerning vehicle accidents, and notify the appropriate law enforcement authorities of the accident as soon as possible.

* Report to the Collision Reporting Centre for all motor vehicle accidents involving an injury or property damage that exceeds $700.

* Complete a DCC Accident Report and return them to the Safety Dept within three days. Faxed copies are acceptable until such time as the Senior Supervisor can review and sign the report.

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Following an accident involving a motor vehicle, the supervisor will conduct an incident analysis (as described in Section 4.4.3) and complete and return the standard DCC accident report to the HSE Manager.

4.6 Summary Reports

Accident summary reports on injuries, illnesses, and other loss producing incidents are completed by the HSE Manager in conjunction with the recommendations of the JH&SC. The Accident Summary reports are published with the monthly JH&SC minutes. The minutes are distributed to all yards, plants and job site locations. Foreman receive copies of the summary reports to share with the crew members as a weekly tailgate topic.

4.7 Responsibilities

4.7.1 Project Engineer

The Project Engineer is responsible for notifying the Safety Dept. of any incidents. The Project Engineer will begin the investigation process and complete the Company's accident report.

4.7.2 Superintendent

The Superintendent is responsible to ensure the accident scene is secured, that all sources of secondary accidents are mitigated. The Superintendent is responsible to ensure the Company's Emergency Response Plan is initiated. The Superintendent will oversee the accident investigation and ensure recommendations to prevent recurrence are adopted.

4.7.3 Safety Advisor

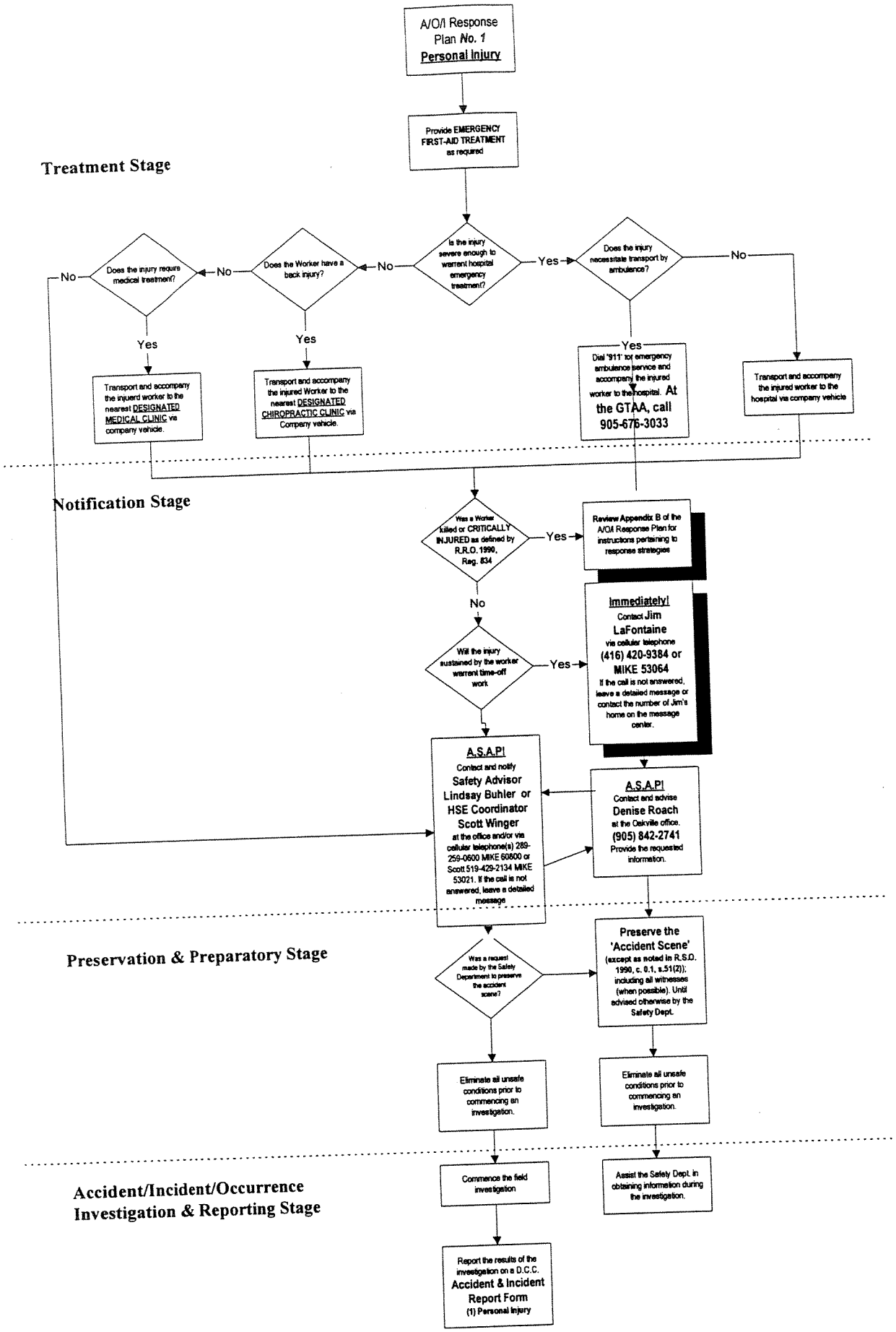
The Safety Advisor is responsible for:
* Reviewing the incident analysis report, giving careful attention to the judgments-of-needs

*Assessing the Analysis of Cause as per the SCAT Chart.

* Ensuring the recommended action plan is appropriate and personnel are assigned tasks to eliminate a recurrence.

* Sending copies of the incident analysis report to supervisor once the review is completed.
* Keeping the Incident Analysis Report Archive updated.

*Ensuring the action plan is implemented and verified during a follow-up audit.


A/O/I Response Plan No. 1
Personal Injury
Provide EMERGENCY FIRST-AID TREATMENT as required
Treatment Stage
Is the injury severe enough to warrant hospital emergency treatment?
Yes
No
Does the injury necessitate transport by ambulance?
Yes
No
Does the Worker have a back injury?
No
Yes
Does the injury require medical treatment?
No
Yes
Transport and accompany the injuerd worker to the nearest DESIGNATED MEDICAL CLINIC via company vehicle.
Transport and accompany the injured Worker to the nearest DESIGNATED CHIROPRACTIC CLINIC via Company vehicle.
Dial '911' for emergency ambulance service and accompany the injured worker to the hospital. At the GTAA, call 905-676-3033
Transport and accompany the injured worker to the hospital via company vehicle
Notification Stage
Was a Worker killed or CRITICALLY INJURED as defined by R.R.O. 1990, Reg. 834
Yes
Review Appendix B of the A/O/I Response Plan for instructions pertaining to response strategies
No
Will the injury sustained by the worker warrant time-off work
Yes
Immediately!
Contact Jim LaFontaine via cellular telephone (416) 420-9384 or MIKE 53064
If the call is not answered, leave a detailed message or contact the number of Jim's home on the message center.
A.S.A.P!
Contact and notify Safety Advisor Lindsay Buhler or HSE Coordinator Scott Winger at the office and/or via cellular telephone(s) 289-259-0600 MIKE 60800 or Scott 519-429-2134 MIKE 53021. If the call is not answered, leave a detailed message
A.S.A.P!
Contact and advise Denise Roach at the Oakville office. (905) 842-2741
Provide the requested information.
Preservation & Preparatory Stage
Was a request made by the Safety Department to preserve the accident scene?
Preserve the 'Accident Scene' (except as noted in R.S.O. 1990, c. 0.1, s.51(2)); including all witnesses (when possible). Until advised otherwise by the Safety Dept.
Eliminate all unsafe conditions prior to commencing an investigation.
Eliminate all unsafe conditions prior to commencing an investigation.
Accident/Incident/Occurrence Investigation & Reporting Stage
Commence the field investigation
Assist the Safety Dept. in obtaining information during the investigation.
Report the results of the investigation on a D.C.C. Accident & Incident Report Form (1) Personal Injury

Accident/Occurrence/Incident Questionnaire

_____
Date and Time of Notification

Health and Safety Department Initial Report

1. Name of Caller: _____
2. Location and telephone number where caller can be reached:
   a) Location: _____
   b) Telephone number: _____
   c) Radio call number: _____
3. Nature of Report:

☐ **Personal Injury:** _____ _____
Name of injured person Badge number

Will the accident result in Loss-time from work? *☐Yes ☐No
Will the accident result in a Possible Loss-time? *☐Yes ☐No
Did the accident result in critical injury or Death? *☐Yes ☐No

If Yes, have you followed the procedures outlined in Appendix E of the response plan manual ☐Yes ☐No

☐**Equipment/Vehicle Damage:** _____
Identity of Vehicle or Equipment

Will the value of damage likely be in excess of $2000.00? *** ** *☐Yes ☐No
NB: If theft of rental equipment cc: Colin Graham

☐**Utility:** _____
Type of Utility Damaged

Did the accident result in contact with hydro (v ≥ volts) or natural gas. *** *☐Yes ☐No
Will the value of damage likely be in excess of $2000.00?

☐**Misc. Damage or Loss:** _____
Nature of Damage of Loss

Will the damage/loss likely be in excess of $2000.00? *** *☐Yes ☐No

4. Identification of the other persons injured, or vehicle/utility/misc. equipment, loss or damage involved in A/O/I/ which was not noted in item 3.

Name	I.D. No.

DUFFERIN CONSTRUCTION COMPANY

690 Dorval Drive Suite 200, Oakville, Ontario L6K 3W7, Tel (905) 842-2741 Fax (905) 842-9278

ACCIDENT & INCIDENT REPORT FORM

Job #:	Location:					
Project Superintendent:	Foreman or Lead Hand:	Date & Time Of Occurrence	Day	Month	Year	Time

-The bracket number (#) accompanying the following types of accidents/incident corresponds to the relevant report section that must be completed.

Type of Accident /Incident					
	Personal (1) Injury ☐	Equipment (2) Vehicle damage ☐	Environmental (4) Damage ☐	Other Property (4) Damage ☐	Near Miss (1,2,3,4) ☐
	Occupational (1) Illness ☐	Utility Damage (3) ☐	Theft/Vandalism (4) ☐	Fire/Explosion (4) ☐	Other (4) ☐

(1) Personal Injury

Last Name:	First name:	Badge #:	Occupation:

Describe the Nature of the injury (i.e. Bruised, cut, sprained, strained etc.) and the bodily location(s) affected:

Indicate all area(s) of injury on the Accident/Incident Diagram Located Below:

What type of treatment was necessary?	First Aid:	Medical Treatment: →	Name of Hospital/Clinic: →	Name of Doctor:

Do you feel that the injuries sustained by the employee will result in loss of time from work? Yes ☐ No ☐

Do you feel that the injuries are work related? Yes ☐ No ☐

(2) Equipment/Vehicle Damage

A Dufferin Construction Vehicle & Mobile Equipment		B Other (3rd party) vehicle/equipment If additional vehicles were damaged, provide the following information for each vehicle on a separate sheet (post script # 1)	
Equipment #:	Year & Make:	Vehicle Make & Model year:	Estimate to Repair ($):
Serial #:	Lic #:	Serial #:	Vehicle Lic #:
Operators name:		Operator's/Owner's Name:	Address of Owner:
Operator's Lic #/Cert #:	Estimate to Repair ($):	Name of Insurance Company:	Insurance policy #:
Describe Damage(s) to Vehicle(s):		Describe Damage to other vehicles:	
		Were injuries sustained by the occupant(s) of the other vehicle Yes ☐ No ☐ Name: Address: Describe Injuries: 1. 2.	

Did the police investigate? Yes ☐ No ☐ If yes , provide the following:
Were charges laid? Yes ☐ No ☐
Police Report #:
Name of Police Officer:
Police Badge Number:
Detachment:

DUFFERIN CONSTRUCTION COMPANY

690 Dorval Drive Suite 200, Oakville, Ontario L6K 3W7, Tel (905) 842-2741 Fax (905) 842-9278

ACCIDENT & INCIDENT REPORT FORM

(3) Utility Damage

Utility Damaged:	Type of Utility: ☐ Overhead ☐ Underground, if underground was the utility hand located? ☐ Yes, if yes what went wrong? ☐ No, if no, why wasn't it? Provide your response in the **Analysis of Cause (Immediate Cause)** section of the accident report

Were utility locates obtained? Yes ☐ No ☐ if yes, complete the following section

Dufferin Construction employee who attended utility locate:	Date of Locate:	Locate #:

Was Dufferin Construction or a subcontractor's equipment involved in the utility damage?
Yes ☐ No ☐ if yes, complete all applicable questions of part A of the previous section **Equipment & Vehicle Damage**

Was the applicable utility notified of the damage Yes ☐ No ☐ if yes, complete the following questions

Time of Notification:	Time Arrived:	Duration of repair:	# of men & equipment involved with repair:

(4) Misc. Damage/ Loss

Damage miscellaneous equipment, material, or process which resulted in damage, failure loss, theft or spill:

_____

_____

_____

Witnesses

Witnesses to accident/incident:

Name:	Address:	Telephone #:
1.		
2.		

Accident / Incident Diagram

Accident Incident Diagram:

Indicate North

Indicate North
Plan View

Vehicle/Equipment References
Show Vehicle Position before
Show Vehicle Position after
Estimate Vehicle Speeds
Posted speed limit (km/hr)
Weather/Road Conditions

Personal Injury Diagram

NO PERSONAL INJURY

Circle or mark the corresponding injury locations

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ACCIDENT & INCIDENT REPORT FORM

Description of Accident / Incident

Description of Accident / Incident

Describe how the accident/incident had occurred, including what the employee and any others were doing or were attempting to do as well as who had assigned the work task and the job procedures used:

Do you have reason to dispute in whole or in part DCC's liability in respect to this accident?

Analysis of Cause

Immediate Cause:

What acts, failure to act or conditions contributed directly to cause this accident/incident?
Consider: equipment/material – such as improper tools used, defective or unguarded equipment, etc.
Work place – such as condition of the jobs site (slippery, muddy, cold, hot, rain, rough, unprotected, unshored, etc.)
Work task – such as housekeeping, not following procedures, position or posture, distraction, abuse, unauthorized action, etc.

1)

2)

3)

Basic Cause:

What specific personal or job factors caused or could cause this accident/incident?
Consider: personal work habits, training, safety promotion, practices and procedures, maintenance, etc.

1)

2)

3)

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ACCIDENT & INCIDENT REPORT FORM

Evaluation of Loss Potential if Not Corrected: to be completed by Operations Dept. Personnel

Accident/Incident Severity Potential

Major ☐ Serious ☐ Minor ☐

Probability of Recurrence

Frequent ☐ Occasional ☐ Seldom ☐

Recommended Managerial Control

Recommended Managerial Control: to be completed by or under the direction of the Project Superintendent.

Prevention

Action Plan: What has, will or should be done to prevent a similar accident/incident? (Number in sequence)

Consider and identity: specific action as well as changes management could initiate to prevent a similar occurrence.

Recommendation	**Action by**	**Date for completion**

Name of person completing this report _____ Foreman/Lead hand's Signature _____ Superintendent's signature _____ Date _____

Accident / Incident Analysis review

Accident / Incident Analysis Review (to be completed by Health & Safety Dept. Personnel **ONLY**)

Reviewer's reactions to the initial analysis of the basic and immediate causes of this accident/incident and the remedial actions directed at possible inadequacies in health & safety programs, its standards or compliance to established standards

DCC Accident (personal injury) Severity Index : _____

DCC SACA (injury) Cost : $ _____

Evaluation of Response, Investigation, Analysis and Reporting of Accidents and Incidents

Evaluation Factors

		Possible Points	Points Awarded
	Initial Notification		
1	Timeliness of initial verbal notification of accident/incident • Subtract 1 point for each additional hour.	5	
2	Accuracy and completeness of information provided during initial notification.	10	
	Investigation, Analysis and Reporting		
3	Timeliness of Investigation: • Was it completed within three days? • Deduct 4 points for each day beyond the third day.	15	
4	Basic and Personal Data • Is the information accurate and complete?	5	
5	Loss Severity and Recurrence Rate • Do evaluations accurately reflect the analysis of the accident?	5	
6	Description • Is there a clear step-by-step description of what happened? • Can you understand the full sequence reading this section alone? • Could you get a clear picture of what happened months later? • Was a comprehensive diagram included?	15	
7	Cause Analysis • Are immediate causes identified? • Are there basic causes for each immediate cause?	15	
8	Prevention • Are there remedial and corrective actions for each basic cause? (Score 0, if basic causes are not identified) • Is a person identified to act on each remedial and corrective action? • Is an implementation timetable identified for each remedial and corrective action?	25	
9	Signatures	5	

Comments:

Evaluator ☐ H&S Manager ☐ H&S Coordinator ☐ H&S Advisor

Appendix 2.4(g)(1)

Appendix 2.4(g)(1) - INTENTIONALLY DELETED

‘

Appendix 2.4(g)(3)

Appendix 2.4(g)(3) - Elements of the Project Specific Site Security, Public Safety and Emergency Response Plan

The Project Specific Site Security, Public Safety and Emergency Response Plan shall include, at a minimum, the following elements:

- Identification of all public safety hazards associated with the Site;
- Identification of all potential means of unauthorized access to the Site;
- Means for controlling access to the Site to authorized personnel;
- Identification of appropriate physical barriers (existing and new fences, security gates, signage, etc) to ensure that unauthorized personnel do not gain access to the Site and procedures for modifications to such barriers if same are ineffective in preventing unauthorized personnel from gaining access to the Site;
- Identification of the manner in which the Site will be monitored (cameras, patrols, etc);
- Identification of the manner and timing for reporting to OPG non-conformance with the Project Specific Site Security, Public Safety and Emergency Response Plan to OPG;
- Manner in which the Contractor will coordinate Site security, public safety and emergency response with the off-Site measures taken by OPG Niagara Plant Group; and
- Manner in which the Contractor will coordinate Site rescue methods with off-Site methods.

Appendix 2.4(m)

Appendix 2.4(m) - Designated Substances Present at Site

Silica and lead are present on the Site, as follows:

- Silica is present in the concrete at the INCW and the PGS Dewatering Structure and may be mobilized by the Contractor through concrete cutting, coring, demolition, etc.; and

- Lead may be present in lead-based coatings applied to handrails and embedded steel parts at the INCW and the PGS Dewatering Structure and may become mobilized through contractor operations such as sandblasting or saw-cutting these elements.

Appendix 2.5(a)(2)

Appendix 2.5(a)(2) - Outline Environmental Management Plan

[See attached]

Ontario Power Corporation Inc.

(OPG)

Niagara Tunnel Facility Project

Proposal No.: Tunnel Facility Project-001

Document: MH-10001-01

Outline of the Environmental Management Plan

August 11, 2005
Project No.: 1051006.00

MORRISON HERSHFIELD

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1.0 INTRODUCTION

1.1 BACKGROUND

In response to the Invitation to Submit Design/Build Proposals, dated December 22, 2004 (as amended February 1, 2005, March 7, 2005, March 21, 2005, April 15, 2005 and April 26, 2005), by the Ontario Power Generation (hereinafter referred to as "OPG"), STRABAG AG and it's sub-contractors (hereinafter referred to as the "Contractor") have developed this Outline Environmental Management Plan (OEMP). The OEMP is provided as required for the proposal submission for the Project.

The OEMP has been developed for the Niagara Tunnel Facility Project (hereinafter referred to as the "Project") as described in the Invitation to Submit Design/Build Proposals, the Draft Design/Build Agreement and associated appendices and amendments. The Contractor has developed the OEMP to meet or exceed the requirements of OPG.

The OEMP will provide the basis for the Environmental Management Plan to be provided to OPG after contract award within 60 days of signing the Design/Build Agreement.

1.2 OEMP OVERVIEW

1.2.1 Purpose/Objectives

The purpose of an environmental management plan is to provide the procedures that will take place during project design, construction and post-construction activities with respect to all issues related to the environment and environmental protection. Generally, these procedures and plans are based on:

- Project requirements;
- Regulatory and approval requirements;
- Government agency requirements;
- Public concerns; and,
- Guidelines and best management practices.

Specifically, the plans and procedures as outlined in this OEMP are based on the following:

- The requirements of the Niagara River Hydroelectric Development Environmental Assessment, dated March 1991 including update of July 13, 1992 and amendment dated June 3, 1993;
- The requirements of the Environmental Assessment Approval, dated October, 14, 1998;
- The requirements of Approvals obtained by OPG;
- The requirements of Approvals to be obtained by the Contractor;
- The requirements of the Draft Design/Build Agreement and associated appendices and amendments;
- The requirements of the Community Impact Agreement, dated December 22, 1993;

- The requirements and information outlined in the Environmental Approvals and Third Party Information dated March 2005;
- Plans submitted to OPG as outlined in this document and the Draft Design/Build Agreement;
- Applicable statutes, laws and regulations;
- OPG's Environmental Management System; and
- The requirements of federal, provincial and municipal government agencies.

The OEMP will describe the Project related environmental requirements, procedures to meet the requirements and compliance procedures that will be implemented by the Contractor. The OEMP demonstrates how the Contractor will ensure that all environmental requirements are met and how the Contractor will work in accordance with applicable statutes, laws, regulations, OPG policies, approvals, agency requirements and project documentation including the Draft Design/Build Agreement and the Community Impact Agreement. These will also be reflected in the management plans to be developed for Project implementation.

In order to ensure environmental protection and compliance, more specifically, the OEMP will meet the following objectives:

- Outline the environmental requirements for the Project;
- Develop management plans for activities that will occur in the Project area and during all phases of the Project to ensure environmental protection (natural and socio-economic);
- Will identify preliminary project environmental mitigation measures to support project engineering design and construction planning and incorporate these into the management plans and construction documents;
- Provide compliance procedures, (including design environmental audits, environmental inspection, environmental training, construction environmental audits, post-construction monitoring and environmental reporting);
- Provide the procedures for risk management and contingency plans for potential risks;
- Provide the management structure and staff qualifications for those responsible for the environmental management and compliance requirements; and,
- Provide reporting and communication procedures.

The information provided on the environmental management plans have been developed based on current best management practices and information in the Environmental Approvals and Third Party Information, dated March 2005. The information in the OEMP provides the Contractor with the scope and guiding principles of management plans throughout all project phases.

1.2.2 Process

The OEMP will provide the basis for the Environmental Management Plan (EMP) to be provided to OPG after contract award within 60 days of signing the Design/Build Agreement.

The individual management plans (e.g. Stormwater Management Plan, Excavated Materials Management Plan, etc) as required by the Project requirements, will be developed and provided as required during the Project design phase.

The EMP may require revision periodically throughout the project to accommodate new or amended legislation, industry standards, community concerns, or changes to the project's design or schedule. If revisions are made to a particular management plan, after the initial filing of the EMP, the revisions will be subsequently submitted to the applicable regulatory authorities upon OPG approval. Copies will be provided to interested parties on request. If, during the remainder of the planning period, concerns that are not addressed in this submission are brought to the attention of the Contractor and a revised management plan is required to address the concerns, the EMP will be revised.

If there are any changes to the Contractor's Environmental Management Plan, a Notice (as contained in Appendix A) will be provided to OPG. Prior to implementation of any change to the Environmental Management Plan, approval from OPG will be required.

1.2.3 Structure

The OEMP consists of eight sections and they are as follows:

- Section 1 provides an introduction to the OEMP outlining the purpose, objectives and structure of the OEMP and the Project requirements.
- Section 2 includes all the issues that require procedures and plans for management as required and as appropriate for environmental protection. It provides the information to be integrated into the management plans, specifically, what is required and how it is to be accomplished.
- Section 3 outlines the how the requirements of the Community Impact Agreement are to be met.
- Section 4 is the environmental compliance plan which describes the procedures that will be followed to ensure compliance with all Project related environmental requirements.
- Section 5 outlines the risk management procedures that will be undertaken by Project staff to flag any potential risks and mitigate the risks. It also provides potential risks and associated contingency plans based on Project information to date.
- Section 6 provides the management structure of the Project Team and Environmental Project Team and the roles and qualifications of the Environmental Project Team members.
- Sections 7 and 8 include the references and glossary, respectively.

1.3 PROJECT REQUIREMENTS

Prior to determining the plans and procedures for the OEMP, it is necessary to understand the requirements of the Project. These requirements are based on the information contained in the Invitation to Submit Design/Build Proposals and Draft Design/Build Agreement and associated appendices and amendments with reference to associated documentation including:

1. Niagara River Hydroelectric Development Environmental Assessment, dated March 1991 including update of July 13, 1992 and amendment dated June 3, 1993;
2. Environmental Assessment Approval, dated October 14, 1998;
3. *Fisheries Act* Authorization 5250-43;
4. Community Impact Agreement, dated December 22, 1993;
5. Environmental Approvals and Third Party Information; and
6. Applicable statutes, laws and regulations.

Table 1, Summary of Environmental Project Requirements provides the type of environmental requirement, refers to the specific source of the requirement and includes the general details of the requirement. In Table 1, the Project requirements are grouped into the following categories: statutes and agreements; plans and submittals; environmental protection; and, public and community.

Generally, the Project requirements are integrated into the design and the associated plans, programs, submittals, contract documents and approvals. These are then carried forth into the construction and post-construction activities where these requirements are monitored and inspected. Figure 1 depicts the environmental Project requirements process.

TABLE 1

Summary of Environmental Project Requirements

Environmental Requirement	Source of Requirement	General Details
Statutes and Agreements		
Applicable Laws	• Sections 2.5(a), 2.5(c)(1), 2.5(d)(1) & (3), 2.6(a) and 5.3 of the Draft Design/Build Agreement • Section 1.1.3(a) of Appendix 1.1 (rrr) – Summary of Work of the Draft Design/Build Agreement	• The Contractor will comply with applicable laws, regulations, guidelines, standards, specifications, manual and codes during all phases of the Project. • If there are any changes to these laws, standards etc., and any resulting change to the Project, then this change will be treated as a Project Change Directive.
Environmental Assessment and Approval	• Section 2.5(a)(2) of the Draft Design/Build Agreement • Section 2.1.1(a) of Appendix 1.1 (vv) – Owner's Mandatory Requirements of the Draft Design/Build Agreement • Section 1.1.3 (a) of Appendix 1.1 (rrr) – Summary of Work of the Draft Design/Build Agreement	• The Contractor will perform the work in a manner that ensures compliance with the Environmental Assessment dated March 1991 (including update of July 13, 1992 and amendment dated June 3, 1993) and the Approval dated October 14, 1998. In addition, the Contractor will comply with all environmental protection measures outlined in the Environmental Assessment dated March 1991, as appropriate.
Existing Approvals	• Section 2.5(2) of the Draft Design/Build Agreement • Section 2.1.1(b) of Appendix 1.1 (vv) – Owner's Mandatory Requirements of the Draft Design/Build Agreement • Sections 1.2.1(hhh) and 1.3.5 of Appendix 1.1 (rrr) – Summary of Work of the Draft Design/Build Agreement	• Contractor must comply with existing approvals or approvals obtained by OPG. These include Department of Fisheries and Oceans Authorization 5250-43. • The Contractor will support the Owner with respect to reporting requirements with existing approvals. • The Contractor will abide by all conditions of approvals.
Approval Acquisition	• Sections 2.5(2) and 2.6(b) of the Draft Design/Build Agreement • Sections 2.1.2 of Appendix 1.1 (vv) – Owner's Mandatory Requirements of the	• Contractor must obtain (in a timely manner before undertaking relevant element of work), pay for all associated expenses and comply with these approvals. These approvals include (but are subject to confirmation after initial consultation with all agencies and

Environmental Requirement	Source of Requirement	General Details
	Draft Design/Build Agreement • Sections 1.1.3(b), 1.2.1(b), 1.2.1(jjj) and 1.3.4 of Appendix 1.1 (rrr) – Summary of Work of the Draft Design/Build Agreement • Section 2 of Appendix 2.8(a) – Submittal Requirements of the Draft Design/Build Agreement • Section 13.1.2 of the Environmental Assessment	a determination of construction procedures): • *Transportation of Dangerous Goods Act* • Temporary Magazine License • *Lakes and Rivers Improvement Act* (Work Permit) • *Public Lands Act* (Work Permit) • *Ontario Water Resources Act* (Permit to Take Water, Section 53) • Ontario *Environmental Protection Act* (Certificates of Approvals for Air and Industrial, Waste Generator Number, Dust Suppressant License) • Niagara Peninsula Conservation Authority – Regulation 97/04 & 508/94 • *Niagara Escarpment Planning and Development Act* – Section 24 • Tree Cutting By-Law and other Municipal Approvals • Ministry of Labour – Notice of Project and Notice for Tunnels, Shafts, Caissons and Cofferdams • Written confirmation by OPG will be obtained for any approvals in the name of OPG. • Copies of all approvals will be provided to OPG prior to submission for review and copies of the final approvals will be provided to OPG. • The Contractor will support the necessary exemptions for navigation in the Niagara River, if required. • The Contractor will abide by all conditions of approvals. • The Contractor will provide all test data and results to meet the requirements of Approvals.
Agency Requirements	• Sections 2.5(b)(3), 2.5(c)(3), 2.5(d)(5) and 2.6(a) of the Draft Design/Build Agreement	• Should any communication (e.g. order, directive or notice) from a regulatory authority be sent to the Contractor, a Notice, as contained in Appendix A, will be provided to OPG.
Community Impact Agreement	• Section 2.5(a)(2) of the Draft Design/Build Agreement • Sections 1.1.3(b) and 1.2.1(iii) of Appendix 1.1 (rrr) – Summary of Work	• The Contractor will comply with the Community Impact Agreement. • The Contractor will support, develop and provide OPG with a citizen's complaints procedure with respect to construction activities carried out by the Contractor.

Environmental Requirement	Source of Requirement	General Details
	of the Draft Design/Build Agreement • Section 1.3.1 of Appendix 1.1 (rrr) – Summary of Work of the Draft Design/ Build Agreement which refers to EA Approval Condition Numbers 9.2 and 9.5 • Community Impact Agreement	• The Contractor will support OPG by providing data, information and attend meetings with respect to the Community Impact Agreement.
Plans and Submittals		
Outline Environmental Management Plan and Environmental Management Plan	• Sections 2.5(a)(3) & (4), 2.5(b)(1), 2.5(c)(2) and 2.5(d)(2) & (4) of the Draft Design/Build Agreement	• Contractor will comply with both the Outline Environmental Management Plan (OEMP) and Environmental Management Plan (EMP). The former will be provided for the proposal submission and the latter will be provided within 60 of the signing of the Design/Build Agreement. • A Notice (as contained in Appendix A) to OPG will be made if there are any changes to the EMP.
Erosion and Sedimentation Control and Stormwater Management Plan	• Sections 2.5(a)(5) & (6) of the Draft Design/Build Agreement • Section 1.3.1 of Appendix 1.1 (rrr) – Summary of Work of the Draft Design/Build Agreement which refers to EA Approval Condition Numbers 7.2(c) and 9.4 • Section 12.3 of the Environmental Assessment • Environmental Approvals and Third Party Information	• The Contractor will complete and provide erosion and sedimentation control and stormwater management plans, including restoration plans for all areas disturbed by the Contractor, based on OPG's "Erosion and Sediment Control During Construction Phase – Preliminary Requirements" dated December 2004 and MOE's memorandum dated December 22, 2004. • The plans will be provided to OPG for review and then for approval by MOE in consultation with the municipalities. • The Contractor will provide the information with respect to mitigative measures for soil erosion and stormwater runoff for the proposed construction and disposal areas, to be provided to the Niagara Peninsula Conservation Authority, MOE and other regulatory authorities.
Environmental Emergency Plan	• Sections 2.5(a)(5) & (6), 2.5(b)(2) and 2.5(d) of the Draft Design/Build Agreement	• Environmental Emergency Plan will be provided to OPG as a submittal. • The Contractor will anticipate, protect and plan for impacts to the

Environmental Requirement	Source of Requirement	General Details
		environment caused by spills. • A Notice (as contained in Appendix A) will be provided to OPG if a spill occurs. • The Contractor will meet all regulatory, government authorities and OPG requirements including spill prevention and clean-up.

Plan for Disposal of Excavated Material	• Section 2.5(c) of the Draft Design/Build Agreement
	• Section 3 of Appendix 1.1 (vv) – Owner's Mandatory Requirements of the Draft Design/Build Agreement
	• Section 1.2.1(cc) and (oo) of Appendix 1.1(rrr) – Summary of Work of the Draft Design/Build Agreement
	• Section 1.3.1 of Appendix 1.1 (rrr) – Summary of Work of the Draft Design/Build Agreement which refers to EA Approval Condition Numbers 2.3.1 and 3.1
	• Section 2 of Appendix 2.8(a) – Submittal Requirements of the Draft Design/Build Agreement
	• Environmental Approvals and Third Party Information
		• The disposal of any excavated material will be carried out in accordance with applicable laws, the EMP and any order, directive or notice from a government authority.
		• A storage pad will be used to store material suspected of containing benzene, toluene, ethyl benzene and xylene (BTEX). This material will be sampled and analyzed to determine appropriate management which is to be approved by applicable agencies. Runoff from this area and stockpile area will be treated, as required, prior to discharge. Approvals will be obtained for discharge to a watercourse.
		• The Contractor is required to install and manage a leachate collection and handling system, leachate treatment and disposal system at the excavated material storage areas.
		• The Contractor will sample excavated materials to determine if the Contractor has introduced contaminants. Material will be managed as required.
		• No excavated material shall be spilled in a watercourse.
		• The Contractor shall submit a Plan for the Disposal of Excavated Materials on OPG lands to the OPG and subsequently to MOE based on OPG's "Management of Excavated Material", dated December 2004.
		• Information in this plan will include:
		  • Arrangement and specifications of proposed material handling plan;
		  • Stockpile design and sequencing;
		  • Haul routes and other delivery systems;
		  • Mitigation measures to manage noise, dust, and other community

Environmental Requirement	Source of Requirement	General Details
		and environmental considerations, accordingly; and, • Confirmation that data confirming system will meet contract requirements.
Disposal Monitoring and Contingency Plan	• Section 2.5(c) of the Draft Design/Build Agreement • Section 3 of Appendix 1.1 (vv) – Owner's Mandatory Requirements of the Draft Design/Build Agreement • Section 1.3.1 of Appendix 1.1 (rrr) – Summary of Work of the Draft Design/Build Agreement which refers to EA Approval Condition Numbers 2.3.1 and 3.1 • Environmental Approvals and Third Party Information	• The Contractor will provide to OPG a disposal and contingency plan (no later than 6 months prior to commencement of tunnel construction) for the management of material (rock, soil, groundwater & surface water) contaminated and/or potential contaminated with BTEX. Impacts will be identified and mitigated accordingly. This plan will be based on OPG's "Management Plan for BTEX", dated December 2004 and MOE's requirements in their memoranda both dated December 2, 2004. • The plan will subsequently be provided to MOE and MNR for approval.

Blasting Plan	• Section 2.2.10 of Appendix 1.1 (vv) – Owner's Mandatory Requirements of the Draft Design/Build Agreement	• The Contractor shall ensure that all blasting is in accordance with NPC119, unless exceptions are obtained, and in accordance with DFO Authorization 5250-43.
		• The Contractor shall:
		  • Establish standard blast warning codes;
		  • Place notice of blasting in local papers;
		  • Develop and submit a protocol for informing affected residents, Niagara Parks Commission, Niagara Helicopters, Hydro One, Niagara Falls Bridge Commission, City of Niagara Fall and Town of Niagara-on-the-Lake of the blasting schedule;
		  • Review and accept results of the pre-blast and post-blast condition surveys;
		  • Monitor ground vibrations and peak particle velocity;
		  • Complete an assessment of effects to structures;
		  • Store blasting material in a designated magazine building;
		  • Complete a weekly audit of blasting material; and,

Environmental Requirement	Source of Requirement	General Details
		• Notify OPG of any missing blasting material. • The Blasting Plan shall be provided to OPG and subsequently to DFO.

Construction Effects of Tunnels and Shafts	• Section 1.3.1 of Appendix 1.1 (rrr) – Summary of Work of the Draft Design/Build Agreement which refers to EA Approval Condition No. 5.1
	• Environmental Approvals and Third Party Information
		• The Contractor shall provide documentation (to OPG for review and for approval by MOE in consultation with the Project area municipalities) of the construction and effects of the construction of the shafts and tunnels based on OPG's "Service Shafts and Tunnels", dated December 2004 and MOE's requirements in their memoranda dated December 7 & 3, 2004.
		• The information to be provided includes:
		  • Handling of groundwater inflow;
		  • Prevention of cross-contamination;
		  • Methods of sealing and maintaining shafts and tunnels;
		  • Nature and extent of slaking in the Queenston shale;
		  • Possible effects of groundwater chemistry on concrete grouting;
		  • Monitoring/maintenance program to verify tunnel/shaft integrity over time;
		  • Contingency plan to deal with possible cavern/tunnel/shaft seepage or failure; and,
		  • Soil and groundwater monitoring program.

Construction Documents	• Section 1.2.1(e) of Appendix 1.1 (rrr) – Summary of Work of the Draft Design/Build Agreement • Section 1.1.4 of Appendix 2.8(a) – Submittal Requirements of the Draft Design/Build Agreement	• The Contactor is responsible for developing the construction documents, including specifications and drawings and specific environmental procedures, prior to construction commencement. The construction documents will outline all of the required measures to implement during construction. With respect to the environmental component, these measures can include, for example, location, type and amount of environmental protection measures, waste quantities reporting requirements, methodology for performing in-water work, and restrictions for in-water work. The construction documents will be provided to OPG for approval.
Other Submittals	• Section 2 of Appendix 2.8(a) – Submittal	• The Contractor will provide to OPG copies of all notices, requests,

Environmental Requirement	Source of Requirement	General Details
	Requirements of the Draft Design/Build Agreement	documents, instruments and certificates from government agencies.
Environmental Protection		
Environmental Protection – General	• Section 2.5(a)(1) of the Draft Design/Build Agreement • Sections 2.2 of Appendix 1.1 (vv) – Owner's Mandatory Requirements of the Draft Design/Build Agreement • Sections 1.2.1(r) and (ww) of Appendix 1.1 (rrr) – Summary of Work of the Draft Design/Build Agreement • Section 1.1.5(a) of Appendix 2.8(a) – Submittal Requirements of the Draft Design/Build Agreement • Section 6 of the Environmental Assessment	• The Contractor will perform work in a manner that protects health and the environment. • The Contractor will implement environmental protection measures required by the Draft Design/Build Agreement and as required by applicable law. • The Contractor will maintain environmental protection measures until later of the Final Completion Date and any date established in any approvals or applicable laws. • The Contractor will provide the specific environmental protection measures for all construction methods.
Air Quality	• Sections 2.5(a), 2.6(a) and 5.3 of the Draft Design/Build Agreement • Section 6.1.2.1(a) of the Environmental Assessment	• The Contractor shall ensure that air quality issues, including dust and air emissions, meet regulatory and agency requirements.
Aquatic and Terrestrial Resources	• Sections 2.5 and 2.6 of the Draft Design/Build Agreement • Sections 2.2 and 6.4.1 of Appendix 1.1 (vv) – Owner's Mandatory Requirements of the Draft Design/Build Agreement • Section 1.3.1 of Appendix 1.1 (rrr) – Summary of Work of the Draft Design/Build Agreement which refers to EA Approval Condition Numbers 7.2 (a) & (c)	• The Contractor shall ensure that the environment is protected; Woodlands Reserve Area and meadow are protected; trees are flagged and approved by owner prior to cutting and clearing; and, grubbing shall not take place between May 1 and June 15. • The Contractor shall remove the rock plug from the PGS canal as per Section 6.4.1, Owner's Mandatory Requirements. • The Contractor shall provide information on the effectiveness of proposed mitigation measures and contingency plans to deal with potential TSS loadings in the Niagara River and SAB2 Canal and the erosion and sediment control and stormwater management plans that

Environmental Requirement	Source of Requirement	General Details
	• Sections 6.1.2.2 and 6.1.2.3 of the Environmental Assessment	include restoration plans for all areas disturbed by the Contractor. These will be provided to OPG for review and then for approval by MOE in consultation with the Project area municipalities.
Waste Management	• Sections 2.5(a)(6) & (7) and 2.5(c) of the Draft Design/Build Agreement • Sections 1.2.1(s) and (bb) of Appendix 1.1 (rrr) – Summary of Work of the Draft Design/Build Agreement	• The Contractor is responsible for the transport, storage and disposal of hazardous and non-hazardous waste. • The Contractor will not dispose of hazardous waste under, over or near any property owned, leased or licensed by OPG or its subsidiaries, but to an off-site location(s). • The Contractor will use all reasonable efforts to reduce, reuse and recycle non-hazardous waste. • The existing in-river accelerating wall will be demolished and disposed of off-site by the Contractor at a location acceptable to OPG.
Noise	• Section 2.2.8 of Appendix 1.1 (vv) – Owner's Mandatory Requirement of the Draft Design/Build Agreement • Section 3.1(d) of Appendix 1.1 (rrr) – Summary of Work of the Draft Design/Build Agreement • Section 6.1.2.1(a) of the Environmental Assessment	• The Contractor shall ensure that noise levels are in accordance with MOE Publication NPC 205, unless exceptions are otherwise obtained. • The Contractor will meet the more stringent requirements of the Niagara Falls Noise Control By-Law 2004-105, MOE Publication NPC 05 or truck traffic to and from the Site at the intake area shall not take place on Sundays unless noise at sensitive receptors are mitigated to OPG's and MOE's satisfaction.
Hydrogeology	• Section 1.3.1 of Appendix 1.1 (rrr) – Summary of Work of the Draft Design/Build Agreement which refers to EA Approval Condition Number 4.1 and 4.2 • Environmental Approvals and Third Party Information	• The Contractor will complete groundwater mapping showing the groundwater flow patterns in the various formations prior to, during and upon completion of the tunnel. This will be done to a 1 km radius of the tunnel alignment. It will be provided to OPG for review and then to the MOE in consultation with the associated area municipalities. OPG will install the groundwater monitoring wells in consultation with the Contractor (Section 1.3.2.1(b) of Appendix 1.1 (rrr)). • The Contractor will provide support to OPG in implementing the Groundwater Monitoring Program dated November 19, 2004 completed by Jagger Hims Limited and subsequently approved by

Environmental Requirement	Source of Requirement	General Details
		MOE.
Archaeology/Heritage	• Section 2.15(j) of the Draft Design/Build Agreement	• If an artifact is uncovered during construction the artifact is the property of OPG and the Contractor will take all reasonable precautions in ensuring that the artifact is not removed by unqualified personnel and that OPG is informed of the finding of the artifact.
Designated Substances and Hazardous Materials	• Sections 2.4 (m), 2.5(a)(6) and 2.20(o) of the Draft Design/Build Agreement	• Contractor is solely responsible for designated substances brought onto the site, shall remove all designated substances prior to Project completion and shall not incorporate designated substances into the permanent facilities. • Hazardous materials brought on site must conform to OPG's HAZMAT approval material list.
Remediation/ Restoration	• Section 2.2.5 of Appendix 1.1 (vv) – Owner's Mandatory Requirements of the Draft Design/Build Agreement • Section 1.2.1(bbb) of Appendix (rrr) – Summary of Work of the Draft Design/Build Agreement • Section 1.3.1 of Appendix (rrr) – Summary of Work of the Draft Design/Build Agreement which refers to EA Approval Condition Number. 7.2(c) • Section 12.3 of the Environmental Assessment	• The Contractor will restore all areas of the Site disturbed by the Contractor to pre-project conditions. • The Contractor will provide restorations plans (with the erosion and sedimentation control plan) to OPG for review and then for approval with MOE in consultation with the Project area municipalities.
Public and Community		
Construction Impacts on the Community	• Section 1.1.3(e) of Appendix 2.8(a) – Submittal Requirements of the Draft Design/Build Agreement	• The Contractor will identify the construction impacts on the community for each applicable element of the Summary of Work and provide mitigative measures.
Public Consultation and Public Relations	• Section 2.15(d) of the Draft Design/Build Agreement • Community Impact Agreement	• The Contractor will support OPG in the providing information and attending meetings of the Neigbourhood Advisory Committee.

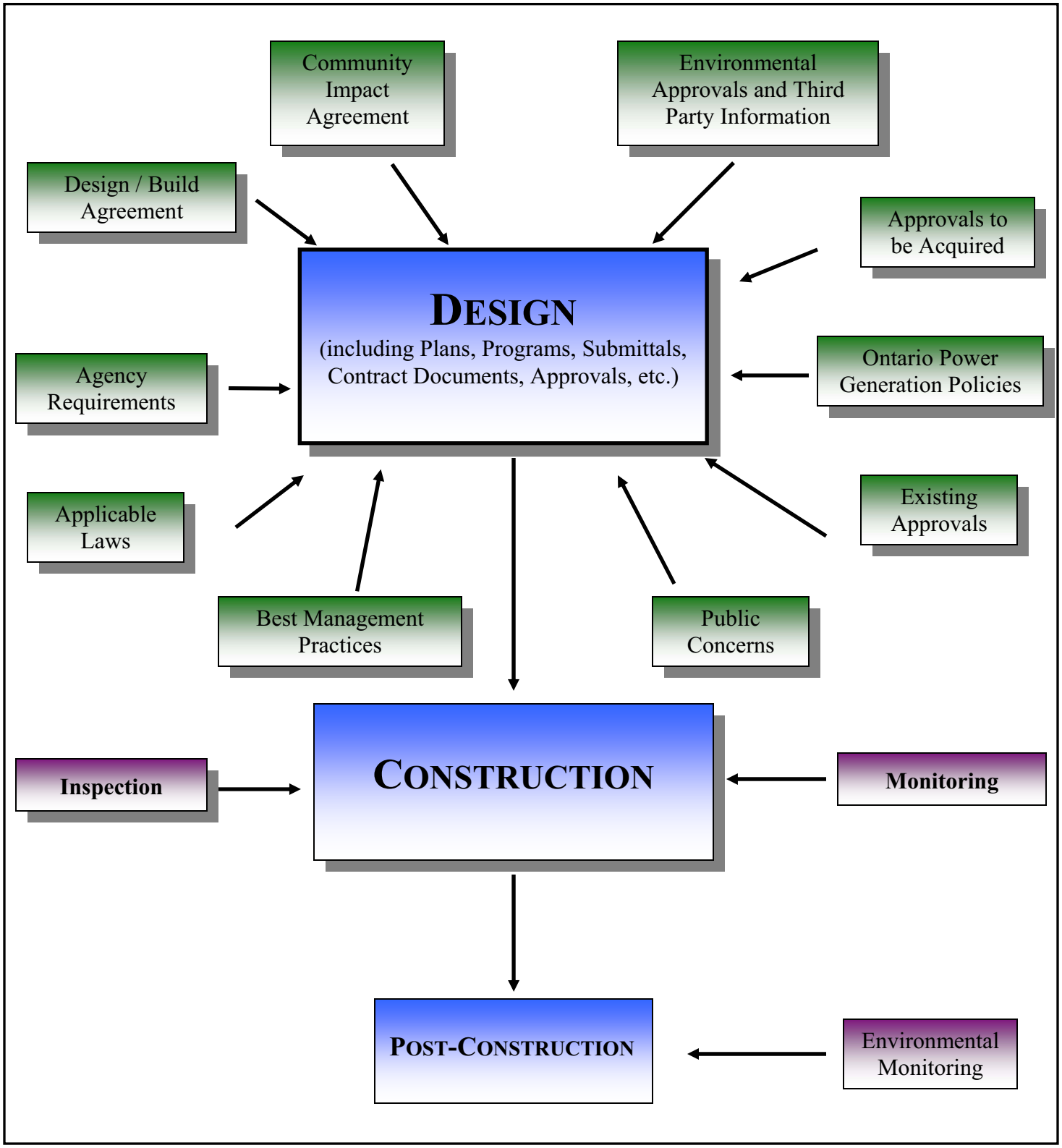


Figure 1: Environmental Project Requirements Process

2.0 ENVIRONMENTAL MANAGEMENT

The information contained in this section will provide the basis for the Plans to be submitted to OPG, as required for Project construction or to aid the Contractor in meeting the Project requirements and schedule. Since the information required to complete these Plans will be determined during the design of the Project, the Plans will be provided to OPG once the required information has been determined. The Plans to be completed are:

- Approvals Acquisition Plan
- Environmental Protection Plan
- Water Withdrawal Plan
- Erosion and Sedimentation Control and Stormwater Management Plan
- Water Management Plan – Intake
- Water Management Plan – Outlet
- Blasting Plan
- Excavated Materials Management Plan
- Construction Effects of Tunnel and Shafts Management Plan
- Environmental Emergency Plan
- Hazardous Waste Management Plan
- Non-Hazardous Waste Management Plan
- Air Quality Management Plan
- Noise Management Plan
- Archaeology Resource Management Plan
- Public Consultation Plan

The Environmental Compliance Plan for the Project is contained in Section 4, below.

2.1 APPROVALS

2.1.1 Existing Approvals

Scope/Requirements

The Contractor will comply with approvals that have previously been obtained by OPG. These are as follows:

1. *Environmental Assessment Act* (Ontario), Approval dated October 14, 1998;
2. International Niagara Diversion Treaty;
3. *Navigable Waters Protection Act;* and,
4. *Fisheries Act*, Authorization 5250-43 and Amendments.

The information to ensure compliance with existing approvals is contained in Section 4, Environmental Compliance Plan, below.

The Contractor is required to complete or support OPG in completing several conditions associated with the Environmental Assessment Approval. The required action for these is contained throughout the Outline Environmental Management Plan and as outlined in Table 1 above.

With respect to the *Fisheries Act* Authorization 5250-43 and associated amendments, the Contractor will:

- Provide a Blasting Plan;
- Provide an Erosion and Sedimentation Control and Stormwater Management Plan (including cofferdam installation and removal methodologies) based on OPG's "Erosion and Sediment Control During Construction Phase – Preliminary Requirements" dated December 2004 and the Ministry of the Environment's memorandum dated December 22, 2004;
- Remove (alive) and transport fish trapped in the dewatered areas of the intake to an appropriate area in the Niagara River;
- Ensure that any water discharged to a water body meets agency and regulatory requirements;
- Ensure that any excavated material, waste (solid and liquids) and construction materials do not enter a water body;
- Implement all mitigation measures to the satisfaction of Fisheries and Ocean's Canada and Ontario Ministry of Natural Resources; and,
- Notify and discuss any changes to the construction of the Project that could impact fisheries resources with Fisheries and Oceans Canada and Ontario Ministry of Natural Resources.

2.1.2 Approval Acquisition

Scope/Requirements

Table 2, Legislative Approvals, (contained in Appendix B), provides the list of potential approvals required for the Project to be obtained by the Contractor during the life of the Project. This list is based on the list of approvals provided in Table 13-1 of the Environmental Assessment dated March 1991 and in Table 1.1B in Appendix 1.1(rrr) – Summary of Work of the Draft Design/Build Agreement. Based on current Project information, information has been obtained on changes to legislation and on new applicable legislation. The requirements for approvals related to these statutes have also been determined and noted in Table 2. The approvals to be acquired are as follows:

- Transportation of Dangerous Goods Act - Permit
- Temporary Magazine License
- Lakes and Rivers Improvement Act – Work Permit
- Public Lands Act – Work Permit
- Ontario Water Resources Act – Permit to Take Water and Certification of Approval under Section 53
- Environmental Protection Act – Waste Generation Number, Certificate of Approval (Air), Certificate of Approval (Industrial Sewage Works) and Dust Suppressant License
- Niagara Peninsula Conservation Authority – Regulation 97/04 & 508/94

- Explosives Act
- Canada Shipping Act – Barge Permit
- Navigable Waters Protection Act – Non-Navigable Water Permit
- City of Niagara Falls - Site Alteration Application
- Regional Municipality of Niagara Falls – Sewer Use By-Law
- Ministry of Labour – Notice of Project, Notice of Project – Part Project, Notice Under Diving Regulations and Notice for Tunnels, Shafts, Caissons and Cofferdams

After initial consultation with the regulatory authorities after contract award, all required approvals will be confirmed. An approval under the *Canadian Environmental Assessment Act*, is not considered as part of this Project as stated in OPG's Response to Proponents Questions 3, dated April 15, 2005.

With respect to the Environmental Assessment Approval, OPG is responsible for meeting the conditions and obtaining respective approvals. The Contractor is responsible for either finalizing the required documentation and support the acquisition of the approvals or providing data and information for the documentation. The following lists the approvals where the Contractor has the above noted responsibilities:

- Plan for Disposal of Excavated Materials
- Disposal Monitoring and Contingency Plan
- Construction Effects of Tunnels and Shafts Management Plan
- Erosion and Sedimentation Control Plan

The Contractor will provide a Blasting Plan to meet the requirements of the *Fisheries Act* Authorizations to be approved by Fisheries and Oceans Canada.

Further details on each of these is provided in the following respective sections.

Approval Acquisition Plan

In order to ensure that environmental and other approvals are obtained in a timely manner so as not to impact any aspect of the Project schedule, an Approvals Acquisition Plan is being advocated. This Plan will involve:

- Discussions with all participating regulatory authorities;
- Detailed consultation with OPG; and,
- Detailed consultation related to the specific Project schedule requirements of the Contractor (subconcontactors and others performing the work).

Thereby, it is the intention to accommodate all reasonable requirement related to the many approvals required to facilitate the work.

To facilitate this process, it is suggested that an Approvals Task Force be formed jointly with OPG, the Contractor and participating regulatory authorities. Since both OPG and the Contractor have responsibilities for approvals, it is also suggested that regular monthly meetings

are held between OPG's environmental team and the Contractor's environmental team to ensure frequent dialogue, to ensure various aspects are understood and to ensure that the approvals are continually moving forward.

An Approvals Acquisition Plan, including a schedule, will be developed by the Contractor. The schedule will be developed based on "best efforts" by the Contractor, since the Contractor is not responsible for the time required by the agencies to review and provide approval. The Plan will be developed in conjunction with OPG and regulatory authorities to devise a realistic schedule for approval acquisition. The Contractor will act in good faith to facilitate the Plan to meet the Project schedule.

If, however, during implementation the Approvals Acquisition Plan proves not to be feasible, through no fault of the Contractor, and therefore could impact the Project schedule, the Contractor will request OPG and the regulatory authority to revise the Plan accordingly. This may or may not require a revision to the overall Project schedule.

The basis of the Approvals Acquisition Plan will be to schedule the approvals based on:

1. The time required by the agency,
2. The time needed to obtain the required information, and
3. The date the approval is required for construction.

Table 2, in Appendix B contains the approximate length of time required by the regulatory agencies to provide the approval based on preliminary discussions with the agencies. During the initial stages of the design phase of the Project, discussions with the relevant regulatory authorities will further take place to confirm the requirement for the approvals and the time required by the agencies to provide the approval. The Plan will be revised accordingly so that the Project schedule will not be impacted or if impacted, the impacts are minimized to the best extent possible.

The Contractor will assemble all information that is required for the approvals. OPG shall provide copies of and/or access to all documentation referenced in the Niagara River Hydroelectric Development Environmental Assessment, dated March 1991, related to the proposed generation facilities and any other documentation related to the Project. Additional information will be provided by the Contractor. All approval applications and associated documentation will be provided to OPG for review prior to submission to the appropriate agency.

Upon receipt of the approval, the Contractor will provide a copy of the approval, including any imposed terms and conditions, to OPG. The Contractor will complete all testing and monitoring requirements, as outlined in the approvals, which are the responsibility of the Contractor. All results will be provided to OPG and the appropriate agency.

The Contractor will invite OPG to all meetings with the agencies. Notification of meeting with regulatory authorities to OPG will be made no less than 48 hours before the scheduled meeting. Any approvals that will remain in place after construction must have input from OPG, as approval conditions may impact OPG.

Agency approval is also required for various plans and other submittals that are Project specific. These include, for example, Citizen's Complaints Procedure, the Erosion and Sedimentation Control and Stormwater Management Plan, Plan for Disposal of Excavated Material, etc. In addition, it is anticipated that there will be requirements stipulated by regulatory authorities from the federal, provincial and municipal governments, that are not required under an approval but are as a result of their jurisdictional and statutory responsibilities. Since regulatory authorities have responsibility for various legislation and regulations, to ensure compliance, they typically provide related requirements and/or recommendations related to environmental protection.

2.2 ENVIRONMENTAL PROTECTION PLAN

2.2.1 Scope/Requirements

Through all phases of the proposed Project there is potential to negatively affect the natural environment. The Environmental Protection Plan will assist project planning and execution so that negative impacts to the natural environment are prevented or controlled. The plan will incorporate and address regulatory requirements, which will guide the decision-making process for natural environmental resource management.

The guiding principles used to develop the Environmental Protection Plan include:

- Meeting or exceeding all existing regulatory standards and requirement of regional stakeholders;
- Meeting or exceeding the requirements as outlined in the Environmental Assessment and approvals; and,
- Implementing best practices in environmental protection.

The Contractor will perform all work in a manner that protects the natural environment. The Contractor will also work in accordance with applicable laws, regulations, approvals and agencies requirements, including, those regulatory authorities responsible for air quality and aquatic and terrestrial resources (e.g. Fisheries and Oceans Canada, Ontario Ministry of the Environment, Ontario Ministry of Natural Resources and Niagara Peninsula Conservation Authority).

The Environmental Protection Plan includes environmental protection measures related to the atmospheric, aquatic, terrestrial and socio-economic environments and includes a restoration plan. The Contractor will provide the specific environmental protection measures, will identify the impacts on the community and provide mitigative measures for all construction methods. The environmental protection measures outlined in Sections 2.2.2 to 2.2.5 below, are primarily based on those provided in the Environmental Assessment and Environmental Assessment Approval and from the industry's best management practices. These measures may change during the design (after consultation with government agencies and after approvals are acquired) and construction of the Project and will be revised accordingly. These protection measures will also be translated into the Plans (e.g. Erosion and Sedimentation Control and Stormwater Management Plan, Water Management Plans, Waste Management Plans, etc.) and construction documents and drawings for the Project.

The Environmental Protection Plan will also include measures to ensure adequate containment in areas where oil leeks, spillage, and other contaminant concerns are likely to occur during normal operations and maintenance. In addition to protection measures, the Plan will include guidelines and designated areas for maintenance activities. These designated areas will be as far away from watercourses as possible and performed on impermeable surfaces with contained boundaries, if possible. All refuelling procedures will take place away from watercourses and in a safe fashion to reduce the likelihood of a spill. All refuelling and maintenance trucks will be equipped with spill clean up materials. All construction equipment will be in good working condition in order to reduce any release of fuels, grease or lubricants.

Since information on the atmospheric, terrestrial and aquatic environments for the Project were completed around 1990, it is necessary to update or "ground truth" some of this information. It is anticipated that only the terrestrial environment, related to flora and fauna, may have changed since this time. Therefore, during the design phase, the Contractor will update the information on the terrestrial environment in areas where they will be disturbed (e.g. construction storage areas, excavated material storage area, retention pond area, etc.). The results, including any changes, will be documented. An assessment will be completed to determine the impacts of any such changes. This information will then be utilized when developing the plans and construction documents. The verification and assessment procedure will be performed by biologists with experience in completing terrestrial investigations. This will ensure that the appropriate environmental protection measures will be included in the construction documents and subsequently in place during construction. Any significant changes will be reported to OPG.

During construction, monitoring of environmental protection measures will be completed. See Section 4.3 below on construction phase environmental inspection.

2.2.2 Atmospheric Environment

The following table, Table 3, provides the proposed preliminary mitigation measures (based on information in the Environmental Assessment and on to-date design information) to be implemented during construction to protect air quality and the atmospheric environment.

Table 3
Proposed Mitigation Measures to Protect the Atmospheric Environment

Issue	Proposed Mitigation
Air Quality – Dust Emissions	• Dust suppressants will be employed where necessary to reduce emissions from construction areas, roadways and the disposal of excavated material. • Air quality will be monitored, if required, for dust and total suspended solids. Mitigation would include altering material handling processes and restricting vehicle/equipment movements. • Tarpaulins will be installed on trucks. • Suitable dust suppressant equipment will

Issue	Proposed Mitigation
	be available at all times.
Air Quality – Natural Gas Emissions	• Air monitoring will be undertaken and the tunnel ventilation system improved accordingly to ensure worker safety.
Air Quality – Exhaust Emissions	• Equipment will be in good working condition in order to reduce emissions impacting air quality.

2.2.3 Aquatic Environment

The following table, Table 4, provides the proposed preliminary mitigation measures (based on information in the Environmental Assessment and on to-date design information) to be implemented during construction to protect the aquatic environment.

Table 4
Proposed Mitigation Measures to Protect the Aquatic Environment

Issue	Proposed Mitigation
Increased level of suspended solids due to in water work.	• Control gates will be closed during blasting and excavation to permit settling at the intake. • Rock plug will be used to prevent entry of rock and fines into the water at the outlet. • The installation of silt curtains for the construction and removal of cofferdams and construction of the dock at the intake.
Increased level of suspended solids due to earth works or runoff.	• Erosion and sediment control measures will be consistent with the Ontario Ministry of Transportation procedures for highway construction and Ontario guidelines for erosion and sediment control at urban construction sites. • Erosion and sediment control measures include, but are not limited to: provision of vegetative cover, slope modification, runoff controls, rock flow check dams, vegetated buffer strips, straw bale flow checks, and silt fence barriers. • Sites will be monitored to minimize potential releases to the aquatic environment. • Standby treatment and disposal measures will be provided for water unsuitable for release. • Ditches between the excavated material

Issue	Proposed Mitigation
	area and the SAB Canals will be constructed and seeded. • Straw bale flow checks will be installed within ditches every 250m and/or before any culvert or intersecting ditch. • Rock flow check dams will be installed in ditches where slopes are greater than 10%. • Stand by supply of silt fence barrier and other environmental protection measures will be maintained throughout the duration of the Project.
Increased level of suspended solids due to discharge of water from retention ponds.	• Treatment/filtering to reduce the discharge of solids in receiving water, in accordance with applicable regulatory requirements. • Monitoring is proposed to ensure suitability of water being discharged from retention ponds to the SAB2 Canal.
Accidental release of fuels, lubricants, solvents, paints, other chemicals or construction materials or wastes.	• Provision of containment where hazardous materials are sorted or handled. • Spills response procedures, contingency planning and emergency response training, and the provision of appropriate equipment for effective emergency response. • Proper treatment and disposal of any spilled materials. • Maintenance and refueling of equipment to be completed in a designated area at least 30m from any water body.
Effects on fish due to blasting.	• Use of a fish deterrent device (acoustic control) will be used to protect fish in the intake channel during blasting, as required. • Complete blasting in accordance with DFO's "Guidelines for Use of Explosives in Canadian Fisheries Waters", *Fisheries Act* Authorization 5250-43 and associated amendments and the Contractor's Blasting Plan.
Increased level of suspended solids and aquatic environment disruption due to removal of rock plugs.	• The rock plugs will be removed by blasting in such a fashion that the plug and associated debris falls into the new tunnel outlet area, away from high velocity areas, encouraging solids to settle out.
Debris in water during intake construction operations.	• Measures will be implemented to ensure that debris is not released downstream of

Issue	Proposed Mitigation
	the Niagara River during the intake construction operations. • Should debris be released accidentally, it will be removed.
Contamination of groundwater from rock storage area.	• Impervious membrane will be installed at the rock storage area for excavated material suspected of being contaminated with BTEX.
Soil erosion from construction works yard and stormwater	• Interceptor drains will be placed around parking areas and roadways to prevent water/soil draining into watercourses. • A minimum 15 m buffer strip will be provided between roadways and power canals.

Erosion and sediment control measures such as silt fence barriers, straw bale flow checks, and sandbag flow checks must be installed, maintained and removed in such a manner as to protect the adjacent watercourses. The following information on the installation of these measures was obtained from Ontario Provincial Standard Specification 577 "Construction Specification for Temporary Erosion and Sediment Control Measures". Schematics of these erosion and sediment control measures are found in Appendix C.

The erosion and sediment control measures shall be installed such that:

- The control measure is adequately supported to ensure that there is no overflow;
- The passage of sediment through or under the barrier is prevented;
- The control measure support is always attached to the upstream side of the control measure;
- Soil scour and erosion is minimized (place additional protection against the downstream side, at the lowest point);
- Multi-component control measures (such as straw bales, sandbags) have no gaps between the pieces and they are placed tightly together; and
- A 2 m end-run angled upstream is placed to direct runoff to the main-run of the barrier.

The erosion and sediment control measures shall be maintained such that

- All control devices are effective, functioning and in stable condition;
- They are vertical, without tears or sagging;
- They are without holes, etc.

Sediment removal will be completed as part of required maintenance. The removal of accumulated sediment will not cause sediment to escape to the downstream side of the control measure. The sediment will be removed to the grade existing when the control measure was installed.

The control devices will only be removed once all work in the area and/or restoration activities are complete. All accumulated sediment must be removed prior to control measure adjustment and/or removal. The control measure will be removed through the use of hand-held equipment in a manner that prevents the release of sediment and any debris to any watercourse.

During the removal of the accelerating wall, no fines are expected to be found or released. The accelerating wall will be removed in such a way as to ensure that material will not be conveyed downstream. If material is unintentionally released, it will be retrieved.

The construction and demolition procedures for the cofferdam will be such that fines released will be limited. The cofferdam cells will be used to filter out sediment when the cofferdam is initially dewatered and when any dewatering is required from the cofferdam during the construction of the intake.

2.2.4 Terrestrial Environment

The following table, Table 5, provides the proposed preliminary mitigation measures (based on information in the Environmental Assessment and on to-date design information) to be implemented during construction to protect the terrestrial environment.

Table 5
Proposed Mitigation Measures to Protect the Terrestrial Environment

Issue	Proposed Mitigation
Wildlife displacement and breeding disruption.	• Clearing operations will be timed to reduce the potential for fauna mortality or breeding disruption. • Clearing and grubbing activities will be limited to times outside of May 1 to June 15 to accommodate the main bird nesting and raising period. • Construction staff will be advised to avoid sensitive areas such as Smeaton Cove, Dufferin Islands and the main construction yard woodlot.
Clearing of vegetation within construction areas	• Areas of preservation will be identified, such as the woodlot within the construction area. • A minimum 10 m buffer zone will be established around these sites; fencing may be used if necessary. • Trees will be identified, by an arborist, for removal, replanting and relocation. • The amount of vegetation cleared will be minimized. • Following construction, disturbed areas will be restored according to the approved

Issue	Proposed Mitigation
	restoration plan.
Damage to vegetation adjacent to construction area	• Where appropriate, an adequate buffer zone will be identified and fenced, if necessary.
Soil compaction	• Vehicles will be restricted to designated routes. • Compacted soils will be loosened following construction.

2.2.5 Socio-Economic Environment

The protection of the socio-economic environment includes that of archaeology, heritage, resource use, local roads and traffic. The following table, Table 6, provides the proposed preliminary mitigation measures (based on information in the Environmental Assessment and from to-date design information) to be implemented during construction to protect the socio-economic environment.

Table 6
Proposed Mitigation Measures to Protect the Socio-Economic Environment

Issue	Proposed Mitigation
Recreational boating in the upper Niagara River in the vicinity of the International Niagara Control Works (INCW)	• Posted signs discourage boating in the vicinity of INCW. • Additional signage will be installed to ensure no accidental entry into construction area, particularly during blasting.
Dirt and debris from construction activities, including despoiling of scenic features at the intake area	• Painted hording will enclose the works yard and will be maintained and landscaped appropriately. • Roads used by construction vehicles will be regularly maintained to manage dirt and debris deposited by these vehicles. • Material piles with the potential to become wind blown will be covered, as required, and dust suppressants will be used where feasible. • Drilling and blasting will be carried out according to procedures used to minimize dust emissions.
Damage to archaeological and heritage resources	• The undisturbed area, designated as a prehistoric archeological site, will be marked and preserved as a natural area. • Fencing will be placed, if required, to restrict access. • If archaeological resources are found during construction, the OPG will be

Issue	Proposed Mitigation
	notified and a qualified archaeologist will be contracted to remove the artifact accordingly. • The artifact is the property of OPG and the Contractor will advise workers accordingly.

2.2.6 Restoration Plan

The Contractor will develop a Restoration Plan detailing the rehabilitation of all disturbed areas to conditions prior to the commencement of construction. The information in the Restoration Plan will also be contained in the Erosion and Sedimentation Control and Stormwater Management Plan, as required. The Restoration Plan aims to:

- Stabilize all disturbed areas;
- Reduce disturbance of the surface soil and ground cover vegetation;
- Reduce the loss of nonrenewable resources, such as surface soil and granular material;
- Reduce long-term erosion of excavated material stockpile area;
- Reduce the loss of soil quality;
- Minimize the use of fertilizer;
- Encourage and facilitate the natural recovery of native plants;
- Encourage and facilitate the establishment of self-sustaining native plant communities;
- Establish species that provide erosion control and do not interfere with existing or proposed end land use;
- Avoid introducing weeds and invasive species; and,
- Remediate (decontaminate), if required.

A stable ground surface will be established by implementing suitable construction and restoration techniques throughout construction, including:

- Grading selectively;
- Providing temporary cover in areas of concern;
- Establishing erosion and drainage control structures; and
- Revegetating most disturbed areas.

With respect to the excavated material stockpile area, after all material is in place, 100mm of topsoil will be placed and appropriate grass mixture applied and trees and shrubs planted. Inspections will be completed to ensure that vegetation is successful. If it is not, it will be reapplied. There is speculation that the excavated material may have a high salt content, which can impede seed growth. The restoration efforts will be monitored and mitigation will be applied if there are any issues with the revegetation of this area.

2.3 WATER MANAGEMENT

2.3.1 Scope/Requirements

To meet regulatory and Project requirements with respect to water management, individual management plans will be developed. These encompass issues related to the management of groundwater, surface water and stormwater and water withdrawal within general and specific areas of the Project. These include:

- Water Withdrawal Plan
- Erosion and Sedimentation Control and Stormwater Management Plan
- Water Management Plan – Intake
- Water Management Plan – Outlet

The guiding principles used to develop the water management plans include:

- Meeting all applicable regulatory standards regarding water use and disposal;
- Meeting Project requirements; and
- Implementing best practices in water management.

Specifications for the management of water will be incorporated in the contract documents and drawings for the Project. All water management plans and associated measures to protect the environment will be inspected to ensure compliance and to protect the environment during construction. See Section 4.3 below for information on the construction phase environmental inspection.

2.3.2 Water Withdrawal Plan

As part of the design phase, water requirements for various components and activities associated with construction, drilling, blasting, operations and maintenance will be detailed. Subsequent engineering analysis will refine water requirements and attempt to reduce the total water demand for the project through re-use and recycling.

Water may be required for the following project activities:

- Water required to maintain haul roads (dust suppression),
- Water required for construction activities; and,
- Water for drilling and blasting operations.

Water will be sourced from existing municipal services, groundwater or the SAB2 Canal. The suitability of water source intake location, from a regulatory perspective, will be determined before locations are finally selected. Unless permission is otherwise granted, all water sources will meet regulations related to water use under the *Ontario Water Resources Act* (Government of Ontario 1999) and the Ontario *Environmental Protection Act*.

As required, a Permit to Take Water, under Ontario Regulation 387/04 of the *Ontario Water Resources Act,* with the Ontario Ministry of the Environment will be obtained.

The water withdrawal points, including amounts, will be monitored during use to ensure withdrawal rates do not exceed approved guidelines and permit requirements.

Water trucks will deliver water as required. Alternatively, surface pipelines might be used to transport water from the waterway to the adjacent project site. Details of onsite water storage will be refined as part of the design phase.

2.3.3 Erosion and Sediment Control and Stormwater Management Plan

During the design phase of the Project, the Contractor will develop an Erosion and Sedimentation Control and Stormwater Management Plan based on OPG's "Erosion and Sediment Control During Construction Phase – Preliminary Requirements" dated December 2004 and MOE's memorandum dated December 22, 2004. The Plan will include the intake and outlet construction area, excavated material disposal area(s) and any other areas disturbed during construction. This will also include a sediment control plan for in-water work and restoration plans for all disturbed areas.

The Erosion and Sedimentation Control and Stormwater Management Plan will provide the proposed mitigation measures to ensure environmental protection. These measures and the Plan will be consistent with the Ontario Ministry of Transportation procedures for highway construction, Ontario guidelines for erosion and sediment control at urban construction sites, provincial stormwater management guidelines and best management practices.

With respect to stormwater management, the Plan will include:

- Measures to prevent negative impacts to the natural environmental features and receptors;
- Measures to control surface runoff;
- Measures to manage surface runoff including the collection and disposal of runoff;
- Snow and ice management; and
- Measures to prevent the contamination of runoff (including snow and ice).

Direct surface runoff into watercourses will not be permitted and as such mitigation measures will be put in place which can include a collection system to direct runoff to retention ponds for treatment, erosion and sedimentation control measures or, as is planned at the INCW area, the stormwater runoff will be emitted to sewers if the runoff quality meets the sewer use by-laws. The retention ponds will promote the settling of suspended solids and the reduction of contaminants to ensure that water discharged from the pond meets the requirements of the Provincial Water Quality Objectives and the conditions of the Certificate of Approval, prior to discharge. Water from the ponds will only be discharged if the total suspended solids effluent limit of 15 mg/L has been met.

Stormwater and effluent from the excavated material area and rock (which is potentially contaminated with BTEX) storage pad will be directed towards the retention pond. Prior to discharge to the SAB2 Canal, sampling and analysis will be completed. The parameters to be analyzed will be based on requirements of the Ontario Ministry of the Environment. The results will be compared with the Ontario Ministry of the Environment's "Guideline for Use at Contaminated Sites in Ontario" (February 1997) and Regulation 153 of the Ontario

Environmental Protection Act to determine treatment requirements. Treatment will be completed, if required, prior to discharge.

Where material suspected of being contaminated with benzene, toluene, ethyl benzene and xylene (BTEX), will be analyzed and sent to the treatment facility for treatment prior to discharge.

Examples of mitigation measures include: the installation of silt fence barriers between the excavated material area and the SAB Canals; construction and seeding of ditches between the excavated material area and the SAB Canals; installation of straw bale flow checks every 250m in the ditches and/or before any culvert or intersecting ditch; and, rock flow check dams in ditches with a slope of greater than 10%. Schematics of erosion and sedimentation control measures are contained in Appendix C.

To ensure the effectiveness of the erosion and sediment control devices, regular and detailed inspection must be performed. The Erosion and Sedimentation Control and Stormwater Management Plan will outline the inspection frequency and requirements. Also included in the Plan are the details for the rehabilitation of all disturbed areas, including aquatic areas to conditions prior to the commencement of construction. The restoration plan will use native species and will require input from all relevant agencies.

The information in the Erosion and Sedimentation Control and Stormwater Management Plan, Plan for Disposal of Excavated Material and Water Management Plans for the intake and outlet areas will be integrated due to common issues in these plans.

The complete Plan will be submitted to OPG for review and subsequently to applicable agencies (e.g. Ontario Ministry of the Environment, Ontario Ministry of Natural Resources and Niagara Peninsula Conservation Authority) for approval. No related construction activities will commence until these approvals have been acquired.

2.3.4 Water Management Plan – Intake

During the design phase, the Contractor will develop a Water Management Plan for works associated at the intake area, which aims to ensure that all surface water discharged from the site meets the effluent criteria established by the Ministry of the Environment. A value added design approach will be used to minimize the amount of water requiring treatment by strategically identifying waste and material storage locations, in relation to surface runoff patterns.

The Contractor will submit a Water Management Plan for works associated at the intake area, which collects and treats, if required, runoff and which manages water during construction operations at the inlet, including cofferdam installation, operation and removal, tunnel construction, acceleration wall removal and construction and dock construction. The runoff shall include all water used in various construction processes, including equipment washing. The Plan will also provide the methodology for managing water within the cofferdams and provide measures to ensure that release of the water within the cofferdams do not negatively impact the water resources. The Plan will include a monitoring process, involving sampling and analysis, to ensure that the effluent meets all discharge criteria prior to release. If the surface water tested meets criteria detailed in the Region of Niagara sewer use by-law, then permission will be

obtained to direct the treated runoff into the sewer system. If the sewer use-bylaw criteria are not met, the management plan must outline what measures will be taken to meet the criteria or propose alternate disposal methods. Any off-site disposal of surface water will be appropriately documented by the Contractor using disposal records and manifests, as required.

The Plan will also address snow and ice management such that the melt water does not flow directly into adjacent watercourses or excavations. Prior to the start of daily activities the Contractor is required to remove snow and ice from work areas and place in an approved location. The stockpiled snow and ice will be surrounded with silt fence in an area graded to facilitate collection of the melt water.

The Erosion and Sedimentation Control and Stormwater Management Plan and Plan for Disposal of Excavated Material will be coordinated with the Water Management Plan for the intake area to ensure that they complement each other and provide an integrated approach to identify responsible and economically viable protection measures.

2.3.5 Water Management Plan – Outlet

During the design phase, the Contractor will develop a Water Management Plan to primarily address the dewatering of the tunnel excavation and outlet area. All discharges from the excavations will be pumped into retention ponds. The retention ponds will have an Ontario Ministry of the Environment Certificate of Approval prior to entering into service. Sampling of the discharge will be completed in accordance with the Certificate of Approval.

The groundwater from the tunnel will be conducted through pipes to the surface and then to the retention ponds and the water treatment plant. During the TBM drive in the decline, the water will be collected behind the cutter head and pumped to the retention ponds. After passing the tunnel low point, a sump pump will be installed with pumps and float switch to ensure that all water will be pumped to the treatment plant. A permanent dewatering station will be established near the outlet area with adequate placement of monitoring wells.

In the retention ponds, the water treatment takes place. The treatment will depend on the content of solids, chlorides and sulphate concentration as well some metals, ammonia, calcium, fluoride and phosphate.

The tunnel water treatment plant consists of a Svedala Lamella Clarifier/Thickener (or similar) with sufficient capacity in combination with a series of two or more ponds. The clarifier is the primary means of treatment and includes oil skimmer, neutralization and flocculation device. The ponds are providing contingency for any flows in excess of the clarifier's capacity.

The Plan will also include a monitoring protocol, which will involve sampling and analysis to ensure that the water quality meets the mandatory discharge criteria. The plan will be submitted to OPG and will subsequently be submitted to the Ontario Ministry of the Environment, Ontario Ministry of Natural Resources and the Niagara Peninsula Conservation Authority for comment and/or approval. Regulatory authorities and OPG will have site access to permit periodic sampling and testing of the water.

Prior to discharge, the effluent will be sampled and analyzed. Based on existing information (as outlined in Condition 4.2(e) of the Environmental Assessment Approval) and to be confirmed by the Ontario Ministry of the Environment, the effluent will analyzed for: general chemistry, major anions and cations, metals, volatile organic compounds and other organics includes polyaromatic hydrocarbons, pesticides and PCBs. The monitoring program will be based on the assumption of a one-week turnaround time for receipt of the test results from the laboratory. Subsequently the retention ponds will be designed with adequate storage capacity to ensure water can be held until receipt of the test results. The chemical analysis results will be compared to the Provincial Water Quality Objective to determine if treatment is required. If treatment is required, the effluent will be directed to the treatment facility.

Effluent from the rock storage area, which contains the potential contaminated rock, will be conveyed across the SAB2 Canal to the retention ponds. The effluent from the retention ponds, after sampling, analysis and treatment, if required, will be discharged to the SAB2 Canal.

In addition, the Contractor has the responsibility of preparing and submitting the required documentation and obtaining the related approvals, as outlined in the Environmental Assessment Approval Condition Nos. 4.1 and 4.2. The required documentation will include groundwater mapping prior to, during and upon completion of the tunnel construction, within 1 km radius along the tunnel alignment, with detailed mapping for specific areas of concern.

The Contractor will provide support to OPG in implementing the Groundwater Monitoring Program dated November 19, 2004 completed by Jagger Hims Limited and subsequently approved by MOE. The work will be completed by an outside nominated sub-consultant.

The groundwater will be monitored in various bedrock units within a one kilometer radius of the tunnel alignment, with emphasis placed on the tunnel incline and decline areas. The various geologic formations in the area will have specific monitoring requirements, such as:

- Lockport Formation – monitoring only within the incline and decline areas
- Grimsby and Whirlpool Formations – monitoring within the outlet area (northern decline) and intake area
- Queenston Formation – limited monitoring near the tunnel incline and decline areas

All groundwater monitoring wells will be tested for general chemistry parameters, major ions and metals. Two samples will be taken from each well and analyzed for volatile organic compounds (VOCs). Wells completed within the Lockport Formation will have two additional samples taken to be analyzed for other organics (polyaromatic hydrocarbons, pesticides and PCBs).

2.4 BLASTING MANAGEMENT

2.4.1 Scope/Requirements

The Contractor will provide OPG with a Blasting Plan which will comply with the following:

- "Guidelines for the Use of Explosives in Canadian Fisheries Waters", Fisheries and Oceans Canada;
- DFO *Fisheries Act* Authorization 5250-43;
- NPC 119 as applicable unless exceptions are obtained; and
- Section 2.2.10 of Appendix 1.1 (vv), Owner's Mandatory Requirements of the Draft Design/Build Agreement.

Specifications for blasting will be incorporated into the contract documents for the Project.

The Blasting Plan will be provided to OPG for review and subsequently to DFO to meet the requirements of the *Fisheries Act* Authorization 550-43.

2.4.2 Blasting Plan

The Contractor will prepare a Blasting Plan which will include the:

- Details of all blasting activities and operations;
- Mitigation strategies;
- Development of standard blast warning codes;
- Details of the ground vibration monitoring program during all blasting activity; and
- Development of a protocol for notification to affected residents.

During construction, monitoring of environmental protection measures and all other associated Blasting Plan measures will be completed. See Section 4.3 below on construction phase environmental inspection.

2.5 EXCAVATED MATERIALS MANAGEMENT PLAN

2.5.1 Scope/Requirement

The Contractor will prepare an Excavated Materials Management Plan based on OPG's "Management of Excavated Material" dated December 2004. It will be developed during the design phase, which details the storage requirements, testing requirements (if necessary), treatment methods (if required), transportation, and disposal method. Every effort will be made to attempt to profit from the reuse of the excavated material. However, contaminated material may pose a problem due to the natural occurrence of BTEX in the shale formations within the Niagara region. A Disposal Monitoring and Contingency Plan will be prepared to manage this potentially contaminated material based on OPG's "Management Plan for BTEX" dated December 2004 and MOE's memoranda both dated December 2, 2004. Any contaminated excavated material will be appropriately stored, treated and disposed of in the most economically feasible fashion.

The specification of these two plans will be incorporated into the contract documentation and drawings for the Project. During construction, monitoring of environmental protection measures

and all other excavated materials management plan measures will be completed. See Section 4.3 below on construction phase environmental inspection.

2.5.2 Plan for Disposal of Excavated Material

As part of the Plan for Disposal of Excavated Material, procedures related to the management of material suspected of being contaminated will be provided. This will include segregation and storage, sampling and analysis and final disposal locations. These procedures will be in accordance with the Ontario *Environmental Protection Act*, Ontario Regulation 153/04 and the Ontario Ministry of the Environment's "Guideline for Use at Contaminated Sites in Ontario" (February 1997). If any material is found to be contaminated, the Contractor will notify OPG.

The excavated material is to be stored between the two SAB canals, no closer than 10m from the canals. All stockpiles will be positioned such that they do not block access to existing or planned transmission towers and lines. Specifically, the stockpiles will be located no closer than five metres from existing or planned transmission towers and overhead lines.

Where a surge pile or stockpile is located at the outlet area, including the designated disposal site, any runoff from the surge pile or stockpile shall be directed to a water treatment facility (i.e., retention ponds). Prior to discharge from the retention pond(s), the water must be sampled and tested to ensure that the water quality meets the acceptable effluent criteria.

The excavated material will be stockpiled using best practices to ensure compaction and slope stability. The Contractor will construct stockpiles such that they are stable on the underlying foundation material with side slopes not steeper then two horizontal to one vertical. Any contaminated material will be stored on a liner system, designed and inspected by a licensed Geotechnical Engineer, to minimize the downward movement of contaminants.

Upon completion of the work, the Contractor will ensure that the surface of the stockpile is generally level with the maximum difference in surface elevation, over any part of the stockpile, of one metre. The stockpile will be graded smooth and crowned sufficiently to promote drainage to the edge of the stockpile. The toe of the stockpile will not encroach on any elevation lower than one hundred and eighty metres and be no closer than twenty metres at any point from the edge of the existing canals. All permanent stockpiles will be revegetated to reduce the impact of erosion.

The Plan will be submitted to OPG for review and subsequently filed with the Ontario Ministry of the Environment.

During construction, the requirements of the Plan will be monitored. See Section 4.3 below on construction phase environmental inspection.

2.5.3 Disposal Monitoring and Contingency Plan

The intent of the Disposal Monitoring and Contingency Plan is to ensure that the natural environment is protected from negative impacts of the storage and disposal of the contaminated material. If negative impacts are identified, mitigation measures will be proposed and implemented. Specifically, areas requiring remediation will be rehabilitated to meet the soil,

groundwater, and sediment standards of Ontario Regulation 153/04 of the Ontario *Environmental Protection Act*. The groundwater remediation will meet the criteria for non-potable groundwater for industrial land use sites, contained in Table 3 of the Ontario Ministry of the Environment publication entitled: *Soil, Groundwater and Sediment Standards for Use Under Part XV.I of the Environmental Protection Act* (Government of Ontario).

The Plan will include the baseline groundwater conditions in the disposal areas and details regarding drainage plans for groundwater and surface water in final disposal areas. This Plan will also outline the protocol for: sampling and analysis of the excavated material, storage, removal, transportation, determination of final destination, the actual destination of the excavated material, and reporting.

Contaminated material shall be stored in a segregated area at the northeast end of the main disposal site. A perimeter drain leading to a retention pond will be installed to redirect contaminated runoff for testing and treatment, if required. Subject to Ontario Ministry of the Environment approval, the retention pond will be discharged provided the suspended solids concentration is less than 15 mg/L, pH is within 6.5 to 8.5, and the Provincial Water Quality Objectives are met. If the runoff exceeds these requirements, arrangements will be made for off-site disposal (i.e., wastewater treatment plant) or further on-site treatment (i.e., aeration).

Sampling of the water within the retention pond will be performed at several locations and depths within the pond for verification purposes. The retention pond will be designed to:

- Accommodate storm events;
- Have volume control capabilities;
- Limit the potential for sediment resuspension;
- Permit maintenance monitoring and sediment sampling; and
- Permit sediment cleanout.

The specific details of the permanent disposal site and retention ponds will be finalized by the Contractor and submitted to OPG at least six months prior to the commencement of tunnel construction. Tunnel excavation will not commence until the Ontario Ministry of the Environment and the Ontario Ministry of Natural Resources have approved this Plan.

During construction, the requirements of this Plan will monitored. See Section 4.3 below on construction phase environmental inspection.

2.6 CONSTRUCTION EFFECTS OF TUNNELS AND SHAFTS MANAGEMENT PLAN

2.6.1 Scope/Requirements

The Contractor will provide further details on the construction effects of tunnels and shafts based on OPG's "Service Shafts and Tunnels" dated December 2004 and MOE's memoranda dated December 3 & 7, 2004. The Plan provides the documentation on the construction effects of tunnels and shafts by providing a plan on managing groundwater inflow, sealing, slaking and

tunnel integrity. It also provides monitoring and contingency plans for tunnel integrity and possible seepage/failure and for the monitoring of soils and groundwater.

The Contractor's Plan will be provided to OPG and then subsequently for approval to the Ontario Ministry of the Environment and the Ontario Ministry of Natural Resources in consultation with the Regional Municipality of Niagara, City of Niagara Falls and the Town of Niagara-on-the-Lake.

2.6.2 Documentation of Construction Effects

The Contractor is responsible for providing detailed documentation on the construction and effects of the shafts and tunnels. The Contractor will provide this information based on studies related to:

- Handling of groundwater inflow;
- Prevention of cross-contamination;
- Methods of sealing and maintaining shafts and tunnels;
- Nature and extent of slaking in the Queenston shale and possible effect of slaking on tunnel integrity; and
- Possible effects of groundwater chemistry on concrete grouting.

2.6.3 Monitoring Plan

Prior to construction, the Contractor provide the details of the monitoring plan to examine the construction effects of the tunnels and shafts. The monitoring plan shall ensure that the following is developed and implemented as required.

- A monitoring maintenance program to verify tunnel/shaft integrity over time;
- A contingency plan to deal with possible cavern/tunnel/shaft seepage or failure; and
- A soil and groundwater sampling program to determine the quality and quantity of material that may require special handling, dewatering, storage or treatment.

The latter will be provided in the Water Management Plan – Outlet and Excavated Materials Management Plans, as outlined above in Sections 2.3.5 and 2.5 respectively.

2.7 ENVIRONMENTAL EMERGENCY PLAN

2.7.1 Scope/Requirements

An Environmental Emergency Plan (EEP), which meets regulatory requirements, will be developed before construction for all storage, handling and transportation of controlled or hazardous materials. The EEP will provide the appropriate procedures in the event of a spill or other environmental emergencies. The planning of emergency measures makes it possible to reduce the impacts, losses and damages caused by accidental spills. The EEP outlines prevention measures, response plans, on-site equipment, reporting, containment and clean up. The management structure for environmental emergency responsibilities and training requirements are also defined.

The EEP addresses various emergency situations, including, but not limited to: flooding, fuel spill, and hazardous materials. The response procedures, contained in the EEP, will be determined for all possible environmental incidents related to this Project and associated activities that will ensure protection of the environment and human health. The EEP and its implementation will comply with the Ontario *Environmental Protection Act* and all other appropriate related legislation and regulations.

If a notice, directive, order or other communication related to an environmental emergency by a regulatory authority to the Contractor, a Notice, as contained in Appendix A, will be provided to OPG.

The Contractor's Site Offices will be provided with a copy of the EEP and all required emergency and reporting personnel phone numbers. The EEP will also be part of the training requirements for all construction site personnel.

The EEP will serve to augment and work in conjunction with the Project Emergency Response Plan. The EEP is a part of the Project Emergency Response Plan. The requirements of the EEP will be incorporated into the contract documentation.

2.7.2 Environmental Emergency Plan

The following provides the elements of the EEP.

Notification and Reporting

If an accidental release of controlled or hazardous material occurs, the worker present during the release will make an immediate report to their supervisor and Project Manager. The Project Manager or Environmental Manager will notify in a timely manner the Ontario Ministry of the Environment, Spills Action Centre, unless the spill is exempt under Ontario Regulation 675/98 of the *Environmental Protection Act*s, as follows:

- Class I – Approved Discharges – Certificate of Approval has been obtained and complied with
- Class II – Water from Reservoirs and Water Mains – exempt completely
- Class III – Household Fires – Not applicable to the Project
- Class IV – Planned Spills – Must apply for exemption approval 15 days in advance of activity resulting in a planned spill, such as maintenance of equipment
- Class V – Refrigerants – Quantity of the spill is less than 100 kilograms
- Class VI – Motor Vehicles – Quantity of spill is not more than 100 litres of fluid, other than fluid transported as cargo, from the fuel system of other operating system of a motor vehicle. Exemption applies provided the spill does not enter and is not likely to enter watercourses; does not cause any adverse effects; and remediation is carried out immediately.
- Class VII – Electrical Utilities – Quantity of spill is not more than 100 litres of mineral oil from electrical transformers or capacitors. Exemption applies provided the spill does not enter and is not likely to enter watercourses; does not cause any adverse effects; and remediation is carried out immediately.

- Class VIII – Petroleum Sector – Spill of a fluid petroleum product at a dispensing outlet of not more than 100 litres in an area restricted from public access or not more than 25 litres in areas with public access. Exemption applies provided the spill does not enter and is not likely to enter watercourses; does not cause any adverse effects; and remediation is carried out immediately.
- Class IX – Transportation of Dangerous Goods – Exempt from reporting applies if quantity is less than the amount requiring reporting in the Transportation of Dangerous Goods Regulations under the *Transportation of Dangerous Goods Act, 1992* (Canada). Also the exemption only applies provided the spill does not enter and is not likely to enter watercourses; does not cause any adverse effects; and remediation is carried out immediately.

Release reports will be documented and maintained in order to comply with and support spills that are exempted from reporting. If the spill is not exempt, documentation of the spill will also be completed. Reporting includes the date, time, location and duration of release; type of emission/pollutant; amount released; circumstances that caused the spill; details of clean-up; method used to dispose of pollutant; any adverse effects; and, notification procedures completed.

If required, fire, ambulance or police will be contacted if the emergency is such that there are potential risks to humans.

Initial Response

If a spill of a substance occurs, the first person on the scene will:

1. Do an initial assessment to identify imminent danger;
2. Restrict site access if there are dangers to human health;
3. Identify the material spilled and verify the nature of the hazard using Material Safety Data Sheets, and implement applicable safety procedures;
4. Cut off the source of the spill, if possible, and if safe to do so;
5. Control danger to human life, for example, by removing ignition sources, if possible, without further assistance;
6. Immediately obtain the assistance of others and begin to contain and clean up the spill; and,
7. Notify the Project Manager or Environmental Manager who will ensure that relevant regulators and affected residents are notified.

Personal protective equipment (PPE) shall be worn by those responding to the spill. The type of PPE will be based on the type and expected concentrations of the contaminants and the routes of exposure.

When notified of a spill, the Environmental Manager will immediately ensure that:

1. Action is taken to control danger to human life and the environment;
2. An on-site safety supervisor is designated/notified;
3. OPG's management personnel are contacted and given details of the spill;

4. If a risk to the public exists, the applicable local authorities (i.e. fire, ambulance and/or police) are notified; and
5. The necessary equipment and personnel are mobilized, and measures are implemented to contain the source of the spill and commence cleanup.

The Contractor will make all suitable equipment available to contain and cleanup the spill.

Once the emergency contacts are made and initial efforts to contain and cleanup the spill are underway, the Environmental Manager will again notify OPG's management personnel and the applicable government agencies.

Spill Containment Procedures

Response personnel will start containment measures immediately to limit the spread of the spill and to reduce danger to the public and impacts on areas of environmental concern, such as waterbodies, and to prevent damage to property. The following steps might also be taken:

- If the spill source is a leaking fuel truck, pump the fuel tank dry into suitable containers or another tank;
- Block potentially affected culverts to limit spill travel;
- Excavate a shallow depression or construct a surface berm in the path of the spill to stop and contain the flow;
- If feasible without unduly delaying containment efforts, remove surface material and store it separately during excavations;
- Apply sorbent materials to contain and cover small volumes of petroleum products; and
- Collect all spilled petroleum product and transport it to an approved waste disposal facility, to the extent practical.

Spill response equipment will be kept on site at all times. Where fuel is stored and dispensed, a commercially available kit for a 40 gallon spill will be kept. These typically include: oil socks, oil pads, pillow, disposable material contaminant bags, latex gloves, granular absorbent and 55 gallon capacity polyethylene salvage drum. For sites within 30 m of a water body, the kit shall include absorbent boom supplies.

Spills Adjacent to or into a Waterbody

If a spill occurs adjacent to, or into a waterbody, response personnel might take the following steps:

- Construct berms or trenches to contain the spilled substance before it enters a waterbody, where practical;
- If the spill is sediment, stop work that is causing the sediment to be released and implement mitigation measures (see Section 2.7.2.5 below);
- Recover free (liquid) petroleum products to the extent practical;
- Clean up contaminated areas, including downstream shorelines, in consultation with spill response specialists and the applicable government agencies; and

- Notify all applicable regulators and potentially affected residents immediately that a spill has occurred adjacent to or into a waterbody.

Siltation of Aquatic Resources

Excessive amounts of silt in a water body caused by construction activities is considered to be a spill. Erosion and sediment control are imperative for addressing instances of siltation of aquatic resources. The following section outlines the procedures to prevent erosion of soils by water and the siltation of watercourses.

Erosion control measures will be implemented, as required, to control water erosion of soils. If erosion is evident, or the potential for erosion is high, the following measures might be implemented progressively, or individually, as required.

- Remove the remaining loose surface material and store it away from the area to be regraded;
- Install temporary berms of subsoil, logs, timbers or sandbags during construction;
- Implement one, or a combination of, the following mitigation measures:
  - Armour the upslope face of berms with geotextile, logs or sandbags;
  - Import small diameter slash, then roll back and walk down with tracked equipment;
  - Apply erosion control matting, mulch or tackifier to hold the soil;
  - Install sediment traps at the discharge points of cross ditches and berms;
  - Install page wire, silt fencing, or both to trap or direct surface water flow; and
- Re-establish vegetation as soon as ground and weather conditions permit.

The Contractor will notify applicable government agencies, as required.

Sediment control measures as outlined in Section 2.3.3, Erosion and Sediment Control and Stormwater Management Plan, and will be implemented as standard environmental protection measures. If an extreme precipitation, stream flow event or other circumstance occurs that renders the existing sediment control measures inadequate, the following measures might be implemented individually or progressively, as required:

- Prohibit the operation of construction equipment close to the banks of watercourses where there is a risk of bank sloughing, bridge failure or flooding of the work area;
- Excavate cross ditches to divert runoff away from the watercourse;
- Construct berms of subsoil, timber, sandbags or rock on approach slopes, banks, or both, to divert surface water flow off construction areas onto well-vegetated lands, where practical;
- Place sandbags strategically to help stabilize and add height to banks, to prevent flooding of nearby areas, especially where vegetation has been removed; and,
- Install page wire, silt fencing, or both, to trap and divert surface water flow from construction areas onto well-vegetated lands.

The Contractor will notify applicable government agencies, as soon as feasible, that contingency measures have been implemented.

Spot Spills

A spot spill is a spill that involves a small quantity of contaminant over a small, isolated surface area. In the event of spot spills, response personnel might take the following steps:

- Ensure that the most suitable method to remove or reclaim contaminated soils is determined;
- Ensure that response personnel will reduce impacts from small spills by taking immediate action, clean up all spot spills immediately and follow suitable materials handling procedures;
- Report to Project Manager, Environmental Manager and to OPG's representative; and,
- Ensure that response personnel flag locations where spot spills have occurred and that the environmental staff records them for future attention during post-construction monitoring.

Reclamation

Site reclamation after a spill has occurred might include the following, as applicable:

- In situ reclamation will only be conducted if approved by OPG and applicable government agencies;
- Following laboratory analysis of contaminants, if required, remediation and final cleanup will be conducted in consultation with the applicable regulatory agencies;
- Documentation for the spill will include a sketch with dimensions showing the spill location and a report describing the type of spill, cause of the spill and the cleanup and reclamation procedures undertaken;
- Used sorbent material will be disposed of at an approved hazardous waste treatment facility, as required;
- For oil spills, attempts will be made to restructure the soil by adding fibre and incorporating it into the surface soil, where practical. Acceptable fibrous materials include local peat and wood shavings;
- Fertilizer might be applied to the site at a rate and formulation suitable for site conditions; and
- The spill area will be reworked during nonfrozen conditions, where practical and necessary.

The Contractor shall ensure that applicable government agencies, as soon as feasible, will be notified that contingency measures have been implemented.

2.8 WASTE MANAGEMENT

2.8.1 Scope/Requirements

The Contractor is responsible for transport, receipt, inspection, use, storage, and disposal of hazardous and non-hazardous substances, materials, solids, liquids and gases. The Contractor will develop and provide both a hazardous waste management plan and a non-hazardous waste management plan. These will include procedures to manage waste generated on site during construction which will also be reflected in the construction documents.

Waste is defined as a broad term which categorizes items that are no longer wanted at the site of generation and are dealt with by either reusing, recycling, composting or landfilling. The waste management plans will contain standards to identify, handle, store, transport, treat and dispose of solid, semi-solid and liquid wastes.

The guiding principles used to develop the waste management plans include:

- Meeting all existing regulatory standards regarding waste management;
- Meeting or surpassing Project requirements; and
- Implementing best practices in waste management.

The regulatory requirements governing the waste management plans set clear direction and standards for decision-making and implementation. Key federal and provincial regulatory requirements used for waste management planning include:

- Ontario *Environmental Protection Act* (R.S.O. 1990), including Regulations 347 (R.R.O.1990) and 102/94;
- *Canadian Environmental Protection Act* (Government of Canada 1999a);
- *Export and Import of Hazardous Wastes Regulations* (Government of Canada 1992c);
- *Transportation of Dangerous Goods Act* (Government of Canada 1992); and,
- *Transportation of Dangerous Goods Regulations* (Government of Canada 2001c).

In accordance with Ontario Regulation 102/94, of the Ontario *Environmental Protection Act,* a Waste Audit and Waste Reduction Workplan will be completed for non-hazardous waste. This will identify all commercially reasonable efforts to implement 3Rs opportunities. It will be completed during the design phase and will be implemented during the construction phase.

A Waste Generator Number, in accordance with Regulation 347 of the Ontario *Environmental Protection Act,* will be obtained for the site and will be removed at the end of the contract.

During the design phase, the potential use of regional infrastructure and services for waste transportation, treatment and disposal will be examined. The Project will use the most suitable methods for managing different waste types, always considering the needs and requirements of the local environment/community.

The Project will take an integrated systems approach to waste management, combining several complementary alternative waste management. An integrated waste management hierarchy will be used to reduce the environmental impact and improve efficiency. The hierarchy will reflect the preferred waste management alternatives that should be explored, in order of preference. The hierarchy is as follows: 1) reduce, 2) reuse, 3) recycle, 4) treat, if applicable, 5) disposal.

To support the waste management hierarchy, the Contractor will:

- Identify waste types and classification;
- Provide proper handling, transportation and storage;
- Ensure proper treatment and disposal; and

- Provide suitable documentation for all waste management activities (e.g. waste manifests).

Figure 2 illustrates the proposed decision-making process for managing waste from point of generation to disposal.

Waste identification information is critical to planning, designing, and implementing plans for proper waste handling, storage, transportation, treatment and disposal. It effects the size of storage facilities, number of transportation vehicles required, treatment requirements and disposal methods.

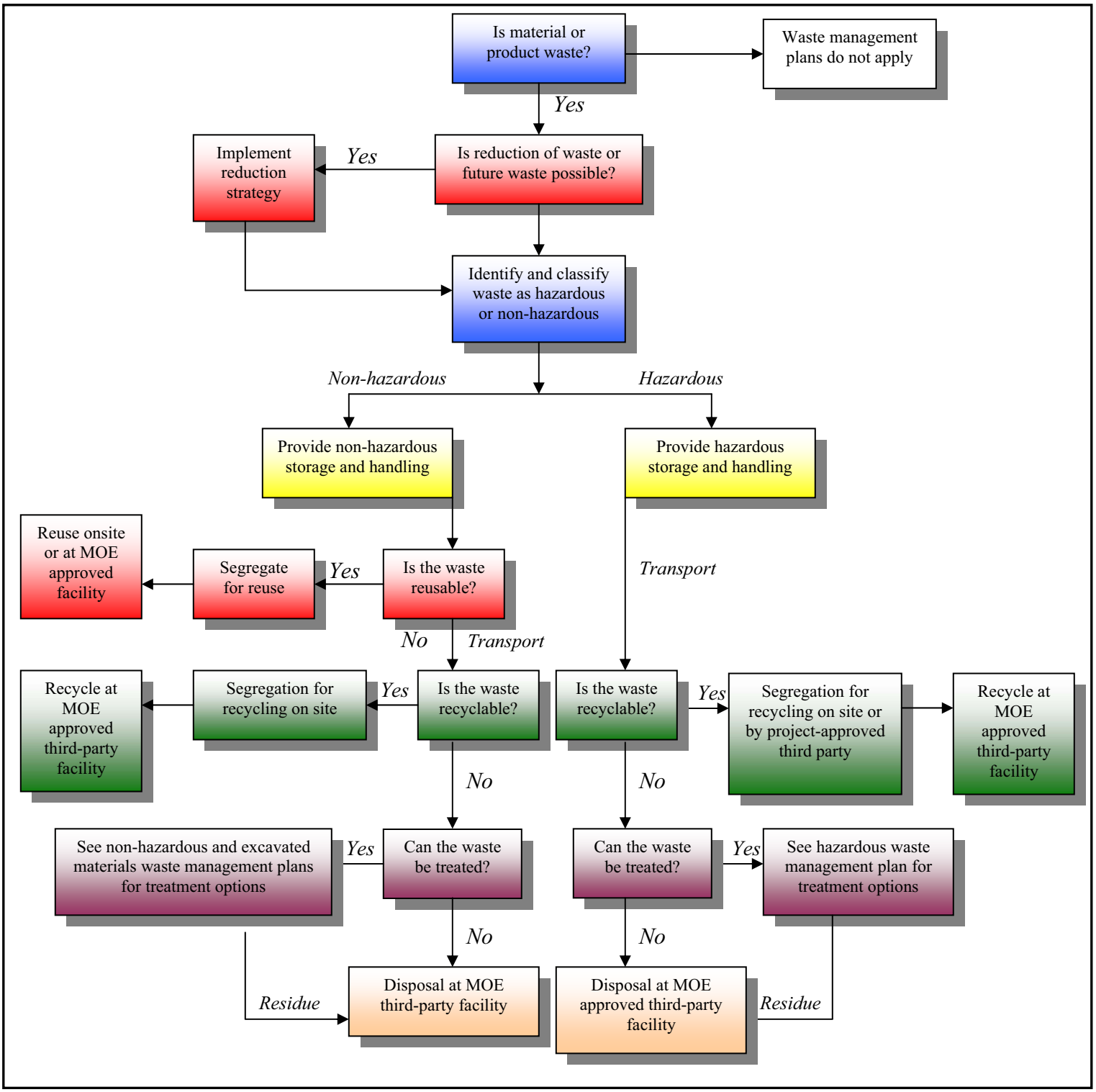


Figure 2: Waste Management Plan Decision-Making Process

2.8.2 Waste Classification

Waste generated by the Project will be classified as hazardous or non-hazardous according to Ontario Regulation 347/90 of the Ontario *Environmental Protection Act.* Generally, hazardous waste is defined as hazardous industrial waste; acute hazardous waste chemical; hazardous waste chemical; severely toxic waste; ignitable waste; corrosive waste; reactive waste; radioactive waste, except radioisotope wastes disposed of in a landfilling site in accordance with the written instructions of the Canadian Nuclear Safety Commission or the Atomic Energy Control Board; pathological waste; leachate toxic waste; or, PCB waste as defined in Regulation 362 of the Revised Regulations of Ontario, 1990. Hazardous waste does not include the following:

- Hauled sewage;
- Waste from the operation of a sewage works subject to the *Ontario Water Resources Act* where the works,is owned by a municipality; is owned by the Crown subject to an agreement with a municipality under the *Ontario Water Resources Act;* or receives only waste similar in character to the domestic sewage from a household;
- Domestic waste;
- Incinerator ash resulting from the incineration of waste that is neither hazardous waste nor liquid industrial waste;
- Waste that is a hazardous industrial waste, hazardous waste chemical, ignitable waste, corrosive waste, leachate toxic waste or reactive waste and that is produced in any month in an amount less than five kilograms or otherwise accumulated in an amount less than five kilograms;
- Waste that is an acute hazardous waste chemical and that is produced in any month in an amount less than one kilogram or otherwise accumulated in an amount less than one kilogram;
- An empty container or the liner from an empty container that contained hazardous industrial waste, hazardous waste chemical, ignitable waste, corrosive waste, leachate toxic waste or reactive waste;
- An empty container of less than twenty litres capacity or one or more liners weighing, in total, less than ten kilograms from empty containers, that contained acute hazardous waste chemical;
- The residues or contaminated materials from the clean-up of a spill of less than five kilograms of waste that is a hazardous industrial waste, hazardous waste chemical, ignitable waste, corrosive waste, leachate toxic waste or reactive waste; or
- The residues or contaminated materials from the clean-up of a spill of less than one kilogram of waste that is an acute hazardous waste chemical.

Hazardous waste will not be mixed or diluted with any substance or divided into smaller quantities to avoid being defined as a hazardous waste.

Non-hazardous waste or municipal waste is defined as any waste, whether or not it is owned, controlled or managed by a municipality, except, hazardous waste, liquid industrial waste, or gaseous waste.

2.8.3 Waste Handling, Storage and Transportation

The Hazardous and Non-Hazardous Waste Management Plans will outline the required facilities for waste storage before transporting waste for recycling, treatment and disposal. During construction, waste storage will only be temporary. However, some materials may be stored longer until waste volumes are sufficient for the selected treatment or disposal option, or for transportation to a waste management facility.

The following guidelines are to ensure proper handling and storage for all waste types:

- Temporary waste storage sites and containers will be provided at designated locations;
- Waste will be sorted and separated according to waste classification, i.e., hazardous and non-hazardous, and end use, e.g., recyclable materials will be segregated from waste intended for treatment and disposal;
- Containers will be selected based on:
  - Waste type, i.e., physical and chemical properties;
  - Preventing wildlife attraction, e.g., positive clamping lids;
  - Transport requirements, e.g., truck, barge or forklift;
- All containers will be labelled to facilitate the safe and proper handling of the waste type;
- Waste will be transferred regularly from points of waste generation, for consolidation at centralized waste management facilities;
- Waste will be stored until quantities are sufficient to support transport for recycling, treatment and disposal;
- Waste management facilities and transfer points will have secondary containment (i.e., berms) to prevent loss of materials to the surrounding environment;
- Centralized waste management facilities and transfer points will have controlled access restricted to authorized personnel; and,
- All waste types and quantities accepted and removed from waste management facilities and transfer points will be documented using waste tracking procedures.

The transportation of all waste types will be planned and implemented to ensure safety for the carriers and to reduce impacts to the environment. Waste will be transported according to Ontario Regulation 347/90 and the *Transportation of Dangerous Goods Act* and regulations. Any interprovincial and transboundary movement of waste, if required, will be performed according to the *Canadian Environmental Protection Act* (Government of Canada 1999a) and its *Interprovincial Movement of Hazardous Waste Regulations* (Government of Canada 2002c) and *Export and Import of Hazardous Waste Regulations* (Government of Canada 1992c).

Waste will be primarily transported by road. Transportation of waste will involve the use of specific, designated vehicles or vehicles that have been adequately adapted to ensure the safe transport of waste. Details for the transportation of waste will be provided, including routes, waste pickup schedules, and waste tracking and documentation for waste identification, pickup, delivery and chain-of-custody.

Each carrier who transports the controlled or hazardous materials must possess, and be able to produce a copy of, the shipping document related to the materials, while the materials are in transport. Placards will be used as clear indications that a transport unit contains controlled or hazardous materials. Trained personnel will monitor the movement of controlled and hazardous materials to ensure compliance with relevant regulations and requirements.

2.8.4 Hazardous Waste Management Plan

During the design phase, the Contractor will prepare a Hazardous Waste Management Plan. This plan shall include the identification and classification of all hazardous waste, treatment options and disposal method, as outlined above. It will also provide the required procedures of managing the hazardous wastes.

A standard hazardous waste classification process will form the basis of Project waste classification. A list will be prepared to itemize all project waste as hazardous or non-hazardous. Hazardous dangerous waste classification will follow accepted *Transportation of Dangerous Goods Regulations* criteria:

- Class 1 – explosives
- Class 2 – gases
- Class 3 – flammable and combustible liquids
- Class 4 – flammable solids, substances liable to spontaneously combust and substances which, on contact with water, emit flammable gases
- Class 5 – oxidizing substances and organic peroxides
- Class 6 – poisonous, toxic and infectious substances
- Class 7 – radioactive materials
- Class 8 – corrosives
- Class 9 – assorted other dangerous goods

The Contractor is responsible for the proper identification, classification, labelling and tracking of hazardous waste. Classification of hazardous waste includes identifying, according to Ontario Regulation 347/90 and the *Transportation of Dangerous Goods Regulations* criteria, the following:

- The shipping name,
- The primary class,
- The compatibility group,
- The subsidiary class,
- The United nations number,
- The packing group, and
- The risk group.

The Hazardous Waste Management Plan will document the required handling, storage and transportation as outlined above in Section 2.8.3.

2.8.5 Non-Hazardous Waste Management Plan

The Contractor, during the design phase, will complete the initial Waste Audit and Waste Reduction Workplan. This will provide the basis for which the Contractor will devise the Non-hazardous Waste Management Plan. The Plan will outline anticipated waste types and volumes, collection procedures, on-site storage, treatment (if necessary), transportation, and final disposal.

As required by Regulation 102/94 of the Ontario *Environmental Protection* Act, the Contractor must complete a Waste Audit and Waste Reduction Workplan to determine the types and approximate amounts of waste generated as a result of the Project. The Waste Management Workplan will determine strategies to divert waste from landfill disposal, utilizing the 3Rs principles. The Workplan will provide specific diversion measures for each waste type and will take into consideration federal and provincial approved waste management strategies and municipal and industry waste management opportunities and constraints. The Contractor will investigate and, if possible, secure the sale of waste generated through various construction activities. The Contractor will participate in the City of Niagara Falls waste diversion program. During the construction phase, the actual amounts of waste diverted in relation to the Workplan and the end location of the waste will be documented in the final Workplan.

The handling, storage and transportation of non-hazardous waste will also be included in the Non-Hazardous Waste Management Plan as outlined above in Section 2.8.3.

The Waste Audit and Waste Reduction Workplan will not include the excavated material as a Reuse of Excavated Materials Report will be completed by OPG.

2.9 AIR QUALITY MANAGEMENT PLAN

2.9.1 Scope/Requirements

The Contractor will ensure that construction activities that could impact air quality are managed in accordance with regulatory requirements. The Contractor will develop an Air Quality Management Program to meet these requirements.

Project activities will produce air emissions from a variety of sources. Controlled air emissions are assumed to occur because of normal operation of equipment and facilities according to regulatory standards and permits. Emission sources might include:

- Equipment and vehicle operation during construction;
- Excavation and transportation of shale from tunnel;
- Electrical generation during construction;
- Process equipment;
- Compressors; and
- Blasting.

Dust from removal and transportation of excavated material may impact air quality within the tunnel and on the construction site. However, the most significant events are assumed to result from emergency occurrences and might include, but are not limited to:

- Vapour loss during fuel transfer;
- Unanticipated blasting debris; and
- Tunnel failure.

The guiding principles used to develop the Air Quality Management Plan include:

- Meeting all applicable regulatory standards regarding emissions;
- Designing, procuring and operating equipment according to the procedures outlined in this plan; and
- Having a program in place to monitor and verify regulatory compliance.

Specifications of the Air Quality Management Plan will be incorporated into the contract documentation for the Project.

2.9.2 Air Quality Management Plan

Specifically, the Air Quality Management Plan will:

- Outline procedures for designing, purchasing and operating project equipment according to applicable regulatory requirements, land use permits and industry best practices for air quality management;
- Include measures for managing project-related air emissions;
- Include air quality monitoring procedures in key areas, for example in the tunnel, intake, outlet, disposal site, truck routes and locations of complaints; and
- Recognize the potential for uncontrolled releases.

The management requirements for the uncontrolled releases are contained in Environmental Emergency Plan in Section 2.7 above.

Mitigation strategies will include:

- Implementing good site management practices to control dust emissions where project road use might disrupt community air quality;
- Reducing the length of time vehicles are left idling along the access roads to the project;
- Using process and compression equipment that complies with appropriate emission standards; and
- Maintaining vehicles and equipment to reduce fuel use.

It is anticipated that the TBM will generate dust within the tunnel. In order to mitigate this, the following is proposed.

A steel dust curtain maintains a seal between the bored diameter and the cutterhead support in the area directly behind the head. Dust generated at the face is trapped in the cutterhead area and sucked out from muck dump area through a closed system in the main beam area through a dust scrubber system provided as part of the backup system.

Dust control is enhanced by a network of nozzles that spray a water pattern on the face. This mist basically prevents the dust particles generated in cutting from becoming airborne. Actual flow to the face is variable and may even be eliminated should ground conditions dictate. Nozzles are mounted in large steel blocks and are oriented to avoid plugging and damage from muck. All exposed plumbing is shrouded by heavy steel angles to prevent damage. Nozzles will also be mounted off the roof supports spraying forward of the dust shield.

2.9.3 Air Quality Monitoring

During the design phase of the Project, the Contractor will incorporate a comprehensive air quality monitoring program within the Air Quality Management Plan. Specifically, the air quality monitoring program will have monitoring stations at strategic locations (e.g. within the tunnel and rock conveyor), depending on atmospheric conditions and location of receptors. The program will determine sampling event frequency, reporting procedures, mitigation measures and response requirements. Specifically, air quality will be monitored within the tunnel during excavation and transportation of shale formations suspected of containing BTEX.

During construction, the Contractor will ensure that the total suspended particulates at property lines of the Project Site will not exceed 100 ug/m^3 for an averaging time of 0.5 hour for fugitive dust sources for particles less than 44 microns. Monitoring for compliance and applying mitigative measures, such as dust suppressants, as required, will achieve this. See Section 4.3 below on construction phase environmental inspection.

Explosive and noxious gases in the tunnel will also be monitored. A gas monitor with sensor heads behind the cutter head and in the dust extractor ducts for the detection of methane gas will be provided. The gas concentration readings are relayed to the operator station and will sound a warning with subsequent shutdown of the TBM at a predetermined level of concentration. Additionally, an oxygen deficiency monitor is installed, which will sound a warning once the oxygen level is below the safe limit. Air samples are taken on a regular basis. The detailed procedures are included in the Site Specific Safety Plan.

2.10 NOISE

2.10.1 Scope/Requirements

The Project's noise emission sources will include facilities, vehicles and construction activities. Noise control measures will be adopted that are consistent with recognized industry practices and guidelines. Specifically, the Contractor shall ensure that noise levels are in accordance with MOE Publication NPC 205, unless exceptions are otherwise obtained. The Contractor will also meet the more stringent requirements of the Niagara Falls Noise Control By-Law 2004-105, MOE Publication NPC 05 or truck traffic to and from the Site at the intake area shall not take place on Sundays unless noise at sensitive receptors are mitigated to OPG's and Ontario Ministry of the Environment's satisfaction.

The specifications of the Noise Management Plan will be incorporated into the contract documentation for the Project.

2.10.2 Noise Management Plan

The Contractor will develop a program for monitoring noise during construction to ensure that the hourly equivalent sound levels from construction activities are met in accordance requirements listed above in Section 2.10.1. This will aim to ensure that impacts to the residents are minimized and meet Ontario Ministry of the Environment and municipality noise requirements. The Contractor will also include in the Noise Management Plan a protocol following the Ontario Ministry of the Environment publication *NPC 103* for ascertaining that all construction equipment and trucks meet the requirements of *NPC 115* and *118*.

Primary mitigation strategies include:

- Implementing industry proven engineering noise controls, including silencers, upgraded building shells, intake and exhaust plenums;
- Applying acoustical treatments;
- Using inherently quiet equipment and equipment with strict noise emission specifications; and
- Scheduling operations activities, e.g., scheduling blasting during the daytime only as practical.

2.11 ARCHAEOLOGY RESOURCE MANAGEMENT PLAN

2.11.1 Scope/Requirements

It has been documented in the Environmental Assessment that there are no indications of archaeological resources in the Project area. However, this does not preclude that artefacts will not be uncovered. The Contractor will develop an Archaeological Resource Management Plan. This Plan will serve to direct the Contractor in the appropriate procedures to follow in the event of an archaeological or heritage resource discovery. The specifications of the Plan will be incorporated into the construction documentation for the Project.

2.11.2 Archaeology Monitoring

The Contractor is required to ensure that if any natural and historical objects of significance are found during excavations, that OPG is notified. The Contractor will not remove any artefacts until OPG is notified. The removal of any artefacts will be at the expense of OPG. The Contractor will be responsible for the appropriate removal and take all reasonable precautions to ensure that the artefacts are not damaged prior to and during removal. Artefacts will only be removed by the appropriate archaeological personnel, or under their supervisor, or upon their approval.

If archaeological, heritage or palaeontological resources are discovered during the design and construction Project phases, the site will be assessed and suitable mitigation measures will be determined. The Contractor will notify the applicable government agencies, as required.

The site will be assessed based on the following information:

- Input from the applicable regulatory authority;
- Input from the environmental team;
- The significance of the site;
- The depth of the site;
- The location of the site relative to the area being developed; and
- The feasibility of alternative locations for site relocation to avoid the resource.

The following steps will be taken if possible heritage or archaeological resources are discovered:

1. Immediately suspend work near any newly discovered archaeological, palaeontological or historic site.
2. Notify the appropriate regulatory agencies.
3. The Contractor's archaeological resource consultant will visit the site, if necessary.
4. They will develop a suitable mitigation plan in consultation with OPG, environmental staff and associated regulatory agencies.
5. Construction within the area will resume after the artefact has been removed and no further work investigation is required.

2.12 PUBLIC CONSULTATION AND PUBLIC RELATIONS

2.12.1 Scope/Requirements

The Contractor recognizes that the Project is located in an urban/tourist area and recognizes the potential intrusiveness of construction on the activities of the local residents. The Contractor also recognizes that the Project is subject to the constraints set out in the Summary of Work and cooperation with and information to the public on the Project is essential. Therefore, the Contractor will participate in local committees and conduct or attend meetings or public information sessions. In addition, the submittals related to design will all include an identification of construction impacts on the community and mitigative measures. This will ensure that the construction activities will be assessed in light of the effects to the public during the design process and measures to minimize or eliminate negative effects will be documented and implemented.

There is the opportunity to promote this unique and important Project. By providing information to the public and providing site access for the public to view interesting aspects, it is anticipated that positive sentiments will be generated about the Project. Furthermore, since it is anticipated that one of the main concerns the local residents may have will be related to public safety, information related to public safety will be conveyed. It is suggested that the following be completed to promote this Project:

- Development and distribution of promotional material at the public information facility and at local school boards;
- Public, including local residents and tourists, access/tours to areas of interest on the site; and
- Publishing articles in industry related magazines.

3.0 COMMUNITY IMPACT AGREEMENT

The Contractor will provide support and assistance to OPG on the implementation of the Community Impact Agreement. This will include the Liaison Committee, Citizen Complaints Procedure, Neighbourhood Advisory Committee, Monitoring and Remedial Programs, Transportation Impact Management Program and Emergency Services. The requirements of the Tourism Impact Management lies with the City of Niagara Falls and the Town of Niagara-on-the-Lake.

3.1 LIAISON COMMITTEE

3.1.1 Scope/Requirements

The Contractor will support OPG by providing information to the Liaison Committee with respect to the status of the Project and will attend Committee meetings as required.

3.2 CITIZEN COMPLAINTS PROCEDURE

3.2.1 Scope/Requirements

The Contractor will develop a citizen complaints procedure during the design phase of the Project. This procedure will provide the public with a means of contacting an appropriate project representative to discuss issues with respect to the construction phase of the Project, provide an internal process of addressing/resolving public concerns, provide a process of documentation and reporting on a quarterly basis and provide a procedure to follow-up with the public on how the concern was addressed.

The draft citizen complaints procedure will be submitted to OPG for review and subsequently to the Regional Municipality of Niagara, Town of Niagara-on-the-Lake and the City of Niagara Falls for review. Revisions to the procedures will be made accordingly.

3.3 NEIGHBOURHOOD ADVISORY COMMITTEE

3.3.1 Scope/Requirements

The Contractor will support OPG by providing information to the Neighbourhood Advisory Committee with respect to the status of the Project and will attend Committee meetings, if required.

3.4 MONITORING AND REMEDIAL PROGRAMS

3.4.1 Scope/Requirements

The Contractor will support OPG in the form of collecting and providing data and information for development of monitoring programs agreed upon by the parties of the Community Impact Agreement with respect to the social, economic and financial effects attributable to the construction of the Project, if required.

Depending on the monitoring and remedial requirements, to be agreed upon by the Contractor and OPG, the Contractor may be responsible for implementing and obtaining the results of these requirements and reporting to the Liaison Committee on a basis to be agreed upon.

3.5 TRANSPORTATION IMPACT MANAGEMENT PROGRAM

3.5.1 Scope/Requirements

The Contractor will support OPG in the form of collecting and providing data and information for the Transportation Impact Management Program. Prior to the commencement of construction activities, the Contractor will submit a Transportation Impact Management Plan, which will subsequently be approved by the Regional Municipality of Niagara.

3.5.2 Plan/Procedures

The Plan will contain the following details:

- Scheduling and coordinating material deliveries;
- Designates routes, lanes and speeds;
- Special designation for toxic materials and explosives;
- Improvement of signs and hardware;
- Keeping roads clean;
- Scheduling to minimize construction traffic during peak tourist season and hours and special tourist events;
- Methods of ensuring contract compliance;
- The daily monitoring of road conditions, on roads to be used by construction equipment, including (but are not limited to): pavement condition, signage and safety;
- Measures to mitigate mud tracking by contracting street sweepers in order to clear construction roads of mud; and
- Reporting procedures.

Prior to, and during construction, the contractor will submit specific traffic control plans regarding certain activities that are expected to result in a disruption to the public. Examples of such activities are:

- Movement of oversized loads, requiring lane closures, police escort, etc;
- Directing construction traffic into residential areas, if applicable; and
- Remedial construction and road improvements (if needed).

The traffic control plans will demonstrate the methods, which the Contractor intends to implement in order to maintain road safety, and as much as possible, mitigate the public's inconvenience.

3.6 EMERGENCY SERVICES

3.6.1 Scope/Requirements

The Contractor will support OPG in developing the Emergency Services Plan. For details, see Preliminary Project Site specific Site Security, Public Safety and Emergency Response Plan.

4.0 ENVIRONMENTAL COMPLIANCE PLAN

4.1 BACKGROUND/REQUIREMENTS

As outlined in the Draft Design/Build Agreement, the Contractor is responsible for specific environmental requirements and OPG has undertaken to complete and be responsible for all remaining environmental requirements as outlined in the following documents:

1. Niagara River Hydroelectric Development Environmental Assessment, dated March 1991, including update of July 13, 1992 and amendment dated June 3, 1993;
2. Environmental Assessment Approval, dated October 14, 1993;
3. *Fisheries Act* Authorization 5250-43;
4. Community Impact Agreement, dated December 22, 1993.

In response to this the Environmental Compliance Plan (ECP) was developed. Since OPG has maintained a significant role for environmental requirements, integration with OPG's work will be an important component of the Project. The scope of the ECP has been developed based on the Contractor's requirements only.

Note that at the time of the proposal submission the ECP is not a complete document, as some of the requirements require input from government authorities. In addition, further requirements may be provided from the conditions of approvals acquired during the design phase of the Project. Additions and clarifications to the ECP will be included after discussions with appropriate government authorities and after approvals are obtained. Amendments may also be made to the ECP as the Project progresses.

Generally, during design, construction and post-construction activities, the Contractor agrees to work in a manner that protects health and the environment and in compliance with:

- The requirements of the Niagara River Hydroelectric Development Environmental Assessment, dated March 1991 including update of July 13, 1992 and amendment dated June 3, 1993;
- The requirements of the Environmental Assessment Approval, dated October, 14, 1998;
- The requirements of Approvals obtained by OPG;
- The requirements of the Environmental Approvals and Third Party Information, dated March 2005;
- The requirements of Approvals to be obtained by OPG or the Contractor;
- The requirements of the Draft Design/Build Agreement;

- The requirements of the Community Impact Agreement, dated December 22, 1993;
- This Environmental Management Plan;
- Plans submitted to OPG as outlined in this document and Draft Design/Build Agreement;
- Applicable statutes, laws and regulations;
- OPG's Environmental Management System; and
- The requirements of federal, provincial and municipal agencies.

In order to meet all of the environmental requirements for the Project, as outlined above, a compliance plan has been developed. This plan provides the specific procedures that will be completed during all phases of the Project to ensure compliance with the Draft Design/Build Agreement, Community Impact Agreement, Environmental Assessment, applicable laws, regulations and guidelines, approvals, agency requirements and applicable Project documentation.

To effectively document and explain the compliance procedures, this section has been divided into the three phases of the Project: design, construction and post-construction. The compliance plan utilizes procedures such as environmental audits, risk management analysis, quality assurance/quality control, and environmental inspection, monitoring and training, to ensure compliance. Figure 3 depicts the Project environmental compliance process. A database will be utilized to effectively track all compliance requirements.

Monthly reports on the progress of the Environmental Compliance Plan will be completed by the Environmental Manager and submitted to OPG and the Contractor's Project Manager. The Environment Compliance Plan Monthly Reports will provide the following information:

- Notices (which will also be provided individually at the time of requirement);
- Agency communication and requirements;
- Compliance procedures completed (e.g. Environmental Audits);
- Results of ongoing risk management assessments;
- Summarized Environmental Inspection reports;
- Activities completed for the Liaison Committee, Neighbourhood Advisory Committee and any other public consultation activities;
- Incidents of non-compliance and resolution; and
- Overall status of environmental compliance.

A risk management assessment will be implemented during all phases of the Project in order to determine risks associated with all environmental issues including the acquisition and prioritization of approvals and compliance issues. This is discussed in more detail below in Section 5.

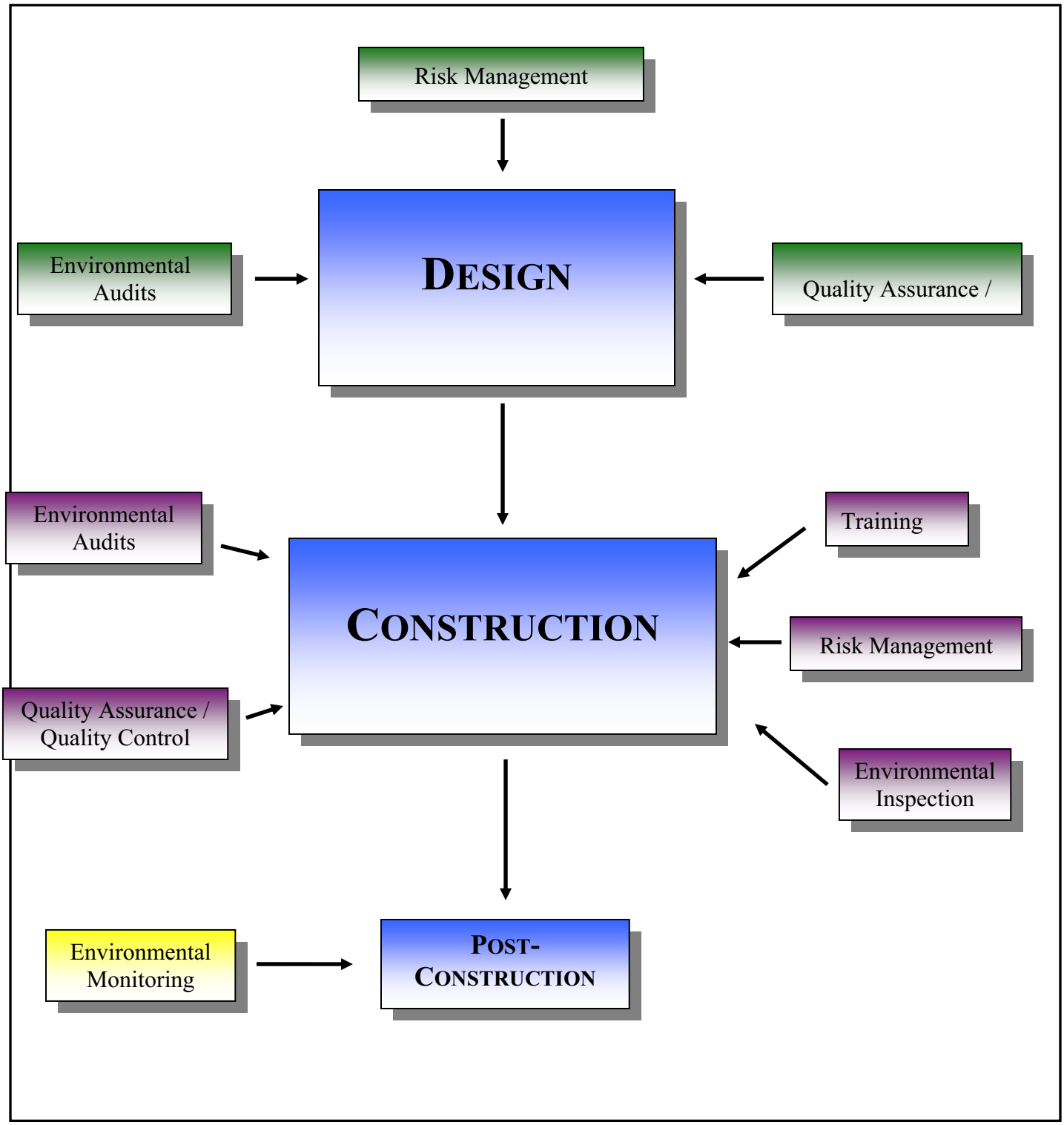


Figure 3: Project Environmental Compliance Process

4.2 DESIGN PHASE

The compliance procedures for the design phase ensure that all activities to take place prior to construction start-up are in compliance with the Project requirements, as outlined above. The design phase includes all activities that are required to be completed in order for construction to take place.

At the beginning of the design phase, the Contractor and OPG will meet with agencies that have jurisdictional responsibilities for environmental and approval related issues. The purpose of the meeting is to provide these agencies with background information on the Project and information on how the Project is going to proceed and be carried out, the specific construction activities for the Project and schedule. This meeting will allow agencies to ask questions and provide their initial requirements. Subsequent to the meeting, the agencies will be asked to provide their requirements in writing. If necessary, the Contractor will provide additional information in order for the agencies to provide their requirements. These requirements can be based on a statutory approval or due to jurisdictional responsibilities for environmental protection. It is anticipated that further meetings will be required with specific agencies on an individual basis.

As previously stated, the Contractor will complete investigations of the terrestrial environment to confirm the information in the Environmental Assessment, dated March 1991, for the Project or to note any changes. Any changes will be assessed in relation to construction activities and reflected in the submittals and construction documents to ensure environmental protection on existing resources.

In order to ensure that design phase activities are in compliance with Project requirements, the compliance procedure will take the form of an Environmental Auditing Program and within the Project Quality Assurance/Quality Control procedures. The Environmental Auditing process will ensure environmental compliance and the QA/QC process will ensure that documentation, and scheduling meet with OPG's standards.

4.2.1 Environmental Auditing Program

The Environmental Auditing Program is a means of ensuring compliance with Project environmental requirements during the design phase. Design phase activities with related environmental components include:

- Approval acquisition;
- Development and submission of Environment Management Plan;
- Provision of plans and submittals (including Environmental Protection Plan, Erosion and Sedimentation Control and Stormwater Management Plan, Environmental Emergency Plan, Water Withdrawal Plan, Water Management Plan – Intake, Water Management Plan – Outlet, Plan for Disposal of Excavated Material, Disposal Monitoring and Contingency Plan for Excavated Material, Blasting Plan, Hazardous Material Waste Management Plan, Non-Hazardous Material Waste Management Plan, Citizen Complaints Procedure, Emergency Services Plan, Construction Effects of Tunnels and Shafts Management Plan, Air Quality Management Plan, Noise Management Plan, Archaeology Resource Management Plan,

Specific Environmental Protection Procedures, Project Schedule, and, any other submittal with environmental implications);

- Development of monitoring programs (including Monitoring and Remedial Programs, Air Quality Monitoring Plan, Archaeology Management Plan, and Noise Monitoring Program);
- Implementation of additional agency design requirements;
- Revisions to Environmental Compliance Plan and the Environmental Management Plan;
- Activities with respect to Community Impact Agreement, (including Liaison Committee, Citizens' Complaints Procedures, Neighbourhood Advisory Committee, Monitoring and Remedial Programs, Transportation Impact Management Plan, and Emergency Services); and
- Development of contract specifications and drawings.

The Environmental Audit for each activity/deliverable listed above will be specific to each activity/deliverable. Generally speaking, the common elements of each Environmental Audit will consist of:

- A structured internal review by the Environmental Manager or Senior Environment Specialist;
- Monthly design review meetings with Project Team (purpose of, for example, determining project changes or issues that could impact environmental requirements);
- Monthly meetings with Environmental Project Team to discuss status of all environmental issues, problems, work to be completed and risk analysis; and
- Documentation of all Environmental Audits.

The Environmental Audit Program will be completed by senior environmental staff with experience in project management, environmental auditing procedures and environmental requirements for design and construction projects. The documentation of the Environmental Audits will be kept on file and OPG may request copies. Monthly reports/updates to OPG on the progress/process of the Environmental Compliance Plan which will include information related to the Environmental Audit program.

The following contains the details of the Environment Audit for each activity/deliverable listed above.

Approvals Acquisition

The Environmental Audit for approvals acquisition will ensure that all appropriate approvals are obtained prior to the commencement of Project construction or of the construction activity requiring approval. This, in turn, will also ensure that the Contractor is in compliance with the Draft Design/Build Agreement and applicable laws.

The Environmental Audit for approvals acquisition will monitor and ensure the following:

- The requirements of the approval are clearly understood;
- The requirements of and application for the approval are conveyed to OPG and then to the agencies in a timely manner;

- The time required for the agency to review the information and provide the approval are clearly understood and scheduled accordingly;
- Follow up with agencies will be completed to facilitate the timely acquisition of approvals;
- Copies of the approvals and conditions are provided to OPG;
- Approval conditions are conveyed to the Project Manager; and
- A methodology to complete approval conditions is developed and implemented.

The documentation of the Environmental Audit for approvals acquisition will be completed and updated on a monthly basis. It is anticipated that this will continue into the construction phase of the Project, as some approvals may be obtained during this time. The Environmental Audit will also outline the approvals to be obtained, the approval requirements, activities completed to ensure compliance and agency communications (which will also be communicated to OPG when received).

As stated above, monthly design review meetings will take place with the Project Team to keep up to date on Project status and changes and to ensure that information required for approvals are conveyed and obtained. Monthly meeting with the Environmental Project Team will be completed to discuss approval requirements and status.

If the requirements of approvals and the direction given by regulatory authorities are conflicting, the Contractor will attempt to resolve the discrepancy or disagreement by meeting with representatives of all the government agencies involved.

Environmental Management Plan

The Environmental Audit for the Environmental Management Plan (EMP) will ensure that the documentation is comprehensive and complete and submitted within 60 days of signing of the Project Agreement.

During the monthly design review Project Team meetings, information requirements will be conveyed and obtained with respect to the Project and EMP. In addition, during the monthly Environmental Project Team meetings, the status and information requirements of the EMP will be completed.

The Environmental Audit will review this activity on a monthly basis to ensure that the requirements have been met and that the activity is on schedule. The Environmental Audit report will be completed after the document has been submitted to OPG.

If the EMP requires revision due to Project changes or agency and OPG requirement changes, the Environmental Audit for this activity will be updated. Note also that if the EMP is revised, OPG will be provided a Notice and the revised document for review and approval prior to the implementation of the change.

Plans and Submittals

The Environmental Audit for Project plans and submittals will ensure that they are completed in compliance with Project environmental requirements. It will ensure that they are in compliance

with applicable laws, regulations and guidelines, agency requirements, approvals, the Draft Design/Build Agreement, Environmental Approvals and Third Party Information and the Community Impact Agreement. It will also ensure that they are approved prior to commencing construction.

The Project plans and submittals include:

- Approval Acquisition Plan;
- Environmental Protection Plan;
- Erosion and Sedimentation Control and Stormwater Management Plan;
- Environmental Emergency Plan;
- Water Withdrawal Plan;
- Water Management Plan – Intake;
- Water Management Plan – Outlet;
- Plan for Disposal of Excavated Material;
- Disposal Monitoring and Contingency Plan;
- Blasting Plan;
- Hazardous Waste Management Plan;
- Non-Hazardous Waste Management Plan;
- Construction Effects of Tunnels and Shafts;
- Air Quality Management Plan;
- Noise Management Plan;
- Archaeology Resource Management Plan;
- Construction Documents; and
- Any other submittal with environmental implications.

The Environmental Audit, for those plans not principally developed by the Environmental Project Team, will monitor the following:

- Participation of an Environmental Team member in the development or finalization of the Plans to discuss and convey environmental requirements;
- Attendance of an Environmental Team member at meetings related to the Plans; and
- Review of all draft plans by an Environmental Team member to ensure that all environmental requirements have been met, which includes: applicable mitigation measures, compliance with relevant legislation, regulations and guidelines, takes into account feasible approaches to environmental issues/problems. Documentation in the form of a memo, providing comments and recommendations will be provided to the Contractor's design team and revised accordingly.

The Environmental Audit, for those plans principally developed by the Environmental Project Team, will monitor the following:

- Participation of a Project Team specialist in the development of the Programs to discuss and convey Project requirements/constraints/issues;
- Attendance of a Project Team specialist at meetings related to the Programs; and,
- Review of all draft Programs by the Project Team specialist to ensure that all Project requirements/constraints/issues have been met and addressed. Documentation in the form of a memo, providing comments and recommendations will be provided to the Environmental Project Team and revised accordingly.

An Environmental Audit and report will be completed per plan/submittal. Should these plans change during the construction phase of the Project, the environmental auditing procedures will be completed and the Environmental Audit report will be updated.

Construction Documents

During the design phase, the environmental protection measures and other environmental requirements will be incorporated into the construction drawings and specifications. The environmental protection measures have been documented in the Environmental Assessment for the Project and will have been developed in plans and submittals and from discussions/communications with relevant agencies.

In order to ensure that all applicable environmental protection measures and environmental requirements are incorporated into the construction documents, an Environmental Audit will take place by a senior environmental staff member.

The Environmental Audit will monitor the following:

- Participation of an Environmental Team member in the development of the contract documents to discuss and convey environmental requirements;
- Attendance of an Environmental Team member at meetings related to the contract documents; and
- Review of all draft contract documents by an Environmental Team member to ensure that all environmental requirements have been met which includes: applicable mitigation measures, compliance with relevant legislation, regulations and guidelines, takes into account feasible approaches to environmental issues/problems. Documentation in the form of a memo, providing comments and recommendations, will be provided to the Contractor's design team and revised accordingly.

The Environmental Audit report will be completed and will document the process and procedures completed.

Community Impact Agreement

In order to ensure all compliance requirements are met, with respect to the Contractor's responsibilities for the various aspects of the Community Impact Agreement, Environmental Audits for each aspect will be completed. The requirements, as outlined above in Section 3, include responsibilities for:

- Liaison Committee;
- Citizens' Complaints Procedures;
- Neighbourhood Advisory Committee;
- Monitoring and Remedial Programs;
- Transportation Impact Management Program; and
- Emergency Services.

With respect to the Contractor's responsibilities for the Liaison Committee and Neigbourhood Advisory Committee, reporting on the compliance of this activity will be contained in the monthly report on the Environmental Compliance Plan to OPG. This will report on all of the actions, including attendance at meetings etc. completed by the Contractor.

The Citizen's Complaints Procedure will be developed by the Public Consultation specialist in the Environmental Project Team with input and review by the Project Manager. The Environmental Audit will monitor the following:

- Participation of the Project Manager in the development of the Procedure to discuss and convey Project requirements/constraints/issues;
- Attendance of the Project Manager at meetings related to the Procedure;
- Review of the Procedure by the Project Manager to ensure that all Project requirements/constraints/issues have been met. Documentation in the form of a memo, providing comments and recommendations will be provided to the Contractor's Environmental Project Team and revised accordingly; and
- Compliance with the requirements of the Community Impact Agreement, OPG and the Regional Municipal of Niagara, City of Niagara Falls and Town of Niagara-on-the-Lake.

With respect to the Citizen's Complaint Procedures, a senior environmental team member will complete an Environmental Audit after OPG and the applicable municipalities have approved the Procedure. During the implementation phase of the Citizen's Complaints Procedure, the Contractor will report to OPG on a quarterly basis on the effectiveness of the procedure. The effectiveness will be based on the public's response to the Procedure.

The Monitoring and Remedial Programs are to be developed by the OPG and the Regional Municipality of Niagara, City of Niagara Falls and the Town of Niagara-on-the-Lake. The Contractor will facilitate this by providing administration responsibilities for the meetings. The Contractor will also support OPG in providing the data and information for the Programs, which could be related to social, economic and financial effects of the construction of the Project. The type of monitoring and remedial program will determine the environmental auditing requirements. Regardless of the type of monitoring and remedial program, the Environmental Audit will monitor the compliance of the program with applicable laws, approvals, OPG policies and other Project environmental requirements.

The Contractor's responsibilities for the Transportation Impact Management Program and Emergency Services involve the submission of plans related to road conditions, traffic and reporting and emergency service requirements. These are to be completed by Project Team road and emergency specialists. The Environmental Audit will monitor the following:

- Participation of an Environmental Team member in the development of the plans to discuss and convey related environmental requirements;
- Attendance of an Environmental Team member at meetings related to the plans; and
- Review of all draft plans by an Environmental Team member to ensure that all environmental requirements have been met which includes: applicable mitigation measures, compliance with relevant legislation, regulations and guidelines, takes into account feasible approaches to environmental issues/problems. Documentation in the form of a memo, providing comments and recommendations will be provided to the Contractor's design team and revised accordingly.

An Environmental Audit will be completed per plan by a senior environmental team member. Should these plans change during the construction phase of the Project, the environmental auditing procedures will be completed and the Environmental Audit report will be updated.

4.3 CONSTRUCTION PHASE

The construction phase compliance procedures will ensure that all construction and monitoring activities are in compliance with Project environmental requirements. Compliance of Project environmental requirements during construction activities will require Environmental Construction Inspection and compliance with Project environmental requirements during monitoring activities will require construction phase Environmental Audits.

4.3.1 Environmental Inspection

Construction Environmental Inspection will ensure that the construction phase is completed in compliance with:

- Approval conditions;
- Laws, regulations, guidelines etc, and Project Agreements;
- Required mitigation measures outlined in the Plans and submittals;
- Agency requirements;
- OPG policies;
- Required mitigation measures and construction activities outlined in the construction specifications and drawings; and
- Requirements of all plans.

It is the responsibility of the Contractor to ensure that the Project is constructed in accordance with the Contract Documents.

The objectives of the Construction Environmental Inspection are to:

- Ensure that all environmental mitigation measures are implemented;
- Ensure that construction activities are completed in a manner that protects health and the environment;
- Ensure that work proceeds in compliance with Project environmental requirements;

- Ensure that the conditions of permits and approvals, and all of OPG's environmental policies and commitments, are met;
- Monitor the effectiveness of the environmental protection measures;
- Cooperate with other activity inspectors to assist in interpreting and implementing environmental mitigation measures;
- Provide alternative environmental protection measures should existing ones prove to be ineffective;
- Identify deficiencies and remedial action;
- Ensure emergency response procedures are implemented as required;
- Sample soil and groundwater, as required;
- Provide effective reporting to appropriate individuals on issues of non-compliance; and
- Complete daily reporting requirements.

An Environmental Inspector will be assigned to the Project during construction. The Environmental Inspector will report directly to the on-site Environmental Manager. The Environmental Manager and the Environmental Inspector will have direct access to the Construction Manager and/or Construction Superintendents should issues of non-compliance be observed and have the ability to stop work if an action could result or has resulted in a contravention to an act, regulation or approval.

The on-site Environmental Manager will be responsible for coordinating all environmental inspections on the construction site, and will report to the Construction Manager.

The Environmental Inspector will complete inspections on a daily basis, at a minimum, for all construction areas/activities for in-water work and areas for excavated material storage, hazardous materials storage, refueling/maintenance, truck cleaning and groundwater effluent storage. The Environmental Inspector will keep a daily log and provide daily monitoring reports to the Environmental Manager and the Construction Manager.

The daily environmental inspection reports will be summarized on a monthly basis and provided to OPG in the monthly Environmental Compliance Reports. The summarized environmental inspection reports will highlight issues of compliance and non-compliance and issues that required resolution and how the issue was resolved (for example, ineffective environmental protection measures and remedial actions).

If an unforeseen environmental event occurs, for which no mitigation measures have been approved, the following personnel will formulate a plan of action:

- Construction Manager and/or Construction Superintendent(s);
- Senior Environmental Team member; and
- Environmental Inspector.

The plan of action will include measures to assess and reduce the environmental impact and will be communicated to all applicable parties.

In particular, environment inspection will include the monitoring of erosion and sedimentation control measures, aquatic and terrestrial resources, archaeological/ heritage resources, noise, waste management, air quality, hydrogeology, and construction effects of tunnels and shafts. The following provides details of these requirements. In addition, after discussions with agencies, including the respective municipalities and after approval acquisition, inspection requirements may be added or changed accordingly.

Archaeology/Heritage

A qualified archaeologist, licensed in Ontario, will be on call during construction should any archaeological artifacts be uncovered. They will proceed on site and provide professional advice on the next course of action, as detailed in the Archaeology Resource Management Plan, Section 2.11.

Noise

During construction, if there are any public complaints with respect noise, the noise will be monitored to determine if it exceeds the requirements outlined in Section 2.10. Mitigation measures will be recommended and implemented, as outlined in Section 2.10.

Excavated Material

The Contractor is required to finalize and implement a sampling and monitoring program for excavated material suspected of being contaminated with BTEX. In addition, the Contractor is required to implement a soil and groundwater monitoring program associated with the storage of the contaminated material, as detailed in the Excavated Materials Management Plan, Section 2.5. The Environmental Inspector will be required to monitoring these areas.

Waste

The waste management strategies as identified in the Hazardous Waste Management Plan and the Non-Hazardous Waste Management Plan, Section 2.8, will be monitored during construction. Should issues of non-compliance be evident, the Environmental Inspector will document the issue and provide the documentation to the Construction Manager for resolution.

Air Quality

Air quality monitoring stations will be constructed as determined in the Air Quality Monitoring Program, Section 2.9. The levels analyzed will be compared with appropriate criteria levels. If levels exceed the criteria, measures will be taken to reduce dust using water or other dust suppressant materials. If a substance other than water is used for dust control, a license from the Ontario Ministry of the Environment will be obtained, as required. If other emissions exceed applicable criteria, mitigation measures will be recommended and implemented.

Hydrogeology

The Contractor is required to aid OPG in the implementation of the Groundwater Management Plan. Depending on the specific activities of this Program, the Environmental Inspector will monitor the areas where the groundwater monitoring will be taking place.

Construction Effects of Tunnels and Shafts

The Contractor is required to finalize a monitoring maintenance program to verify tunnel/shaft integrity over time. Depending on the specifics of this program, environmental inspection may be required, as detailed in Section 2.6.

4.3.2 Environmental Auditing Program

The construction phase Environmental Auditing Program will involve all activities that required design phase Environmental Audits and that will be completed during the construction phase. These include:

- Approval acquisition (should some approvals be acquired during the construction phase) in Section 4.2.1.1 above;
- Some monitoring programs as outlined in Section 4.2.1.3 above;
- Community Impact Agreement in Section 4.2.1.5 above (including Citizen Complaints Procedure, Liaison Committee, Neighbourhood Liaison Committee, and, Monitoring and Remedial Programs); and
- Any changes on environmental requirements that will result in a change to an Environmental Audit due to construction.

The purpose of the Environmental Audits during construction is to ensure that compliance is maintained and documented for those design activities continued through to the construction phase as listed. Refer to section 4.3.1 for the procedures to be followed.

In addition, an Environmental Audit for Environmental Construction Activities (i.e. environmental inspection) will be completed. The objective of construction Environmental Audits for Environmental Construction Activities is to ensure that all of the standards for environmental compliance are met or are exceeded for the construction.

The Audit will include:

- Review the construction environmental protection programs for all applicable construction activities;
- Evaluate chain-of-command procedures related to environmental issues;
- Ensure the adequacy of the environmental training program;
- Audit compliance with the environmental protection measures to be used during construction;
- Ensure the construction waste management program is adequate to handle and dispose of all waste associated with construction;
- Handling of response/remedial action in environmental emergencies; and
- Audit the inspection program that addresses environmental issues related to construction.

Senior environmental Project team staff will complete the Environmental Audit for Environmental Construction Activities. A report will be completed on a quarterly basis, which will be provided to the Construction Manager and OPG.

4.3.3 Training

In order to ensure environmental protection and compliance, training of construction staff on the Project will be completed. The purpose of the training is to provide direction and promote awareness for all relevant personnel and to ensure effective implementation of environmental requirements and protection measures. Two types of training will be provided, one for all construction personnel and another for environmental inspection personnel.

Construction Staff

The Training Program for construction site personnel will involve environmental orientation and include:

- Principles of Project environmental protection;
- An outline of the Project's environmental requirements and issues;
- Regulatory commitments associated with the project;
- Importance of environmental protection measures;
- Emergency response requirements and procedures; and
- Roles and responsibilities of project personnel with respect to environmental requirements and issues and chain-of-command.

For the purposes of ensuring that all individuals on the site will work in compliance with legislation, regulations, guidelines, approvals and Project environmental requirements and to support the Training Programs, the Contractor will prepare an Environmental Handbook that will outline the general environmental issues and mitigation associated with the Project, and the roles and responsibilities of all Project personnel and visitors, regarding environmental protection. All construction personnel will be required to complete a sign-off page stating that they have read, understood and will comply with, the contents of the Handbook and taken the Training Program before working on the site. All individuals who have completed the environmental training will be given a sticker that must be displayed on their hard hat.

The Training Program for construction site personnel will be developed and presented by the Environmental Project Team members.

Environmental Inspection Staff

The Environmental Inspectors will be required to complete an environmental training course before the start of construction, which focuses on Project specifics. The primary objective of this training is to ensure that the Environmental Inspectors understand:

- All of the Project's environmental requirements and issues;
- All regulatory commitments associated with the Project;
- Role of the environmental inspector in ensuring that these commitments are met;
- Environmental protection details, including environmental protection measures;
- Monitoring requirements and details;

- Reporting and documentation requirements and chain-of-command;
- Environmental constraints, the EMP, the ECP;
- Conditions of regulatory permits and approvals;
- Spills response and reporting procedures and responsibilities; and
- Construction management organization, roles and responsibilities.

The Training Program for environmental inspection personnel will be developed and presented by the Senior Environmental Specialists.

4.4 POST CONSTRUCTION

In order to ensure that all environmental requirements are complied with for all post-construction activities, an environmental monitoring program has been developed.

4.4.1 Environmental Auditing

Post construction environmental monitoring will be required to:

- Evaluate the success of vegetation in the areas disturbed by construction and rehabilitated according to the restoration plans;
- Evaluate the success of any permanent erosion and sedimentation control measures;
- Assess and report on the status of outstanding environmental issues identified in the environmental as-built report; and
- Identify any new environmental issues that might have arisen during the construction.

A list of any outstanding environmental issues/requirements will be completed and provided to OPG during the last year of construction. During the design phase when approvals are obtained, any post-construction requirements from the approvals will be provided to OPG during the design phase. At the end of each year of post-construction environmental monitoring a report will be provided to OPG outlining the post-construction environmental monitoring activities completed and a revised list of outstanding environmental issues that require further action or monitoring. Post-construction monitoring reports will be submitted OPG for review and then subsequently to regulatory agencies, if required.

The Contractor will use a master list or database to track the status of issues addressed during post-construction monitoring. This list or database will be updated on an ongoing basis. The list will form the basis of a post-construction monitoring report, which will be prepared at the end of the first year and as required after construction. Issues that are resolved will be removed from the list for the following calendar year.

The frequency of the monitoring events will be determined during the last year of construction. During the monitoring events, a monitoring report, including remedial measures, if required, will be provided to the Contractor's representative responsible for post-construction issues.

Qualified personnel will conduct post-construction monitoring related to environmental issues, such as those pertaining to vegetation and erosion and sedimentation control and those required

as a result of approval conditions. Site inspection procedures to monitor the status of these environmental issues will be developed on a site-specific basis and any remedial measures will be implemented.

4.5 QUALITY ASSURANCE/QUALITY CONTROL

With respect to environmental compliance, the Contractor's Quality Assurance/Quality Control (QA/QC) program plays an important role. The QA/QC program requires that senior Project personnel review all documentation prior to submission to OPG. The review will include compliance with the Project requirements and commitments and ensuring that the submittals/documentation are free of errors and meet or exceed OPG standards.

For details on the Project's QA/QC program have been submitted in a separate section of this proposal.

5.0 RISK MANAGEMENT

The Project's risk management procedures have been submitted in a separate section of this proposal. The following provides the details of the risk management process for the environmental issues which is integrated into the overall Project risk management procedures.

5.1 PROCESS

In order to determine risks associated with all environmental issues including the acquisition and prioritization of approvals and compliance issues, a Risk Management Plan will be developed. The Risk Management Plan will be completed as follows.

At Project start-up, an Environmental Risk Management Team will be developed made up of key Project personnel including the Project Manager, Environmental Manager, Project Managers from the major subcontractors and two OPG representatives. The Environmental Risk Management Team meetings will be coordinated with Project level risk management plan meetings.

The Environmental Risk Management Team will determine the risk factors. These risk factors will be analyzed for probability, level of impact, overall risk, risk response and risk allowance. The risk factors will also be prioritized and those with higher unacceptable risks will have higher priority for response. The relevant components of the Project will be modified if risks are found to be unacceptable or risk mitigation measures will be developed and implemented to minimize the unacceptable risks. Throughout the Project, at regular intervals or when the Project changes result in a change to risks or new risks become evident, the Risk Management Plan will be revisited and revised accordingly. This will ensure that new risks are determined, analyzed and responded to throughout the life of the Project and that existing risks will be monitored and responded to accordingly during the entire Project. Several industry guidance documents on risk management plans and checklists of potential risk factors will be utilized when completing the Environmental Management Plan. In addition, the Risk Management Plan will be completed with the aid of appropriate risk management software (e.g. Risk Radar) to ensure quality control, reliability, time efficiency, cost effectiveness and accuracy.

Involvement from key stakeholders (e.g. Ontario Ministry of the Environment, Ontario Ministry of Natural Resources and respective municipalities) will be required to complete the Risk Management Plan. The draft Risk Management Plan completed at project start-up will be communicated to key stakeholders for input, comment and notification. Any changes to the Risk Management Plan during the project implementation phase will also be communicated to the key stakeholders.

5.1.1 Identified Risk Issues

Upon review of the Project requirements, information to date and discussions with Contractor's team members, several risks have been identified. These are as follows:

- Delays in project schedule;
- Coordination of work to be completed by OPG;
- Stop work situations;
- Extreme weather conditions;
- Rare flora/fauna discoveries; and
- Contaminated groundwater.

Details of these risks are provided below, including contingency plans. Contingency plans describe procedures to be implemented if unforeseen events occur that could have environmental impacts during construction or operation of the project. Similar to the management plans, conceptual contingency plans have been developed to address regulatory requirements. Contingency plans provided are conceptual in nature and describe:

- Initial response actions that might be undertaken to control an event that would have negative environmental impacts;
- Mitigation that might be applied in a specific situation that would reduce or control negative environmental impacts; and
- A protocol for proper communication procedures if a contingency plan were implemented.

Delays in Project Schedule

It has been identified that third party (federal, provincial and municipal agencies) reviews may cause a delay in the Project schedule. In order for the construction to commence, many approvals are to be acquired. According to the Draft Design/Build Agreement, Environmental Assessment Approval and the Community Impact Agreement, approval acquisition is required for numerous statutes, plans and submittals. The responsibility of approval acquisition is shared between OPG and the Contractor. From experience and from discussions with relevant agencies, the time required by agencies to review information and provide approval is not consistent and can impact Project schedules. In addition, approvals of plans and submittals will also require agency review prior to implementation and could cause Project delays. The Contractor has no control over process requirements and the time needed by the agencies to provide their approval.

Early in the design phase, the Contractor will develop an Approvals Acquisition Plan including a schedule. This will be completed in conjunction with OPG and the relevant government authorities. An Approvals Task Force, jointly made up of OPG, regulatory authorities and the Contractor will be

established. If through no fault of the Contractor, deadlines by OPG or third parties are not met, the Contractor will request revised schedules by OPG and the government authorities. A meeting with the agencies early in the design process will also clarify the requirements of the approvals.

In addition, in order to mitigate this potential risk, it is proposed that agencies assign or hire a staff member to the Project at the expense of OPG. This will ensure that agency staff are committed to the Project and therefore not have to deal with conflicting priorities from other projects. This dedication of time by the agencies will help to potentially alleviate schedule delays from third party reviews.

Other measures to reduce the risk of third party review include TAC monthly meetings to ensure appropriate communication with agencies requirements and approval times and risk sharing between OPG and the Contractor.

Coordination of Work to be Completed by OPG

As outlined in the Draft Design/Build Agreement, the Contractor is responsible for specific environmental requirements and approvals and OPG has undertaken to complete and be responsible for all remaining of environmental requirements and approvals as outlined in the Environmental Assessment dated March 1991, the Environmental Assessment Approval and the *Fisheries Act* Authorization. OPG has maintained a significant role for environmental requirements on the Project. These potentially will affect the Contractor's responsibilities on the Project and Project schedule. In addition, the information obtained by OPG during the course of executing their responsibilities should be conveyed to the Contractor. Coordination of the work by the Contractor and OPG is a risk that could impact Project deliverables.

In order to mitigate this risk, it is proposed that monthly meetings be held with OPG's and Contractor's environmental teams to coordinate activities and disseminate information.

Stop Work Situations

During construction, certain environmental events can occur (such as a spill or significant issue of non-compliance) that will result in the requirement to stop work. The Environmental Inspector in conjunction with the Construction Manager and/or Construction Superintendent(s), will have the ability to stop work should these events occur. Stop work situations could result in Project delays.

In order to mitigate the risks to the Project schedule, it is proposed that immediate action be completed by the Contractor to resolve the problem and the action be determined in conjunction with senior environmental team member, Environmental Inspector and Construction Manager or Construction Superintendent. The Contractor will: develop and implement an effective emergency response plan; provide training to workers in the response procedures; effectively communicate issues of compliance and non-compliance; ensure all approvals are in place prior to construction; and, continue risk management analysis to aid in foreseeing any potential issues.

Extreme Weather Conditions

Extreme weather conditions can negatively impact the natural environment on and within the construction areas. Terrain disturbance and soil structure damage through rutting or compaction

can result from wet soil conditions. Sedimentation of water features can result in extreme rain conditions on construction sites.

If warranted, contingency measures will be implemented in the area experiencing wet conditions. The contingency measures that might be implemented individually, or in combination, as required by site-specific conditions in the affected area include actions such as:

- Restrict construction traffic, where feasible, to low-ground pressure equipment;
- Work only in nonproblem areas, such as well drained soils, until conditions improve;
- Install geotextiles, swamp mats or corduroy in problems areas;
- Suspend construction until soils dry out;
- Ensure erosion and sedimentation control measures are functioning, as well as possible;
- Regrade areas that were subject to rutting, if rutting has occurred; and
- Rip compacted solids, if soil compaction has occurred.

Rare/Endangered Flora or Fauna Discoveries

Rare plant species and uncommon vegetation communities are as identified in the Environmental Assessment, dated March 1991. However, since this time federal and provincial species at risk lists and legislation have changed.

If rare or endangered wildlife, a site-specific wildlife habitat feature, a rare plant, or uncommon vegetation community are discovered during the "ground-truthing" exercise or during construction, the discovery will be assessed and suitable mitigation measures will be determined. In addition, appropriate government agencies will be notified as required. The site will be assessed based on the following information:

- The location of the newly discovered feature relative to the proposed construction area;
- The timing of construction versus the critical timing constraints for the wildlife species;
- The potential for construction activities to be altered, to reduce or avoid disturbance;
- The relative rarity of the plant or vegetation community;
- The growth habit and propagation strategy of the plant or vegetation community; and
- The habitat preferences of the animal, plant or vegetation community.

If this occurs during construction, work at that location will be suspended until the Environmental Inspector is notified, and they in turn notify:

- Applicable government agencies;
- The Contractor's wildlife assessment or botanical specialist; and
- The Environmental Manager.

The wildlife assessment or botanical specialist will visit the site if necessary. They will develop a suitable mitigation plan in consultation with the Project's environmental staff. Subsequently, the applicable government agencies will be notified.

Contaminated Groundwater

During construction, the Contractor will be performing groundwater monitoring, as part of OPG's Groundwater Management Plan. In the event that the monitoring identifies groundwater contamination, the Contractor will execute the contingency plan which will consist of the following:

- Identify the source of contamination, characteristics of the contaminant, and the volume of contaminant introduced into the groundwater;
- Remove the contamination source, if possible, which may result in a work stoppage;
- Develop and implement mitigation measures, if applicable; and
- Develop a remediation plan to treat the contaminated groundwater and reduce the extent of the contamination, this may include using natural attenuation ("do-nothing") as the remediation approach.

In the event of groundwater contamination the Contractor will notify the OPG and applicable regulatory agencies.

6.0 PROJECT TEAM

6.1 TEAM ORGANIZATION/MANAGEMENT STRUCTURE

6.1.1 Project Team

Please refer to the Project Organization Chart and List of Personnel, submitted as separate sections of this proposal.

6.1.2 Environmental Project Team

The Environmental Project Team will be made up of individuals/firms with expertise in specialties required for the Project. The head of the Environmental Project Team or the Environmental Manager will be a senior level environmental specialist with experience in large scale design and construction projects. The Environmental Manager will report directly to the Project Manager. Senior, Intermediate and Junior Environmental Specialists will support the Environmental Manager to meet the design and construction requirements of the Project. The Environmental Specialists will have experience in natural sciences (fisheries and terrestrial biology), waste management, public consultation, soil and groundwater monitoring, management of water (surface, storm and groundwater) and approval acquisition.

During construction, the Environmental Inspector will report directly to the Environmental Manager and also to the Project Manager, if issues of compliance during construction arise.

The Environmental Manager will be responsible for overseeing the following specialists/firms: archaeology, air quality, arborist, remediation/restoration and public consultation/public relations. The Environmental Manager may report directly to OPG, as required.

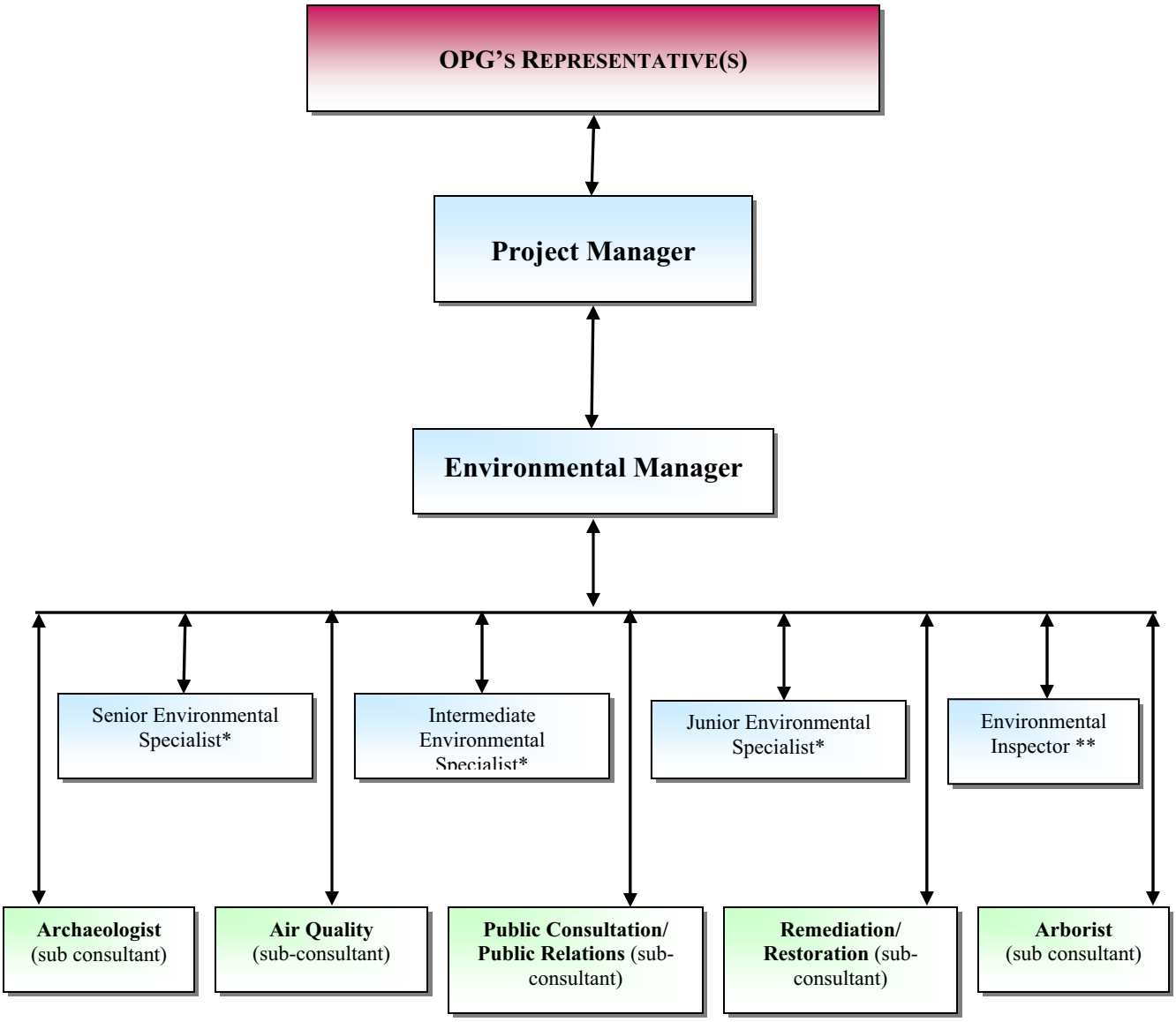
Figure 4 provides the Environmental Team Organization Chart.

6.2 ROLES AND RESPONSIBILITIES OF ENVIRONMENTAL TEAM STAFF

6.2.1 Environmental Manager

The Environmental Manager will undertake the following roles and responsibilities:

- Manages all environmental staff and environmental subconsultants;
- Attends all Project meetings with OPG for design and construction phases; and
- Completes monthly reports on Environmental Compliance Plan and completes the Environmental Audits.



* Environmental Specialists (design phase only) responsible for approvals, design, Community Impact Agreement, waste management, contaminated sites and natural sciences (fisheries and terrestrial).

** Environmental Inspector (construction phase only) responsible for environmental inspection, sampling and analysis (surface water, groundwater and effluent), fisheries and Community Impact Agreement.

Figure 4: Environmental Team Organization Chart

- Provides advice to Project Manager and OPG on environmental issues;
- Completes QA/QC responsibilities on environmental documentation;
- Leads all Environmental Project Team meetings;
- Liaises with agencies and attends meetings with agencies and OPG; and
- Partakes in the Project and environmental risk management assessments.

6.2.2 Senior Environmental Advisor(s)

The Senior Environmental Advisor(s) will undertake the following roles and responsibilities:

- Provides advice to Environmental Team Project Manager on specific environmental issues (in particular related to compliance);
- Reviews documentation, plans, monitoring programs and training programs (in particular related to compliance).

6.2.3 Senior Environmental Specialists

The Senior Environmental Specialists will undertake the following roles and responsibilities:

- Provides advice to Environmental Manager on specific environmental issues;
- Completes Environmental Audits;
- Attends Project meetings related to specific design and construction elements;
- Partakes in the environmental risk management assessment;
- Completes Community Impact Agreement public and municipal consultation requirements;
- Liaises with agencies and attends meetings with agencies and OPG, as required;
- Completes documentation;
- Develops and implements plans and monitoring programs;
- Develops and presents training programs.

6.2.4 Intermediate and Junior Environmental Specialists

The Intermediate and Junior Environmental Specialists will undertake the following roles and responsibilities:

- Provide support to the Environmental Manager and Senior Environmental Specialists;
- Complete research;
- Attend Environmental Team Project meetings;
- Aid in the implementation of Project requirements; and
- Draft environmental documentation (e.g. Environmental Handbook).

6.2.5 Environmental Inspectors

The Environmental Inspectors will undertake the following roles and responsibilities:

- Monitor construction activities on a daily basis;
- Maintain a log of monitoring events;
- Complete a daily monitoring report and provide to Environmental Manager and Project Manager;
- Provide advice and recommendation for ineffective environmental protection and issues on non-compliance; and
- Sample surface water and groundwater and provide recommendations on management.

6.3 QUALIFICATIONS OF ENVIRONMENTAL STAFF

6.3.1 Environmental Manager

The Environmental Team Project Manager will have the following qualifications:

- Fifteen years of experience managing multi-disciplinary environmental projects including those for design and construction projects;
- Have an undergraduate degree or higher in a related environmental field from a recognized university;
- Experience in managing staff, environmental planning, providing advice with respect to environmental issues and compliance, risk management assessments, obtaining approvals, liaising with agencies, client relations, and in QA/QC responsibilities; and
- Effective communicator and project manager.

6.3.2 Senior Environmental Advisor(s)

The Senior Environmental Advisor(s) will have the following qualifications:

- Fifteen years of experience in providing advice on specific environmental issues, in particular environmental compliance; and
- Experience in reviewing environmental documentation, for in particular environmental compliance.

6.3.3 Senior Environmental Specialists

The Senior Environmental Specialists will have the following qualifications:

- Fifteen years of experience in working on environmental projects including those for design and construction projects;
- Have an undergraduate degree or higher in a related environmental field from a recognized university;
- Experience in providing advice with respect to environmental issues and compliance, risk management assessments, obtaining approvals, liaising with agencies, public consultation/public relations, development and implementation of plans and monitoring programs, and, development and presentation of environmental training programs; and
- Providing advice on specific environmental issues.

6.3.4 Intermediate and Junior Environmental Specialists

The Intermediate and Junior Environmental Specialists will have the following qualifications:

- Five and two years of experience respectively on environmental projects including those for the design and/or construction projects;
- Have an undergraduate degree or higher in a related environmental field from a recognized university or college;
- Experience in environmental research, field work and/or writing reports.

6.3.5 Environmental Inspectors

The Environmental Inspectors will have the following qualifications:

- Five years of experience in environmental inspection of construction projects with particular experience with in-water construction;
- Have an undergraduate degree or higher in a related environmental field from a recognized university or college;
- Experience in providing advice and recommendations to upper management on environmental issues, field work and report writing. Environmental projects for the design and/or construction projects environmental research, field work and/or writing reports; and
- Have good communication skills.

7.0 REFERENCES

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Ontario Hydro. 1991. Niagara River Hydroelectric Development Environmental Assessment (including Update, Amendment and Associated Documentation)

8.0 GLOSSARY

best management practices	A practice or combination of practices that will be implemented by the proponent and considered to be an effective and practical (including technological, economical, and regulatory considerations) means of planning and constructing the project.
CCME	The abbreviation for Canadian Council of Ministers of the Environment.
cofferdam	A device that, when placed within a stream channel, is designed to divert half of the main flow of water away from an area to be subjected to disturbance within the stream channel.
construction phase	The phase of a project after the design phase, during which project facilities and infrastructure are assembled and installed on their foundations, and connected and tested to ensure that they operate as designed.
contaminant	A substance that is present or released in the environment at an amount, concentration, level or rate that results in, or might result in, an adverse effect.
DFO	The abbreviation for Fisheries and Oceans Canada.
ECP	The abbreviation for Environmental Compliance Plan.
EEP	The abbreviation for Environmental Emergency Plan.
EMP	The abbreviation for Environmental Management Plan.
grubbing	A construction activity that involves removing tree roots and stumps from areas that will be under construction or development.
habitat	The part of the physical environment in which a plant or animal lives, e.g., a stream habitat or forest habitat.
hazardous materials	Any substance or material that, because of its quantity, concentration, or physical or chemical characteristics is capable of posing a significant risk to health, safety, property or the environment through handling, transportation, or storage. Any substance or material that is regulated as a controlled product under federal or provincial legislation. This definition excludes hazardous waste.
heritage resources	Cultural, historic, archaeological and paleontological resources, including pre-contact and post-contact features.

impact	Any effect on land, water, air or any other component of the environment, including any effect on the social and cultural environment or on heritage resources.
mitigation	The elimination, reduction, or control of a project's adverse environmental effects, including restitution for any damage to the environment caused by such effects through replacement, restoration, compensation or other means.
MNR	The abbreviation for the Ontario Ministry of Natural Resources.
MOE	The abbreviation for the Ontario Ministry of the Environment
monitoring	Resolving specific outstanding environmental issues, observing the potential environmental effects of a project, addressing the effectiveness of mitigation measures undertaken, identifying unexpected environmental issues and determining the action required based on the result of these activities.
non-hazardous materials	Any substance or material that does not fit within the parameters outlined in the definition of hazardous materials.
OEMP	The abbreviation for Outline Environmental Management Plan.
operations phase	The phase of a project during which the generators and associated facilities are operated.
page wire	A robust material used to add support to a silt fence. It increases the strength of the silt fence, to contain large amounts of eroded soil and silted water on the upslope side of the fence.
restoration	The process of re-establishing a disturbed site to a former or other productive use, not necessarily to the same condition that existed before disturbance. The land capability might be at a level different, i.e., lower or higher, than that which existed prior to the disturbance, depending on the goal of the process. Restoration includes the management of a contaminated site and revegetation where necessary. Restoration is not considered complete until the goals for restoration have been achieved.

riparian	Pertaining to anything connected with, or immediately adjacent to, the banks of a watercourse or waterbody.
silt fence	Impermeable material installed at the base of slopes and along banks of watercourses that is designed to capture eroded soil and silted water that runs off during spring break-up or during heavy rains. Silt fences are left intact until revegetation of the area is sufficient to reduce or eliminate soil erosion.
siltation	The discharge of soil material into a watercourse, or disturbance of the streambed, that results in an increased sediment load.
soil compaction	The loss of void spaces between soil particles as a result of vehicles and heavy equipment travelling over poorly drained, fine textured soils.
sorbent material	Materials that are used to absorb liquid hydrocarbons after a spill.
species at risk	An extirpated, endangered or threatened species, or a species of special concern, as defined in the *Species at Risk Act*.
stockpile	A storage supply of material, such as granular or soil, to be used later.
study area	The area within the spatial boundaries of the scope of the Project.

APPENDIX A - Environmental Notice

ENVIRONMENTAL NOTICE

To: **Ontario Power Generation Inc.** •

Contract: • (the "**Agreement**")

Contract No.: •

Environmental Notice No.: •

Date: •

Defined terms in this Notice have the same meanings given to those terms in the Agreement. Under Section 2.5(b) of the Agreement, the Contractor hereby gives OPG notice of:

a) The changes to its environmental management, protection and monitoring program and plan described on Appendix A to this Environmental Notice;	■
b) The discharge, spill, release, emission, deposit or leak described in Appendix A to this Environmental Notice; or	■
c) The order, directive, notice or other communication attached as Appendix A to this Environmental Notice from the Governmental Authority set out in the order, directive, notice or other communication.	■

APPENDIX B - Table 2 – Legislative Approvals

TABLE 2

Legislative Approvals

Statute with Approval Requirement	Anticipated to be Required (Yes/No/Possibly)	Details	Approximate Length of Time for Approval by Agency
International Niagara Diversion Treaty, 1950	No	• Previously obtained by OPG	
International Boundary Waters Treaty Act - 1985	No		
Fisheries Act - 1985	No	• Previously obtained by OPG	
Navigable Waters Protection Act – 1985 (Navigable Water Permit)	No	• Previously obtained by OPG	
Navigable Waters Protection Act – 1985 (Non-Navigable Water Permit)	Yes	• A non-navigable water permit for work on this non-navigable section of the Niagara River is required.	Up to 3 Months
National Transportation Act – 1987	No	• Act repealed in 1996 and replaced with the Canada Transportation Act	
Canada Transportation Act – 1996	No	• Act governs transportation modes such as aircrafts and trains. The Act does not cover requirements for the construction of structures that may interfere or obstruct transportation.	
Canada Shipping Act – 2001	No	• Act governs requirements for operating and maintaining vessels and does not cover requirements for construction of structures, which may obstruct navigation. This is addressed under the Navigable Waters Protection Act.	

Transportation of Dangerous Goods Act – 1992	Possibly	• Section 31. (1) of the Transportation of Dangerous Goods Act states that a permit may be issued authorizing any activity to be carried on in a manner that does not comply with this Act, if the regulatory authority deems that the manner in which the authorized activity will be conducted provides a level of safety at least equivalent to that provided by compliance with this Act. • Contractor requires permit if transporting dangerous goods as defined by the Act.	Up to 3 months
Canada Water Act – 1970	No	• Permit not required, as there will be no intentional emission of contaminants into a water body.	
International River Improvements Act - 1985	No	• Section 4. of the International River Improvements Act states that no person shall construct, operate or maintain an international river improvement unless that person holds a valid licence therefore issued under this Act. • License required if the project involves a structure that will alter the natural flow of an international river. This Act also triggers the Canadian Environmental Assessment Act, see below. • Discussions with Environment Canada – project is exempt	
Canada Wildlife Act – 1985	No	• Act specifies designated wildlife areas, where permits are required to disturb vegetation etc. The Niagara Falls area is not a designated wildlife area as specified in this Act.	
Migratory Birds Convention Act – 1994	No	• No permit required prior to construction. Construction should commence prior to the nesting season to minimize concerns. If a nest is encountered during construction then a permit is required to move or dispose of the nest. The permit is applied for and granted within the same business day.	
Environmental Contaminants Act	No	• Act repealed in 1988, except Section 9, which was repealed in 1994.	

Canadian Environmental Assessment Act	No	• Section 74 (3) states when a proponent proposes to carry out a project which was conducted in accordance with EARPGO, the information from that assessment can be used to comply with section 18 or 21. If requirements are not met under these sections, they must be met to proceed with the project. • Not required as per OPG's Response to Proponent's Questions 3 dated April 15, 2005	
Resources and Technical Surveys Act - 1985	No	• Act does not contain any permit requirements.	
Canada Land Surveys Act	No	• Act established fees to be charged for release of maps, plans, field notes, etc.	
Explosives Act – 1985	Possibly	• Section 7. (1) of the Explosives Act states that The Minister may issue (a) licences for factories and magazines; (b) permits for vehicles used for the transportation of explosives. • License required for temporary storage of explosives on site.	Up to 3 Weeks
Historical Sites and Monuments Act, Indian Burial Grounds	No	• Environmental assessment isolated four undisturbed areas and one archaeological site. These sites will not be disturbed during construction, therefore no permit required.	
Telecommunications Act – 1993	No	• Act contains the regulations to broadcast in Canada, or distribute broadcasting, such as a radio station or cable provider.	
Ontario Environmental Assessment Act	No	• Previously obtained by OPG.	
Ontario Environmental Protection Act (Air)	Yes	• Permit is required for tunnel ventilation system and works such as paint booths.	Up to 3 Months
Ontario Environmental Protection Act (Water/Industrial Sewage Works)	Yes	• Permit required, for the release of discharge from the retention ponds to a water body. However, if contaminants are accidentally introduced, the spill must be reported to the Niagara Conservation Authority and the Ministry of the Environment.	Up to 3 Months

Ontario Environmental Protection Act – Reg. 347	Yes	• Section 18. (1) of the Ontario Environmental Protection Act – Regulation 347 states that every generator who operates a waste generation facility that is involved in the production, collection, handling or storage of subject waste shall, (a) before transferring any subject waste from that waste generation facility, submit an initial Generator Registration Report to the Director in respect of the facility; and (b) on or before February 15 in each year, submit an annual Generator Registration Report to the Director in respect of each waste generation facility operated by the generator. • Waste generator number required.	8 – 20 Weeks
Ontario Environmental Protection Act – Dust Suppressant	Yes	• Permit for the use of dust suppressants other than water is required.	Up to 3 Months
Ontario Water Resources Act – Reg. 285 - 1999	Yes	• Section 34. (3) of the Ontario Water Resources Act states that despite any general or special Act or any regulation or order made there under and subject to subsection (5), no person shall take more than a total of 50,000 litres of water in a day, (a) by means of a well or wells that are constructed or deepened after the 29th day of March, 1961; or (b) by means of an inlet or inlets from a surface source of supply, where the inlet or inlets is or are installed in the source of supply or is or are enlarged after the 29th day of March, 1961; or (c) by means of a structure or works constructed after the 29th day of March, 1961 for the diversion or storage of water; or (d) by any combination of the means referred to in clauses (a), (b) and (c), without a permit issued by a Director. • Permit to take water required.	3 Months
Pesticides Act – Nov. 2004	No	• The act establishes regulations for individuals and firms who will be performing exterminations, as a contractor would be performing this work (if needed) they would be required to have the appropriate licenses under the act.	

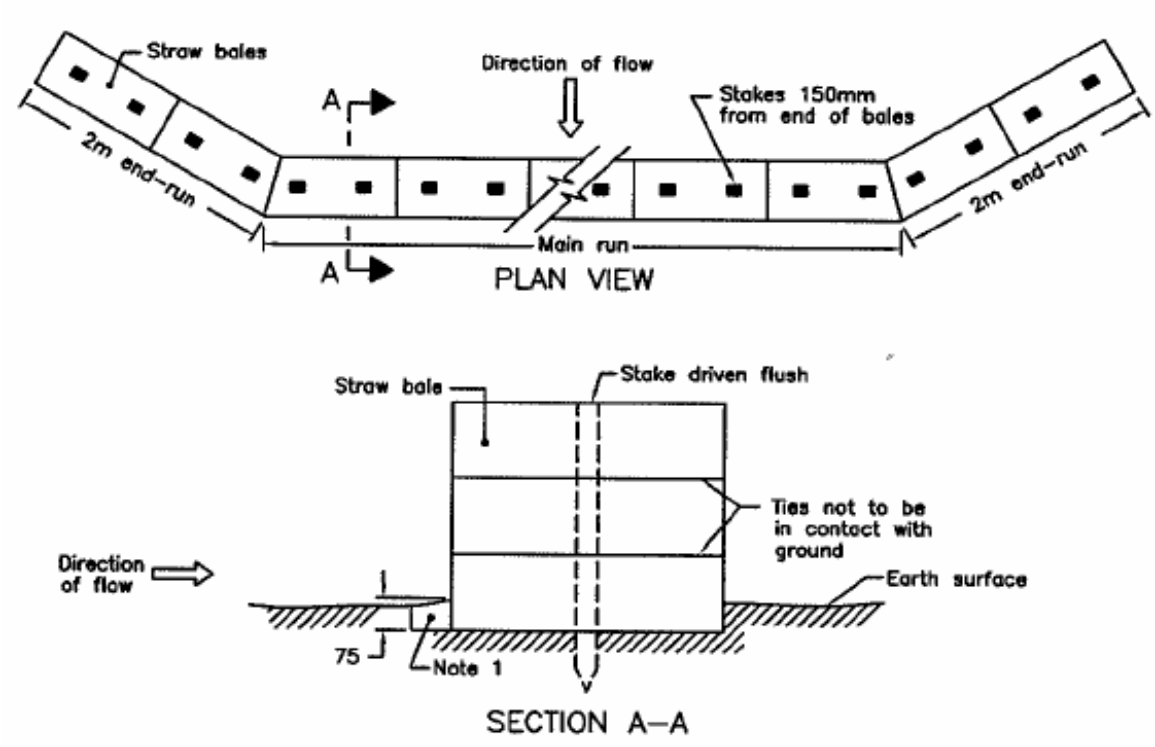
Public Lands Act – 1990	Yes	• Section 14. (1) of the Public Lands Act states that the Lieutenant Governor in Council may make regulations, (a) prohibiting an activity specified by the regulations on public lands or shore lands unless the activity is carried on in accordance with a work permit. • Application for work permit required if planning on working on provincially owned land.	Minimum 6 Weeks, Maximum 1 Year
Lakes and Rivers Improvement Act	Yes	• Section 14. (1) of the Lakes and Rivers Improvement Act states no person shall construct a dam in any lake or river in circumstances set out in the regulations without the written approval of the Minister for the location of the dam and its plans and specifications. • Regulation 454/96 states that for the purpose of subsection 14 (1) and section 16 of the Act, approval is required to, (a) construct or make improvements to a dam; (b) construct a water crossing draining an area greater than five square kilometres, unless construction is undertaken by a Ministry, municipality or Conservation Authority on lands owned by the Crown, the municipality, or the conservation authority undertaking the construction; (c) channelize a river or stream that may harmfully alter fish habitat or impede the movement of fish in a river, stream or lake, except for the installation or maintenance of a drain, subject to the Drainage Act; (d) enclose or cover a length of river or stream for greater than twenty metres in length; (e) install, if the installation may result in damming, forwarding or diverting water, a cable or pipeline into the bed of a river, stream or lake except for the installation of heat loops, water intakes and service cables for private residences.	Minimum 6 Weeks, Maximum 1 ½ Years
Beds of Navigable Waters Act – 1990	No	• Act states that when crown land is sold, unless explicitly stated, the sale does not include the bed of any waterbody.	
Beach Protection Act	No	• Act repealed and now covered under the Aggregate Resources Act.	

Conservation Authorities Act – 1990 Reg. 97/04 & 508/94	Possibly	• See Niagara Peninsula Conservation Authority below.	Up to 3 Months
Mining Act – 1990	No	• Permit not required, as the excavation is not for the primary intent of recovering aggregate or mineral resources for commercial use.	
Aggregate Resources Act – 1988	No	• Permit not required, as the excavation is not for the primary intent of recovering aggregate or mineral resources for commercial use.	
The Plugging Code	No	• The Plugging Code does not exist.	
Provincial Parks Act -	No	• Act governs activities within provincial parks, the construction zone is not within a Provincial park, therefore no permits or approvals are required.	
Forest Fire Prevention Act - 1990	No	• Act applies to fire regions and the construction zone is not within a fire region, therefore no permits are required.	
Trees Act	No	• Act repealed in 1998, replaced with the Forestry Act.	
Forestry Act – 1998	No	• Section 12. (1) of the Ontario Forestry Act states that the council of any municipality may enter into agreements with the owners of land located in the municipality providing for, (a) the reforestation of portions of the land; (b) the entry and planting of trees upon such portions by the employees or agents of the council; and (c) the fencing of the portions and conservation of all growing trees thereon by the owner. • Permits or licences must be obtained under the individual municipalities, if required.	
Endangered Species Act	No	• Project does not plan to destroy or interfere with the habitat of species listed in Schedule 1 and 2 of the act. The EAS identifies dusky salamanders and bald eagles in the vicinity of the Niagara River, however construction operations are not believed to be in the same areas. Confirmation required.	

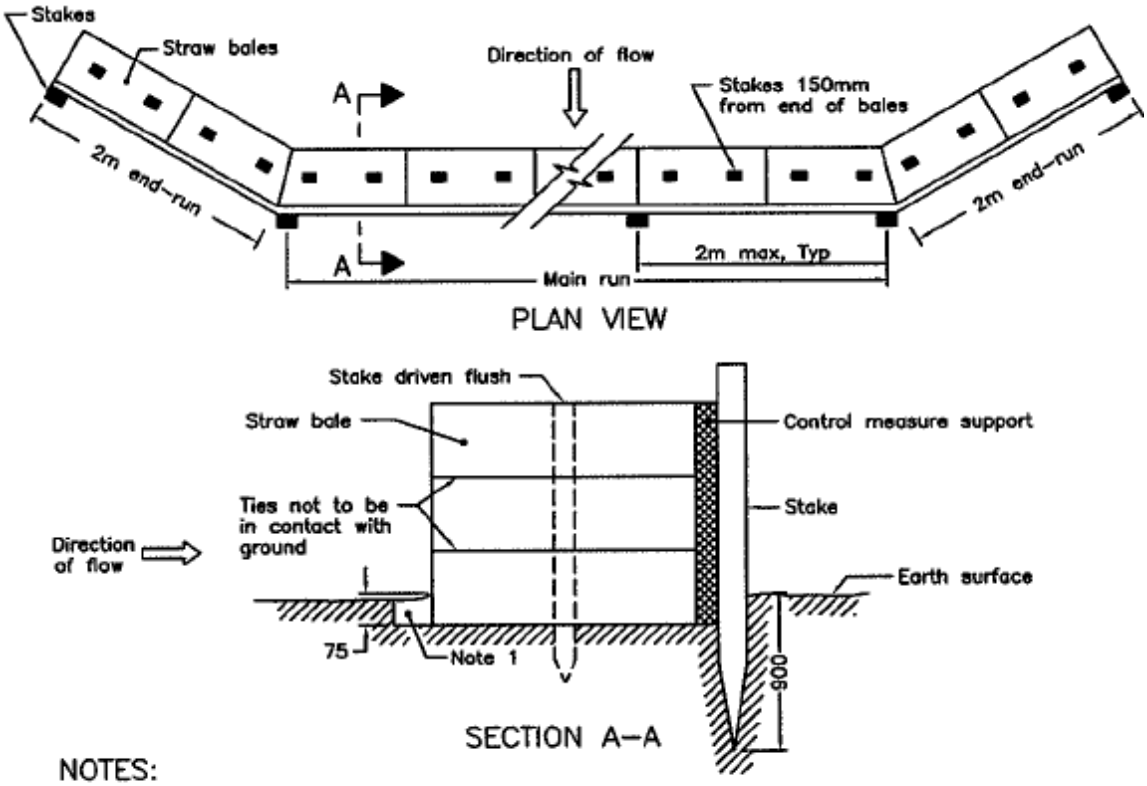
The Power Corporation Act – 1990	No	• Act was mostly repealed in 1998. The remaining portions govern pension plans for employees of power corporations and the appointment of a commission for the control and management of the construction, operation and maintenance of all works undertaken by the corporation for the distribution and supply of power in a municipality of 60,000 or more.	
The Planning Act – 1990	No	• All zoning approvals, setbacks, building heights as stipulated by municipal plans and by-laws.	
Ontario Heritage Act – 1990	No	• Environmental assessment isolated four undisturbed areas and one archaeological site. These sites will not be disturbed during construction, therefore no permit required.	
Occupational Health and Safety Act – 1991 – Reg. 213	Yes	• Notice must be filed before construction commences.	1 Day
Public Health Act – 1990	No	• Act does not apply to construction projects or work sites. This is governed under the Occupational Health and Safety Act.	
Dangerous Goods Transportation Act	No	• Permits are required for carriers of dangerous goods, which would be the trucking company. Permit would only be required if hazardous waste was being removed from the site. Then all parties involved (including the generator of the waste) must have a permit to transport dangerous goods. If a permit is required it usually takes 3 weeks.	
Provincial Highways Act	No	• Act repealed and replaced by the Highway Traffic Act	
Highway Traffic Act - 1990	No	• Act governs vehicle types, accepted uses, and licensing processes within the Province of Ontario.	
The Fire Marshall's Act	No	• Act repealed and replaced with the Fire Protection and Prevention Act	
Fire Protection and Fire Prevention Act – 1997	No	• Act governs building materials and protection and prevention measures. Does not govern construction projects.	

Niagara Parks Act – 1990	No	• Act governs the development of hydroelectric power and revenue collection.	
Weed Control Act – 1990	No	• Act outlines property owners' responsibility to destroy noxious weeds. No permits required.	
Municipal By-Laws	Yes	• Area municipalities have noise, sewer use and road use bylaws. The following are required: Site Alteration Application with the City of Niagara Falls and Sewer Use By-Law with the Regional Municipality of Niagara Falls.	3 – 6 weeks
Niagara Peninsula Conservation Authority	Possibly	• As granted under the Conservation Authorities Act – 1990 Reg. 97/04 (Section 4) & 508/94 (Section 4), the Niagara Peninsula Conservation Authority requires the submission of an Application for Fill, Construction and Alteration to Waterways Permit.	3 – 6 weeks
Niagara Escarpment Planning and Development Act (1990) & Regulations	No	• Section 24. (1) states that despite any other general or special Act, if an area of development control is established by regulation made under section 22, no person shall undertake any development in the area unless such development is exempt under the regulations or unless the development complies with a development permit issued under this Act. 19 • A development permit is required as this project is not exempt.	Minimum 6 weeks, Maximum 6 months
Species at Risk Act – 2004	No	• Some species are identified in the Niagara Region that are listed under the act. The construction activities do not anticipate any disturbance to the species or their habitat.	

APPENDIX C - Schematics of Erosion and Sedimentation Control Measures (From Ontario Provincial Standards)



Light Duty Straw Bale Barrier

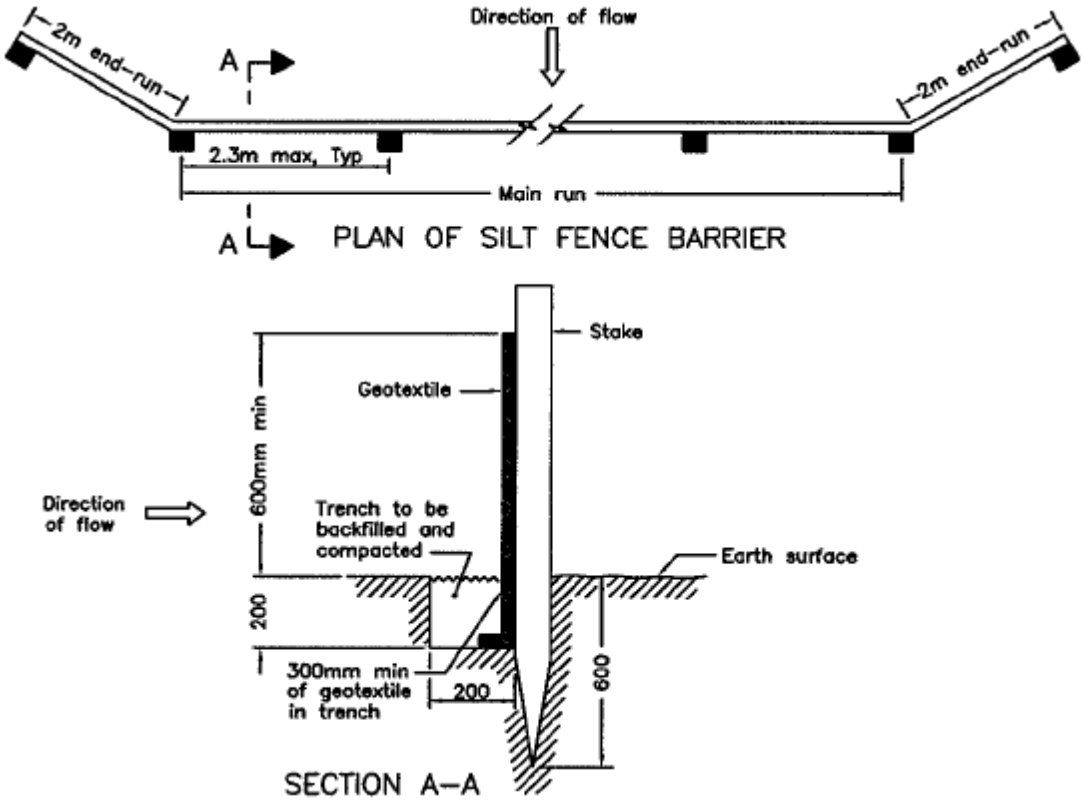


NOTES:

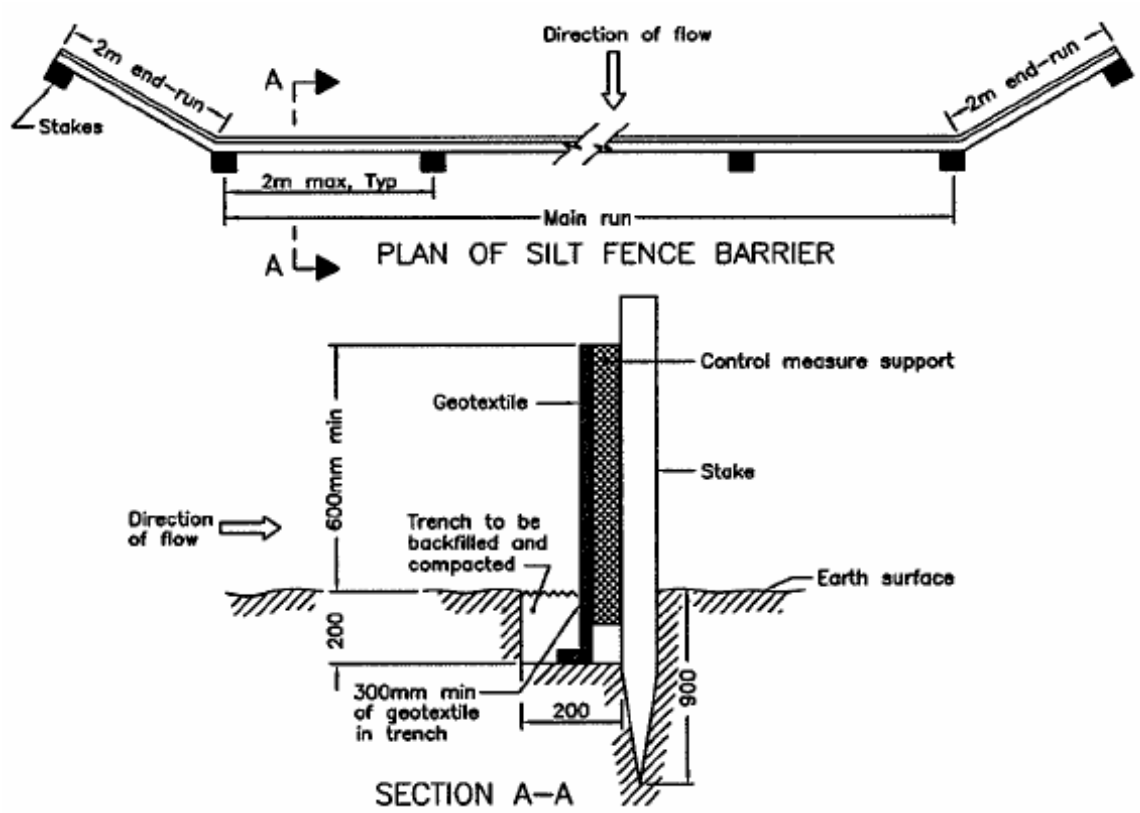
1 Balance of excavated trench to be backfilled following bale placement.

A All dimensions are in millimetres or metres unless otherwise shown.

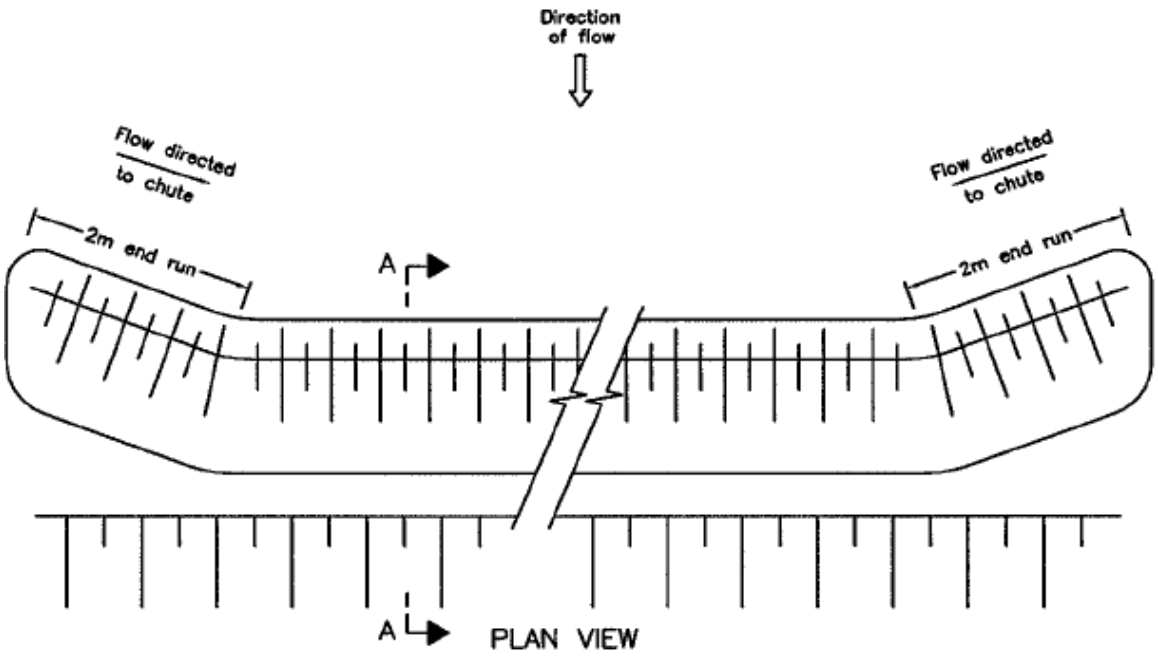
Heavy Duty Straw Bale Barrier

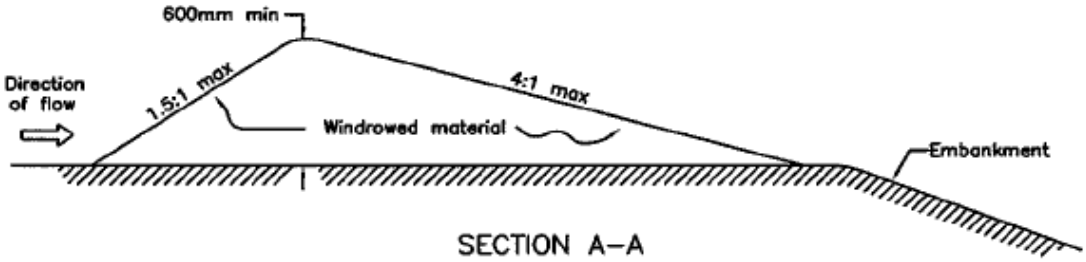


Light Duty Silt Fence Barrier

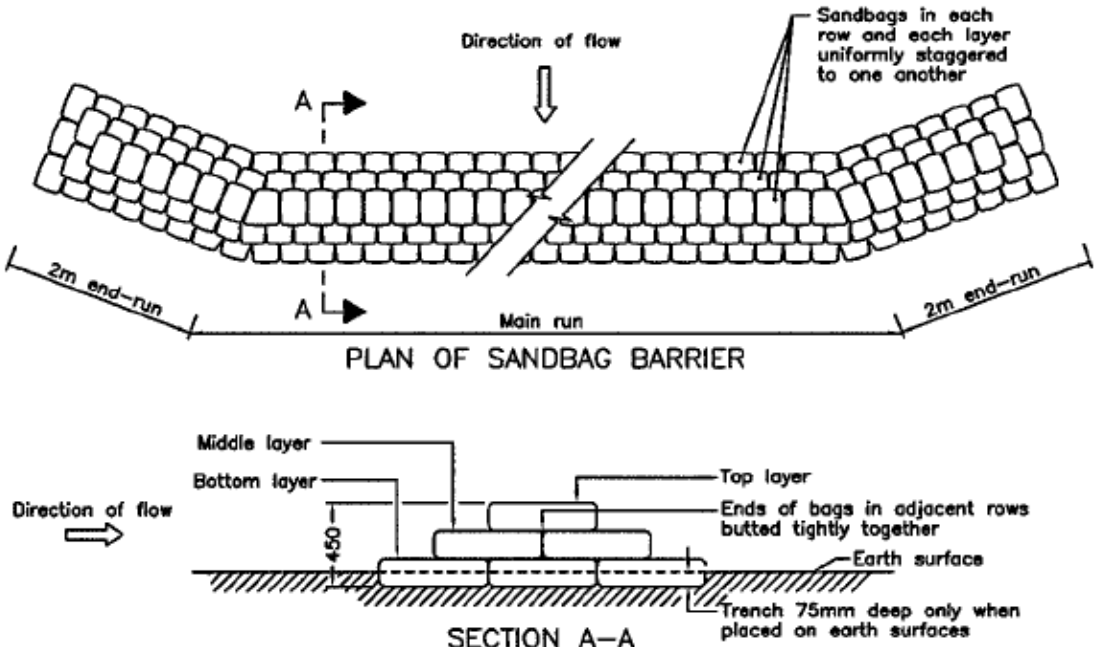


Heavy Duty Silt Fence Barrier

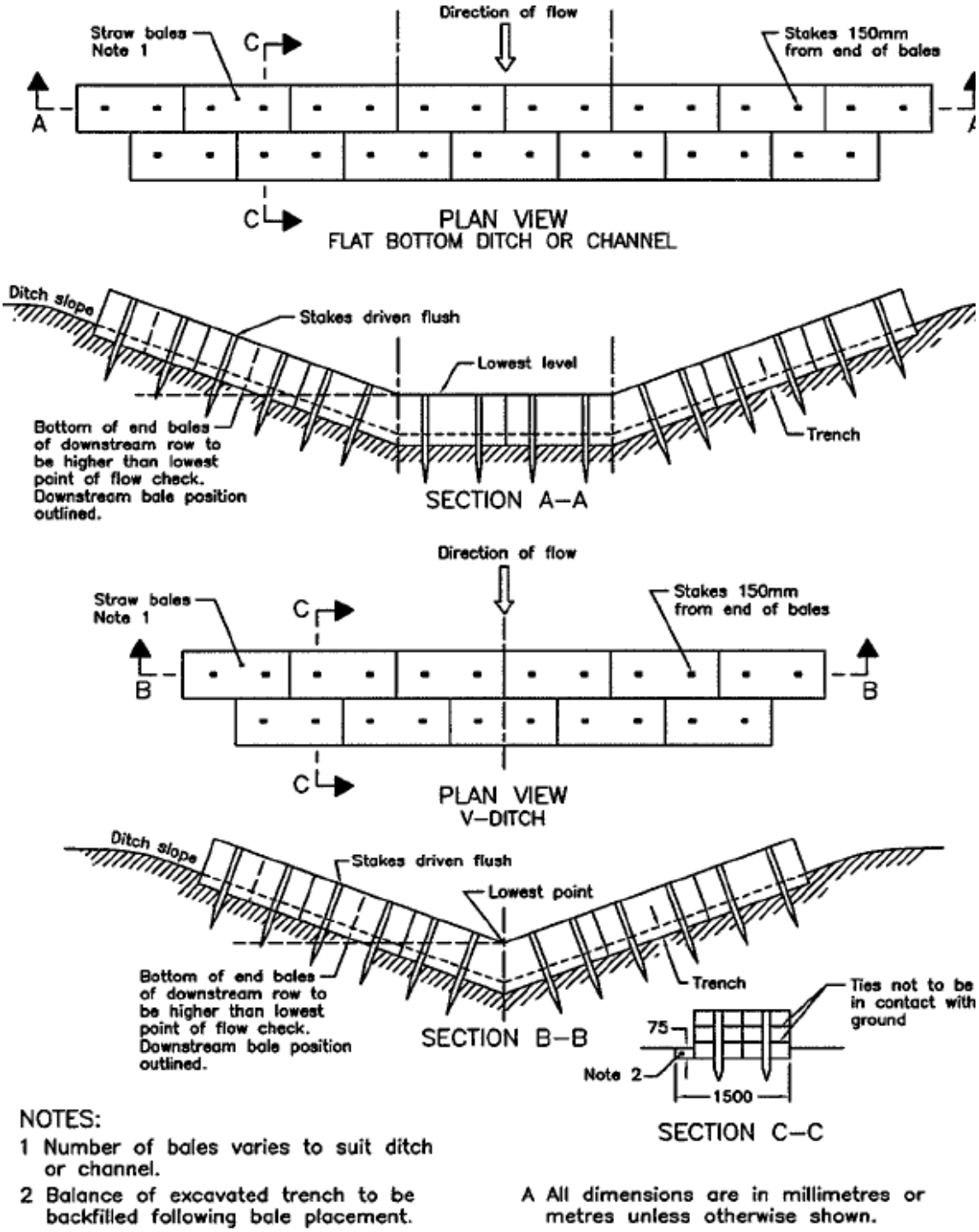




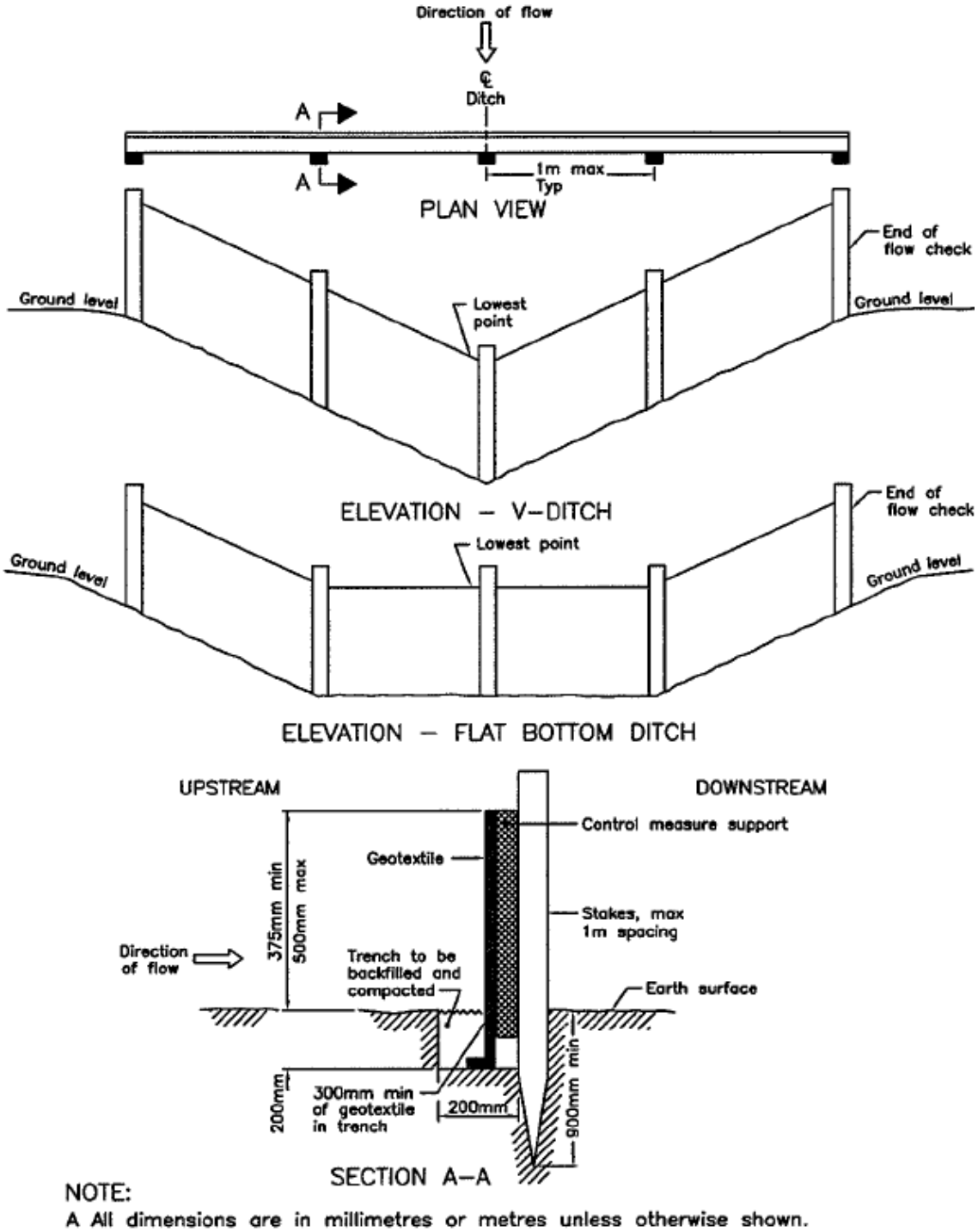
Berm Barrier



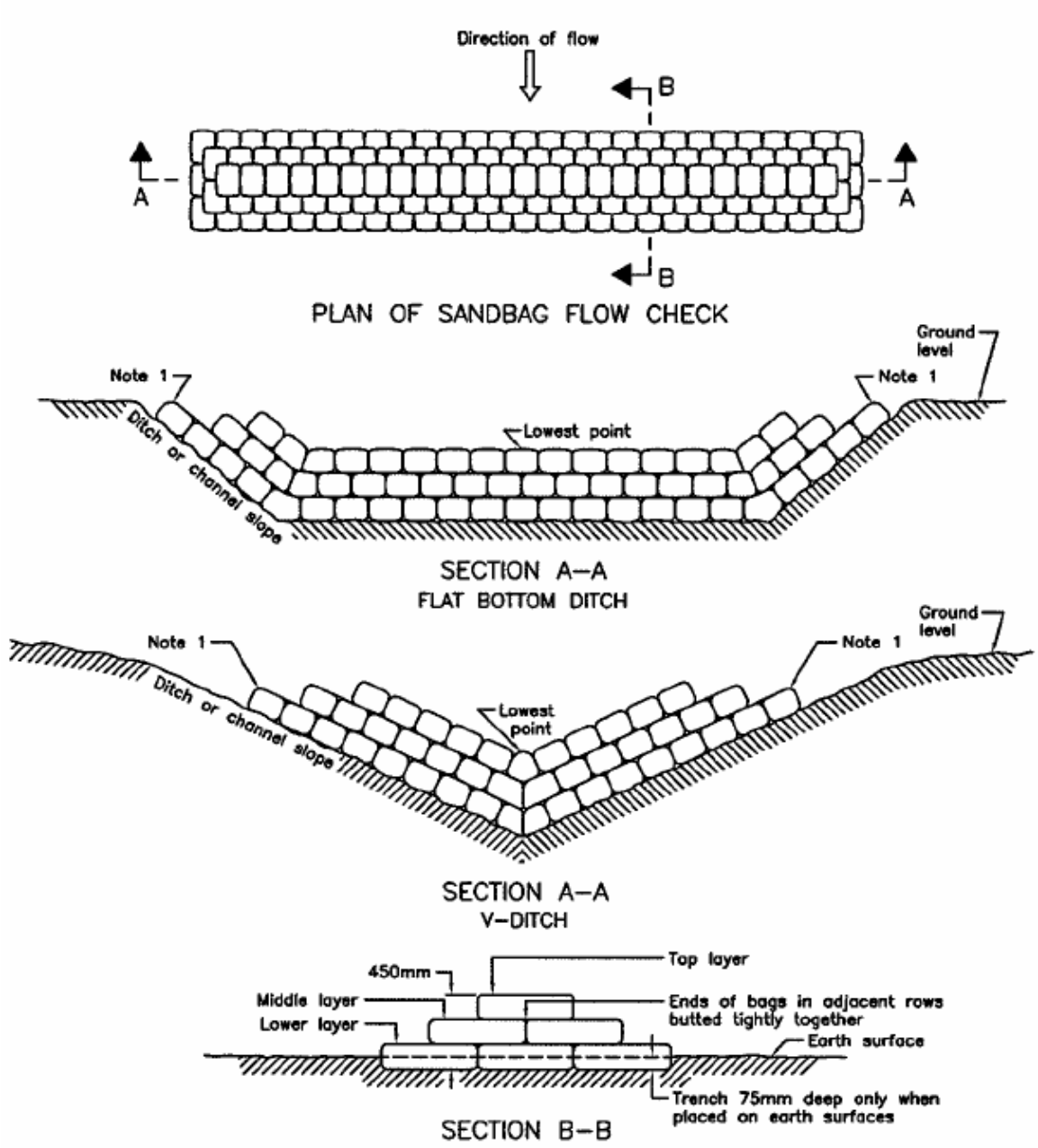
Sandbag Barrier



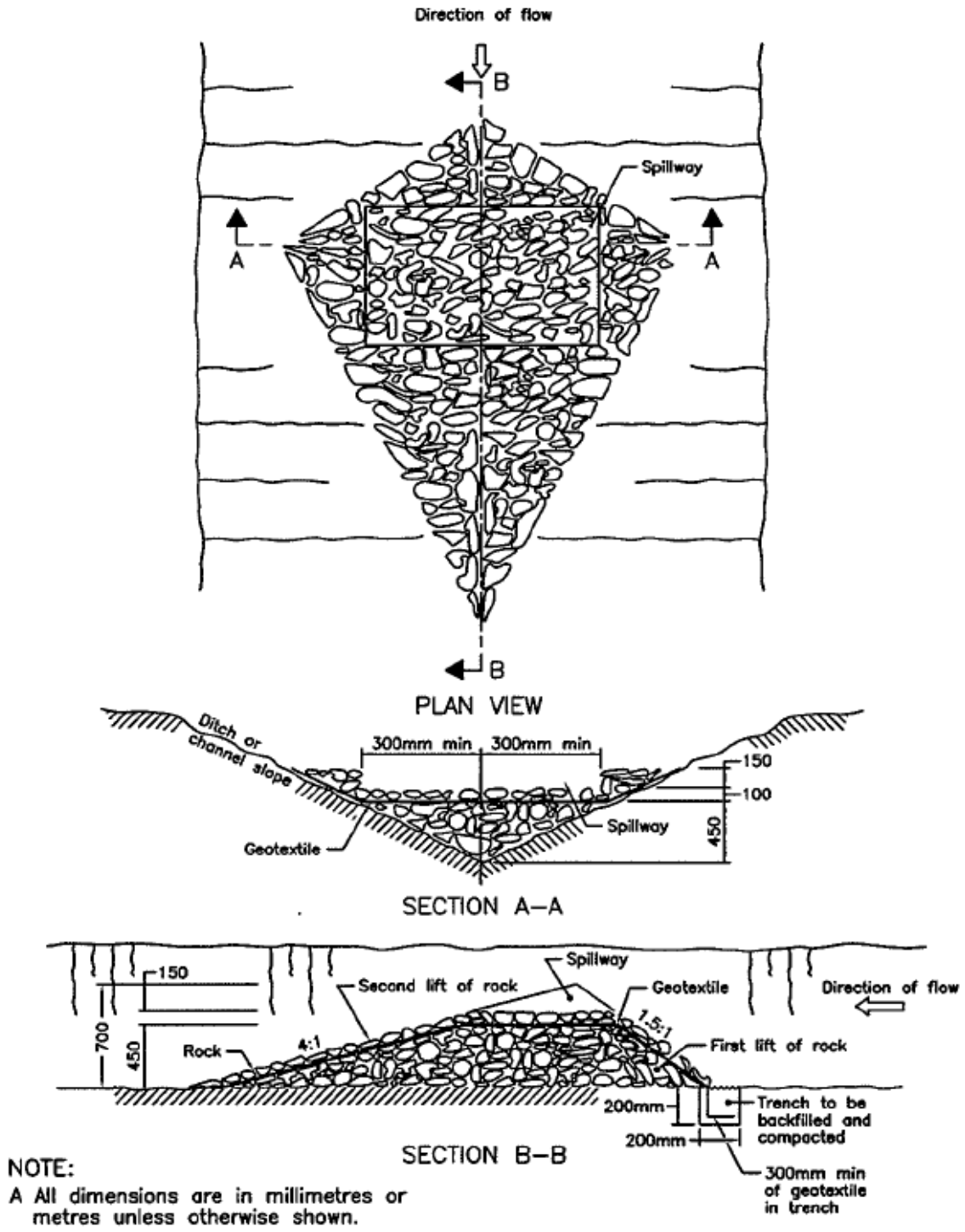
Straw Bale Flow Check



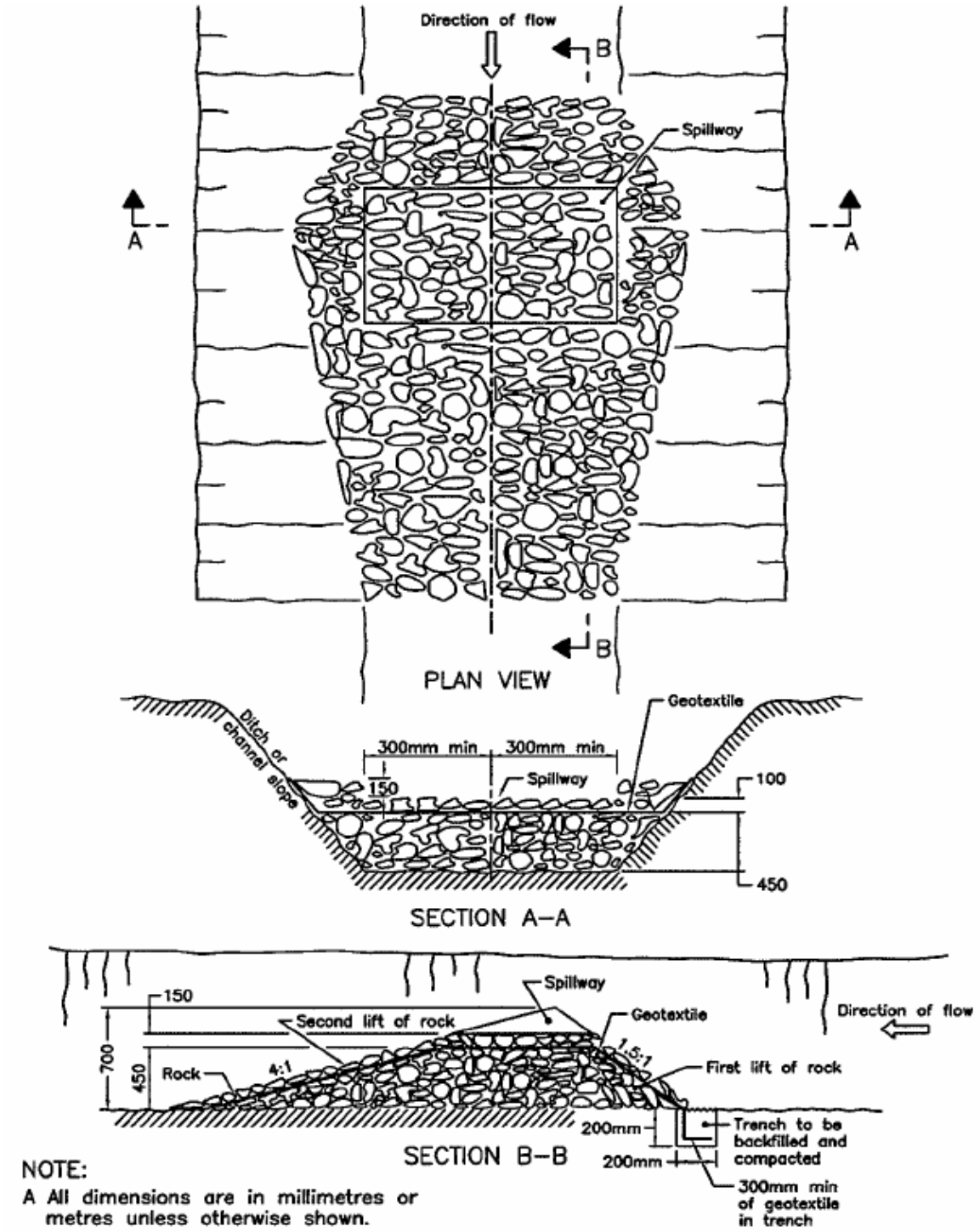
Silt Fence Flow Check



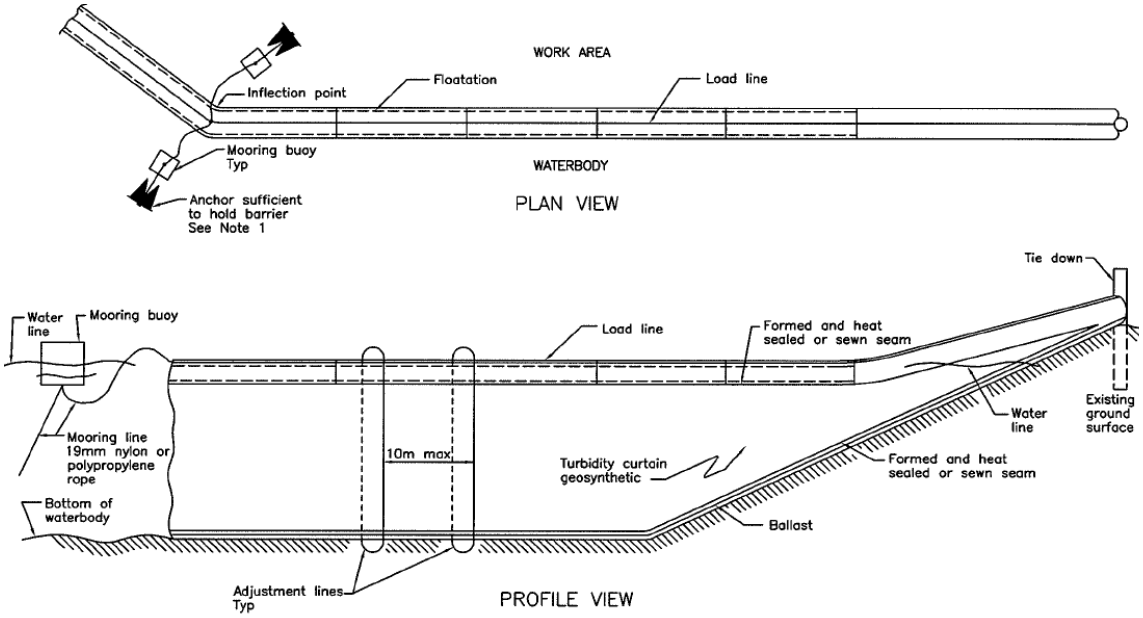
Sand Bag Flow Check



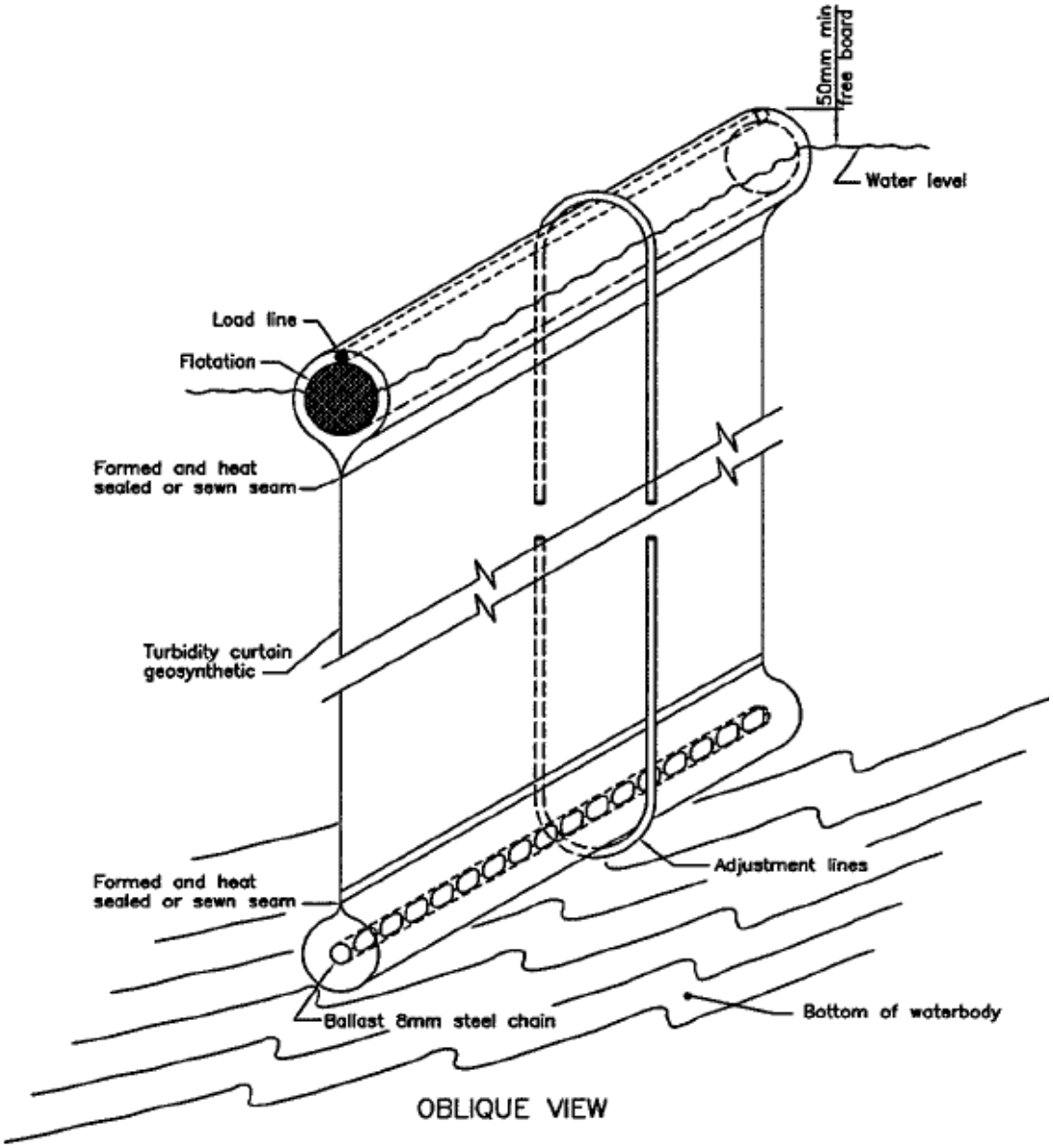
Temporary Rock Flow Check – V-Ditch



Temporary Rock Flow Check – Flat Bottom Ditch or Channel



Turbidity Curtain



Turbidity Curtain – Seam Detail

Appendix 2.5(b)

Appendix 2.5(b) - Environmental Notice

ENVIRONMENTAL NOTICE

To: Ontario Power Generation Inc. ("OPG")	Contract: Design/Build Agreement dated •, 2005 between Strabag AG (the "**Contractor**") and OPG (the "**Agreement**") Environmental Notice No.: • Date: •

Defined terms used in this Notice have the same meanings given to those terms in the Agreement. Under Section 2.5(b) of the Agreement, the Contractor hereby gives OPG notice of:

(a)	the changes to its environmental management plan described on Appendix A to this Environmental Notice;	■
(b)	the discharge, spill, release, emission, deposit or leak described on Appendix A to this Environmental Notice; or	■
(c)	the order, directive, notice or other communication attached as Appendix A to this Environmental Notice from the Governmental Authority set out in the order, directive, notice or other communication.	■

STRABAG AG

By: _____

Name:
Title

Appendix 2.7(a)(3)

Appendix 2.7(a)(3) - INTENTIONALLY DELETED

Appendix 2.8(a)

Appendix 2.8(a) - Submittal Requirements

1. SUBMITTAL REQUIREMENTS

For each element of the Work shown under Section 2, Summary Table of Submittals, the Contractor shall submit those Submittals marked with a "✓" and the Additional Submittals as indicated. Each Submittal shall comply with the following requirements.

1.1 Submittal Categories

1. **Schedules**-submit schedules in accordance with Agreement Sections 2.7(a)(1); 2.7(a)(2); 2.7(a)(3); and 7.1

2. **Environmental and Quality Assurance Documents**-submit in accordance with Agreement Sections 2.5(a)(4); 2.5(a)(5); and 2.12(c)(1).

3. **Design Basis Document**-for each applicable element of the Summary of Work, submit information as one complete document. Allow 45 calendar days for the Owner's review. The Submittal shall include the following:

   (a) identification of Summary of Work elements and applicable codes and standards

   (b) layout drawings, major plans and profiles, major sections, typical details, work limits, tie-ins and relationships to existing facilities and features

   (c) conceptual design solutions, loadings, design calculations

   (d) construction methodology with sequence and phasing of demolition, removal and construction for each package and relationship to the overall Project

   (e) identification of construction impacts on the community and mitigative measures

   (f) measures to address compliance with constraints in the Owner's Mandatory Requirements

   (g) measures to address compliance with 90-yr service life

   (h) identification of design issues and deviations from the Owner's Mandatory Requirements.

   (i) equipment and material specifications

   (j) other relevant information which defines the Work.

4. **100% Construction Documents**-submit in discreet construction packages according to the scheduled sequence of construction. Allow 30 calendar days for Owner's review. The submittal shall include the following:

(a) Drawings and Specifications ready for construction with signature and seal of a professional engineer registered in the Province of Ontario. An Autocad 2000 copy of each drawing and four paper copies to be delivered. Each drawing and item of data will contain the name of the Project, the title of the package of Work to which the drawing belongs, the OPG requisition number and the title of the drawing or data item.

(b) checked engineering analysis and design calculations

(c) minutes from the Contractor's design review meetings.

5. **Construction Methods**- submit the following in discreet construction packages according to the scheduled sequence of construction. Allow 30 calendar days for Owner's review

   (a) specific environmental protection procedures

   (b) specific QA/QC Plan and procedures

   (c) specific method statements.

6. **As-Built Design and Drawings**-submit the following engineering as-built documents. Identify revisions to the 100% Construction Documents. Allow 30 calendar days for Owner's review

   (a) Drawings updated with all 'as-built' revisions and changes made during construction

   (b) Specifications revised to reflect 'as-built' condition

   (c) checked design calculations for revisions to the 100% Construction Documents.

7. **Additional Submittals**-In addition to the above, the Contractor shall submit 'Additional Submittals' as identified under Section 2, 'Summary Table of Submittals'. Unless otherwise indicated, submit in accordance with the Contract Schedule. Allow 45 calendar days for Owner's review.

1.2 Format of Submittals

1. Submit written documentation on 8a by 11 in. paper.

2. Submit four copies of all submittals and such additional copies as the Owner may reasonably request.

3. Drawings shall be per the Owner's standards. Standards with respects to borders, levels, text, etc, will be provided.

4. Compact disc (CD) format shall be used to submit electronic files of as-built documents.

5. Software requirements shall be as follows:

   (a) Drawings shall be in AutoCAD version 2000

   (b) word process documents are to be in MS Word 2000

   (c) spreadsheets are to be MS Excel 2000

   (d) schedules are to be in Primavera Project Planner for Windows Version 3.1 with the capability for delivery in P3e/c - Version 3.5

   (e) any other proposed software requires prior approval by the Owner.

2. SUMMARY TABLE OF SUBMITTALS

Statement of Work Element	DesignBasis Document	100% Construction Documents	Construction Methodologies	As-Built Design and Drawings	Additional Submittals
Schedules					• 3 Month Detailed Schedule per Agreement Section 2.7(a)(1) • Submittal Schedule per Agreement Section 2.7(a)(2) • Detailed Contract Schedule per Agreement Section 2.7(a)(3) • Progress Schedule per Agreement Section 2.7(c) • WSIB account number per Agreement Section 2.14 • Schedule of Values per Agreement Section 7.1 • Schedule of Man-Hour Breakdown per Agreement Section 7.13(g)

Statement of Work Element	DesignBasis Document	100% Construction Documents	Construction Methodologies	As-Built Design and Drawings	Additional Submittals
Health and Safety					• INCW Part Project Specific Site Safety Plan per Agreement Section 2.20(d) • INCW Part Project Specific Site Security, Public Safety and Emergency Response Plan per Agreement Section 2.20(h)
Environmental Protection					• Environmental management plan per Agreement Section 2.5(a)(4) • Copies of all notices, requests, documents, instruments and certificates to applicable Governmental authorities per Agreement Section 2.6(a) • Copies of Approvals together with any imposed terms and conditions from the Governmental Authorities having jurisdiction, on receipt per Agreement Section 2.6(b) • Such plans as may be required by OPG including those set out in Agreement Section 2.5(a)(5) • All test data and results required to meet compliance with Approvals
					• Results from the groundwater monitoring program including monthly water level readings; and quarterly groundwater sampling and chemical analyses shall be submitted within 6 weeks after each sampling date. An annual groundwater monitoring report shall be submitted to OPG within 2 months after the last quarter of each year's sampling period.

Statement of Work Element	DesignBasis Document	100% Construction Documents	Construction Methodologies	As-Built Design and Drawings	Additional Submittals
Quality Assurance Program					• Quality Assurance Program per Agreement Section 2.12(c) • All quality control test data and results required by the Quality Assurance Program
Temporary Utilities	✓	✓	✓		• General arrangements and specifications for all temporary utilities including connection to Municipal utilities and Owner's power supply
Temporary Facilities	✓	✓	✓		• Layout of the temporary facilities required at the diversion tunnel outlet including any water treatment facilities • Layout and details of the temporary facilities required for the construction of the intake structures including the Contractor's dock, cofferdam and water treatment facilities • Layouts and details of all other construction plant such as concrete or grout mixing plants required to undertake the Work • Layout of the temporary access road between the intake construction area and Portage Road

Statement of Work Element	DesignBasis Document	100% Construction Documents	Construction Methodologies	As-Built Design and Drawings	Additional Submittals
Construction Activity Report					• Submit a weekly construction activity report summarizing each shift of work performed in that week. The report shall include as a minimum information on the work activities performed during the shifts, measurement and quantities of pay items, deliveries of materials or equipment, manpower on site by craft, major equipment on site and hours in production, boring logs detailing advance and downtime, significant events, weather and weather related events, visitors, testing, survey, layout, health and safety, environment, look-ahead schedule, and other information as required by OPG
Instrumentation	✓	✓	✓	✓	• Submit the following: • Instrument details, including manufacturers name, product details and specifications • Installation procedures, including (as appropriate) drilling or fixing methods, mixes for grouts, grouting methods, coupling, cabling and sealing methods • Manufacturer's details for electronic readout and data acquisition • Method of protecting instrument against damage • Locations and depths of proposed instrumentation to be installed

Statement of Work Element	DesignBasis Document	100% Construction Documents	Construction Methodologies	As-Built Design and Drawings	Additional Submittals
					• Monitoring plan for instrumentation including establishment and utilization of alert and response levels. • Provide a detailed schedule for the installation of all instruments • Within 7 days after installing any single instrument, provide • Full details of the installation, including depth and location of instrument, locations of couplings and seals • Base readings and monitoring frequency for the instrumentation
Accelerating Wall, Intake & Intake Approach Wall	✓	✓	✓	✓	
Diversion Outlet Canal	✓	✓	✓	✓	
Tunnel Piezometers	✓	✓	✓	✓	
Dewatering System Shafts	✓	✓	✓	✓	
Intake Structure	✓	✓	✓	✓	

Statement of Work Element	DesignBasis Document	100% Construction Documents	Construction Methodologies	As-Built Design and Drawings	Additional Submittals
Intake Gates	✓	✓	✓	✓	• Manufacturing inspection and test plans and commissioning procedure for intake gate and guides. • Price list of recommended spares for 1-yr operation. • Operating and maintenance manuals for equipment.
Outlet Structure	✓	✓	✓	✓	
Outlet Structure Gate & Hoist	✓	✓	✓	✓	• Manufacturing inspection and test plans and commissioning procedure for outlet gate and guides and hoist. • Price list of spares for 1-yr operation. • Operating and maintenance manuals for equipment.
Flow Verification Test	✓	✓	✓	✓	
Tunnel	✓	✓	✓	✓	• Details of the proposed grout mix or mixes, including additives, for prestess, contact and consolidation grouting. • Maintain and submit daily records of all grouting operations, rates of take, pressures used, types of mix, and such other data as may be required by the Owner.

Statement of Work Element	DesignBasis Document	100% Construction Documents	Construction Methodologies	As-Built Design and Drawings	Additional Submittals
					• Submit 60 days before commencing tunneling, complete details of all grouting equipment proposed, including but not limited to mixing, pumping, pressure measurement, accelerator dosing and control devices, flow and directional control, temporary storage vessels, coordination of TBM functions. • Submit details of the proposed procedure for tunnel grouting, including but not limited to, the location of mixing plant, mode of transport of mixed materials to face for injection, testing procedures, coordination with other related TBM functions, injection points used and their order, location and control of the introduction of any admixtures. • Submit proposed method statement and procedure for watering-up and commissioning of the tunnel including pre-watering-up inspection, sectional service gate and outlet closure gate closure, tunnel filling including rate and any hold points, instrumentation monitoring requirements, frequencies, post-watering-up inspection.
Tunnel Boring Machine					• Within 8 weeks after the Start Date. • Detailed general arrangement drawings of the TBM, back-up plant and equipment. • Specifications of the TBM, back-up plant and equipment.

Statement of Work Element	DesignBasis Document	100% Construction Documents	Construction Methodologies	As-Built Design and Drawings	Additional Submittals
					• Loads assumed, together with actual loads used, for design purposes for the main components. • Details of the relevant specifications used • Details of main bearing and main bearing seal. • Detailed schedule of manufacture of the TBM, back-up plant and equipment including delivery dates and testing dates. • Unpriced copies of Contract(s) with TBM manufacturer. • During manufacture • progress reports at weekly intervals including future necessary action to maintain delivery date. • Submit method statements, data and records at least three (3) months before commencement of tunneling operation.

Statement of Work Element	DesignBasis Document	100% Construction Documents	Construction Methodologies	As-Built Design and Drawings	Additional Submittals
Tunnel Boring Machine (cont)					• Operations making up normal tunnel construction cycle and associated logistics to include, but not limited to, organization and control, logistical supply TBM operations covering all intended machine parameters and interlocks along tunnel route taking account of the expected ground conditions to be encountered. Statement should include, but not be limited to, cutting head rotation speed and torque, TBM thrust, rates of advance. • Launching TBM. • Dealing with slabbed and spalled loose rock, including infilling of overbreak where required. • Installation of initial lining including sequencing equipment required, material required, equipment and material supply logistics. • Probing ahead of tunnel face, including equipment to be employed for drilling exploratory holes. • Consolidation grouting including equipment for mixing, storing and injecting grout ahead of the TBM. • Operation of TBM guidance system, including translation of information on alignment drawings into input for the guidance system.

Statement of Work Element	DesignBasis Document	100% Construction Documents	Construction Methodologies	As-Built Design and Drawings	Additional Submittals
					• Handling of spoil • Temporary water supply system for the TBM • Temporary drainage, lighting and ventilation systems • Temporary high voltage power and communication systems, including installation, operation, monitoring and protection • Layout and description of proposed gas monitoring systems for TBM and the tunnel • Response to activation of gas detectors

Statement of Work Element	DesignBasis Document	100% Construction Documents	Construction Methodologies	As-Built Design and Drawings	Additional Submittals
					• Emergency evacuation drill for individuals and entire underground crew • Procedure for manually steering the TBM and in the event of malfunction in the TBM guidance system • Contingency plans including, but not limited to, machine entrapment, cutter head jammed with rock pieces and not turning, sudden high water inflows, replacing main bearing and/or seals underground • Methods for achieving adequate TBM gripper pad seating in areas of excessive sidewall spalling. • Keep detailed records of usage of consumable fluids, oils and greases used in TBM operation, and submit to Owner on a monthly basis. • After each cutter head inspection, submit a cutter head condition report including position of replaced tools, degree of wear of replaced items and condition of remaining tools inspected.

Statement of Work Element	DesignBasis Document	100% Construction Documents	Construction Methodologies	As-Built Design and Drawings	Additional Submittals
Disposal of Excavated Material					• Prior to commencement of construction, submit for the Owner's review arrangements and specifications of the proposed material handling plan. Such plan shall include as a minimum the Contractor's stockpile design, stockpiling sequence, haul routes, or other delivery systems where applicable, and all mitigation measures proposed to comply with noise, dust, and other community and environmental considerations. Provide data confirming system will meet contract requirements.
Tunnel Survey					• Method statement for checking that the monuments established by the Owner are correct and are satisfactory to the Contractor for correctly laying out the work. • Method statement showing the proposed TBM guidance system and demonstrate that the equipment is capable of continuously monitoring and recording the position and attitude of the shield and achieving the tolerance specified. • Method statement showing how the Contractor intends to translate the information on the Drawings into TBM guidance information. • Method statement for conducting a 1:100 000 closed traverse survey through the completed tunnel and back to survey origin. • As-built tunnel alignment from closed traverse survey.

Statement of Work Element	DesignBasis Document	100% Construction Documents	Construction Methodologies	As-Built Design and Drawings	Additional Submittals
Concrete					• Proposed concrete mix design including additives, aggregate supply and testing, cement supply, alkaline aggregate reactivity and durability testing in accordance with applicable standards.
Demolition and Disposal of Dewatering Structure	✓	✓	✓	✓	• Details of the relocation of the existing waterline that is currently supported by the dewatering structure, including general arrangement, design and materials, fabrication and commissioning.

Appendix 2.9(c)

Appendix 2.9(c) - Notice of Error in the Contractor's Proposal Documents or the Final Submittals

NOTICE OF ERROR IN THE CONTRACTOR'S PROPOSAL DOCUMENTS OR THE FINAL SUBMITTALS

To: Ontario Power Generation Inc. ("OPG")	Contract: Design/Build Agreement dated •, 2005 between Strabag AG (the "**Contractor**") and OPG (the "**Agreement**") Specification Error Notice No.: • Date: •

Defined terms used in this Notice have the same meanings given to those terms in the Agreement. In accordance with Section 2.9(c) of the Agreement, the Contractor hereby gives OPG notice of the error/deficiency/defect/inconsistency/discrepancy/omission/deviation from the requirements of the Agreement in the Contractor's Proposal Documents or the Final Submittals as more particularly described below:

• ***[Describe issue]***

STRABAG AG

By: _____

Name:
Title

Appendix 2.12(c)(2)

Appendix 2.12(c)(2) - Outline Quality Assurance/Quality Control Program

[See attached]

SECTION 11

OUTLINE OF QUALITY ASSURANCE/QUALITY CONTROL PROGRAM

General

The Quality Assurance/Quality Control Program is an integral part of the Design/Build Agreement. It will ensure that the design, procurement, construction and commissioning is completed according to schedule, that the quality of the work is in accordance with the requirements of the OPG and that this can be demonstrated to OPG on an on-going basis during the performance of the work.

The Quality Assurance and Quality Control Program consists of various key elements:

- The requirement that Quality Control procedures, processes and testing are first established and then are built in as an integral component of the Contractor's work.
- The requirement to demonstrate that the Contractor's Quality Control procedures and processes are being adhered to through the appropriate on site and off site testing, inspection and documentation.
- The requirement that this documentation be well organized to allow verification, that the Contractor's Quality Control procedures, processes and testing have been implemented appropriately.
- The requirement for an independent verification, that is Quality Assurance, of these various elements.

The Quality Assurance Manager is a key component of the overall Quality Assurance and Quality Control Program.
The Quality Assurance Manager will be employed full time for the duration of the design/build process and will be experienced in administering QA/QC plans, reviewing the design for constructability and presentation of details of the work, developing QA/QC check lists for submittals, sampling/testing, inspection of works and tracking of timely submittals.

The prime contractor Strabag, Dufferin and the other subcontractors and the design consultants have comprehensive internal QC processes in place, which will be submitted with the Quality Assurance Program within 60 days after signing of the agreement.

Quality Assurance Manager

The Quality Assurance Manager reports to the Project Manager and is responsible for the QA/QC Program. His role in general terms will be:

- Performing the Quality Assurance of the Contractor's work and assuring that the Contractor performs the Quality Control of their own work.
- Ensuring that the QA/QC Program is clearly articulated and meets the QC requirements and is followed.
- Tracking the Contractor's QC process and results to ensure compliance with the QA/QC Program.
- Ensuring that records are maintained of the Contractor's work, materials supplied and placed and other aspects of the work in such an manner to meet the requirements of the QA/QC Program.
- Preparing weekly reports for the Project Manager and OPG to provide assurance that the QA/QC program is being adhered to and that a quality product is being produced.
- Ensuring that the non conformance notice as detailed in appendix 2.12 (c)(4) are produced in a timely manner and remedial action is undertaken in a timely manner.

Summary

This Outline Quality Assurance and Quality Control Program is not meant to be all inclusive and is not. A detailed plan will be developed as required by OPG on signing of the Contract. All members of the Design/Build Team will customize their existing QA/QC Programs, processes and procedures for the project to ensure that the objectives of OPG are met. This will be formulated into one integrated plan that will be administered by the Quality Assurance Manager on behalf of the Contractor Project Manager for OPG.

STRABAG

RESPONSIBILITIES MATRIX

INTERNATIONAL BUILDING CONSTRUCTION

FE

E ... Decision making responsibility
D ... Execution responsibility
M .. Assistance
I .... Information recipient

E ... a decision must be reached; with several "E", a decision must be reached by mutual agreement
D ... are responsible for execution of the process / activity; tasks can be delegated to "M"
M ... obligation to assist in fulfilment of the tasks, where required
I ... ..substantiated dispatch of information to "I"

Miscellaneous: in the event that a "function" (BL, GRL, BRL, etc) is vacant, the respective responsibilities must be assumed by the person of the next higher function level

No.	Processes / Activities	UBL	DRL	BRL	GRL	BL	POL	TE	LKA	KALK	AV	DRK	BRK	GRK	BK	SEK	ZE	TGF	KGF	PF	BRVZ	BMTI	TPA	BTL	SFK	ABE	BQM	ZQM	
1	**RESPONSIBILITY OF MANAGEMENT**																												
1.1	**Company Management**																												
1.1.1	QM Assessment (Management Review)	D		I	I				I			D															M	I	
1.2	**QM System / Documents**																												
1.2.1	Organisation Chart Division	D		I	I	I			I			D	I	I	I	I											I	I	1.
1.2.2	Distribution / Updating of QM Documents	I														M											D		1.:
1.2.3	Internal Document Register Division	I										I				I											D		1.:
1.2.4	Admin. of Standard Specifications of Division	I		I	I	I			D	M						M													
1.2.5	Job Descriptions (not compulsory)	E		D	M								D														M	I	
2	**PROCESS MANAGEMENT**																												
2.1	**Acquisition / Advertising**																												2.
2.1.1	Acquisition	D		D	M	M			M			D	D																2.
2.1.2	Prequalificaton	I		D					M				M								M								2.
2.1.3	Advertising / Customer Support	D		M	M							D	M								M						I		2.'
2.1.4	Customer Survey incl. Analysis			E	D	M																							2.'
2.2	**Customer Requirements / Tender / Contract**																												2.:
2.2.1	Inspection / Collection of Invitations to Tender	E		E	E				D	M																			2.:
2.2.2	Allocation / In-house Harmonisation	D		M	I				I																				2.:
2.2.3	Feasibility Study / Risk Appraisal	(I)		M	D				M		M		M	M								M							2.:
2.2.4	Decision to Process	I		E	I				I	I			I																2.:

No.	Processes / Activities	UBL	DRL	BRL	GRL	BL	POL	TE	LKA	KALK	AV	DRK	BRK	GRK	BK	SEK	ZE	TGF	KGF	PF	BRVZ	BMTI	TPA	BTL	SFK	ABE	BQM	ZQM	
2.2.5	Formation of a Bid Venture	E		D	M				M				I					M	M	M									2.:
2.2.6	Tender Estimate					M			M	D	M					M						M							2.:
2.2.7	Internal Harmonisation Estimating Department	I		I	D				M	M				M															2.:
2.2.8	Check / Approve / Sign Tender	E		M	D				M			M	M	M															2.:
2.2.9	Follow-up of Tender (Project List)	I		M	D				M					M															2.:
2.2.10	Contract Negotiation / Verification	I		M	D				M			I	M	M						M									2.:
2.2.11	Contract Acceptance / Conclusion of Contract	ED		M	I				I			M	I	I						M									2.:
2.2.12	Prepare / Sign Joint Venture Agreement	I		I	M	M	I						M	I	I			D	D	M	I								2.:
2.2.13	Identify / Approve / Process Change of Contract			I	M	D			M				I	I															2.: 2.:
2.2.14	Prepare Variation Orders / Feasibility Study			I	E	D			M		M		I	I															2.:
2.2.15	Negotiate Var. Orders / Acceptance of Contract			M	D	M			M		M		I	I	I														2.:
2.3	**Planning / Development**																												
2.3.1	only if required																												2.:
2.4	**Site Planning and Control**																												
2.4.1	Project Internal Commencement Meeting			I	D	M	I		M	I					M														2.: 2.:
2.4.2	Work Execution Planning / QM Plan					D	I	M							M														2.: 2.:
2.4.3	Time Scheduling and Resources Planning			I	M	D	M	M							M							M							2.: 2.:
2.4.4	Work Estimate / Budget List	I		I	M	D		M	M	M	M		I	I															2.: 2.:
2.4.5	Waste Disposal Concept Construction Site Waste Management Implem. / Documentation				I	D	M	M								M										M/I			3.:
2.4.6	Waste Management Concept (Locations > 100 MA)																									D			3.:
2.4.7	Safety Planning, Evaluation, Instruction, Continuous Control re Work Safety				I	D	M																		I/M				3.:
2.4.8	Drawings Distribution Route, Verification / Distribution of Drawings					D	I	M								I													2.: 2.: 4.:
2.4.9	Site Installation				M	D	M	M	M		M				M							M							2.: 2.:

No.	Processes / Activities	UBL	DRL	BRL	GRL	BL	POL	TE	LKA	KALK	AV	DRK	BRK	GRK	BK	SEK	ZE	TGF	KGF	PF	BRVZ	BMTI	TPA	BTL	SFK	ABE	BQM	ZQM	
2.4.10	Preservation of Evidence / Insurance				M	D	I								M						M								2.4 2.4

No.	Processes / Activities	UBL	DRL	BRL	GRL	BL	POL	TE	LKA	KALK	AV	DRK	BRK	GRK	BK	SEK	ZE	TGF	KGF	PF	BRVZ	BMTI	TPA	BTL	SFK	ABE	BQM	ZQM	
2.4.11	Call-off Deliveries / Inspection upon Receipt					D	M	M							M														2. 3.
2.4.12	Acceptance of Provisions by the Client					D	M																						2. 2.
2.4.13	Call-off / Check Performance of Subcontr.					D	M	M																					2. 3.
2.4.14	Check Employment of Foreign Labour					D	M																		M				Bu De
2.4.15	Carry out / Document Construction Work as per Contract			I	M	D	M	M							M														2.
2.4.16	Handover Project to Client			I	M	D	M	M	I				I	I	I														2.
2.4.17	Rectification of Deficiencies				I	D	M	M						I	I														2. 4.
2.4.18	Verification / Approval of Incoming Invoices					D							M	M	M						I								2.
2.4.19	Prepare / Check / Approve Outgoing Invoices				E	D							M	M	M	M		E	M		I								2.
2.4.20	Check / Approve Client Correction Copy				I	D							I	I	M			I	I		I								2.
2.4.21	Request Certificate of Guarantee/Warrenty Request Surety Bond				I	E							I	I	D			I	I		I								2.
2.4.22	Payment Effected in Time? Default in Payment					I							E	I	I				E		I								2.
2.4.23	Request Payment				I	I							D	M	M				D		M								2.
2.4.24	Sue Client?	I		E	I	I						I	M	I	I			E			M								2.
2.4.25	Apply Finaled Statement				M	D									I														2.
	Guar. Work During Defects Liability Period																												
2.4.26	Damage Report				D	M	M											D											2.
2.4.27	Check Guarantee Claim			I	E	D							I	I	I			E	I										2.
2.4.28	Relay Deficiencies, if applicable to Subcontr. / Deadline + Carry out + Inform Client				D	D	M	M					I					D	I		I								2.
3	**RESOURCES MANAGEMENT**																												
3.1	**Personnel**																												
3.1.1	Determine Need for Training / Report to PMS	I		D	M							I	M	M							I								3.
3.1.2	Approval Training Programme	E		M	I							E	M	I															3.
3.1.3	Keep Training Records															M					D								3.
3.1.4	Instruction of New Employees			D	D	D	D		D				D	D															3.
3.1.5	MA Interviews	D		D	D	D	D		D			D	D	D															3.
3.2	**Procurement**																												

No.	Processes / Activities	UBL	DRL	BRL	GRL	BL	POL	TE	LKA	KALK	AV	DRK	BRK	GRK	BK	SEK	ZE	TGF	KGF	PF	BRVZ	BMTI	TPA	BTL	SFK	ABE	BQM	ZQM	
	Material Procurement (SUPP)																												3.:
3.2.2	Determination of Material Requirements				M	D	M	M							M														3.:
3.2.3	Invitation to Tender				E	D		M							M	M		E											3.:
3.2.4	Check and Assess Tenders				M	D									D			M											3.:
3.2.5	Conduct Contract Negotiations				D	M								M	M			D	D										3.:
3.2.6	Check / Approve Proposal for Contract Award	E		E	E	E							I	I	I			E	I										3.:
3.2.7	Award of Contract				D	M	I	I					D	M	M			D	D										3.:
3.2.8	Accept Delivery					M	D	M							I														
	Procurement of Work Performance (SUB)																												3.:
3.2.9	Determination of SUB's Requirements				M	D	M	M							M			M											3.:
3.2.10	Prepare and Approve Invitation to Tender for SUBs				E	D		M							M	M		E											
3.2.11	Check and Assess SUB's Tenders				M	D									M			M											3.:
3.2.12	Conduct SUB Contract Negotiations, Prepare Proposal for Contract Award				D	M								M	M			D											3.:
3.2.13	Award SUB's Tender if SUB Costs are Covered (up to EURO ....., see last page)	E		E	E	E							I	I	I			E	I										3.:
3.2.14	Award SUB's Tender if SUB Costs are not Covered (up to EURO ....., see last page)	E		E	I	I						I	I	I	I			E	I	I	I								3.:
3.2.15	Award of SUB Contract / Letter of Award				D	M	I	I					D	M	M			D	D										3.:
3.2.16	Continuous Verification / Acceptance of SUB's Services					D	M	M							I														3.:
3.2.17	Check / Approve SUB's Variation Orders				I	D		M	M						M			I											3.:
3.2.18	Check / Approve Final SUB's Invoice			I	E	D		M					I	I	I			E	I										3.:
	SUB/SUPP Qualification and Assessment																												3.:
3.2.19	Admission of SUB / SUPP (First-Time Qualification)				D				I				M	M															3.:
3.2.20	Assessment of Subcontractors / Suppliers						D								M														3.:
3.2.21	Updating of Award of Tender Database				D	M			I																				
	Procurement of Plant and Equipment																												3.:
3.2.22	Determination of Requirement / Order at BMTI				M	D	M								M								I						3.:
3.2.23	Plant and Equipment Acceptance / Function Performance Test					M	D								I								I						3.:
3.2.24	Availabilty Notification of Plant and Equipment				I	D	M								I								I						3.:

No.	Processes / Activities	UBL	DRL	BRL	GRL	BL	POL	TE	LKA	KALK	AV	DRK	BRK	GRK	BK	SEK	ZE	TGF	KGF	PF	BRVZ	BMTI	TPA	BTL	SFK	ABE	BQM	ZQM	
3.2.25	Lease Plant and Equipment from Third Parties				I	D	M								M							I							3.:
3.2.26	Investment Request for Purchase of New Plant or Equipment	D		D	I	I									I							I							3.:

No.	Processes / Activities	UBL	DRL	BRL	GRL	BL	POL	TE	LKA	KALK	AV	DRK	BRK	GRK	BK	SEK	ZE	TGF	KGF	PF	BRVZ	BMTI	TPA	BTL	SFK	ABE	BQM	ZQM	
	Repair and Servicing / Maintenance																												
3.2.27	Prepare / Adhere to Maintenance Schedule and Plan					I	D															M							3.2
3.2.28	Instigate / Carry out Repair and Servicing Works					M	D															D							3.2
3.2.29	Request Equipment Replacement					M	D															M							3.2
	Internal / External Communication																												
3.2.29	Signature Authorisation Regulation	D		I	I	I			I			D	I	I	I	I													3.2 2.2
4	**CONTROL AND IMPROVEMENT PROCESSES**																												
4.1	**Tests and Inspections**																												4.
4.1.1	Test Flow Chart				M	D																							4.
4.1.2	Instigate / Carry out Technical Inspections					D	M																						4. 2.
4.1.3	Economic Monitoring (Target/Actual comparisons)			I	D	M							I	I	I			D	I										4. 2.
4.1.4	Determination / Delimitation of Performance				M	D							I	I	D			M	I		M								4. 2.
4.1.5	Verification / Updating of Work Estimate			I	E	M		M	M	D	M		I	I	I			E	I										4.
4.1.6	Actual Costing of Own Services			E	I	D		M	I	I								I											
4.2	**Control of Test Instruments**																												
4.2.1	Determination Requirement of Test Instrument				I	D	M	M										I				I							4.
4.2.2	Determine / Adhere to Calibration Dates					M	D	M														M							4.
4.2.3	Instigate / Carry out Calibration and / or Repairs					D	M	M														I							4.
4.3	**Internal Quality Audits**																										D	D	4.
4.3.1	Schedule / Carry out Annual Audit Planning / System Audit																										D	I	4.
4.3.2	Schedule / Carry out Site Audits																												
4.4	**Handling of Errors**																												4.
4.4.1	Non-conformities / Cost Appraisal					D	M	M																			I		4.
4.4.2	Marking / Recording of Non-conformities				I	D																					I		4.
4.4.3	Preparation / Implementation of Measures				M	D	M	M																					4.

No.	Processes / Activities	UBL	DRL	BRL	GRL	BL	POL	TE	LKA	KALK	AV	DRK	BRK	GRK	BK	SEK	ZE	TGF	KGF	PF	BRVZ	BMTI	TPA	BTL	SFK	ABE	BQM	ZQM	
4.5	**Improvement Processes / Corrective and Preventive Action**																												
4.5.1	Collection / Analysis of Case Histories etc.	I			M																						D		4.:
4.5.2	Determination of Measures / Responsibilities	E			D																						M		4.:
4.5.3	Checking of Implementation / Effectiveness	I			D																						M		4.:
4.5.4	Checking for Wide Scope of Relevance	I			M																						D	I	4.:

Procurement Authorisation (top limit) :

	EURO		EURO
BL	72,672.83	**BK**	72,672.83
GRL	363,364.17	**GRK**	363,364.17
BRL	726,728.34	**BRK**	726,728.34
DRL	---	**DRK**	---

Division Management Approval (Date, Signat

Replaces CH 3.3-HSB Int-02 Version 01

Prepared/amended and approval obtained: ZQM, 02.07.2004

Type	No..	Version	Title	Application must	Application can	Approval date	Filing Site file
1. MANAGEMENT RESPONSIBILITY [5.]							
1.1 COMPANY MANAGEMENT							
VA	1.1-STO-01	02	Company Planning and Assessment			08.09.03	
FB	1.1-HB Int-01	01	Responsibilities Matrix UBL Construction Building International	X		02.06.03	
FB	1.1-HB Int-02	02	Management Structure HB	X		28.02.04	
FB	1.1-HB Int-03	02	Organisation Chart UBL Construction Building International	X		01.04.04	
1.2 QM SYSTEM							
VA	1.2-HSB-01	01	Structure and Handling of QM System			11.01.00	
VA	1.2-HSB-02	01	Documents and Records			11.01.00	
VA	1.2-HSB-03	01	Administration of Standard Specifications			11.01.00	
CH	1.2-HB Int-02	02	Internal Document Register	X		04.07.03	
2. PROCESS MANAGEMENT							
2.1 GENERAL							
VA	2.1-HSB-01	01	Acquisition/Advertising			11.01.00	
CH	2.1-STO-01	05	Customer Questionnaire	X		08.09.03	
CH	2.1-STO-02	04	Prequalification Request	X		05.03.03	
CH	2.1-HB Int-01	01	Assessment of Co-operation with Project Development	X		05.05. 03	
2.2 CUSTOMER REQUIREMENTS							
VA	2.2-HSB-01	01	Preparation of Tender and Verification of Contract			11.01.00	
VA	2.2-HSB-02	01	Verification of Contract in Case of Amendments			11.01.00	
VA	2.2-HB Int-01	02	Building Automation – Preparation of Tender			02.07.04	
VA	2.2-HB Int-02	02	Architecture/Interior Design – Preperation of Tender			02.07.04	
FB	2.2-HB Int-01	02	Decision Tree.	X		05.05.03	
FB	2.2-HB Int-02	01	Estimating Process	X		05.05.03	
FB	2.2-HB Int-03	01	Top Sheet	X		05.05.03	
FB	2.2-HB Int-04	01	Risk Check List	X		17.05.03	
CH	2.2-HB Int-01	03	Project Presentation	X		29.04.04	
2.3 PLANNING AND DEVELOPMENT							
VA	2.3-HSB-01	01	Planning and Development			11.01.00	
VA	2.3-HB Int-01	01	Total-Package Main Contract			06.11.00	
VA	2.3-HB Int-02	02	Building Automation – In-house Design and Project Processing			02.07.04	
VA	2.3-HB Int -03	02	Building Automation – Outsourced Design and Project Processing			02.07.04	
VA	2.3-HB Int-04	01	Architecture/Interior Design – Design Work			27.08.01	
VA	2.3-HB Int-05	01	Architecture/Interior Design – Processing of Minor Contracts			27.08.01	
2.4 SITE PLANNING AND CONTROL							
VA	2.4-HSB-01	01	Work Execution			11.01.00	
VA	2.4-HSB-02	01	Work Preparation			11.01.00	
VA	2.4-HSB-03	01	Commercial Site Management			11.01.00	
VA	2.4-HSB-04	01	Guarantee Work during Defects Liability Period			11.01.00	
VA	2.4-HSB-05	01	Client's Property			11.01.00	
FB	2.4-HSB-01	01	Site Organisation Chart		X	26.01.00	4.2.1
FB	2.4-HSB-04	02	List of Drawings – Received and Forwarded	X		10.05.01	8.1
CH	2.4-HSB-01	03	Internal Project Commencement Meeting – Major Construction Sites	X		02.07.04	4.1.1
CH	2.4-HSB-02	02	Internal Project Commencement Meeting – Minor Construction Sites	X		02.07.04	4.1.1
CH	2.4-HSB-03	02	Site Workflow Plan / QM-Plan	X		02.07.04	4.1.1

Type	No..	Version	Title	Application must	Application can	Approval date	Filing Site file
CH	2.4-HSB-04	01	Commercial Activities on Site		X	16.12.99	5.
CH	2.4-HB Int-01	01	Takeover Protocol		X	24.04.03	
CH	2.4-HB Int-02	01	Monthly Project Report	X		01.01.05	
3. RESOURCE MANAGEMENT							
3.1 PERSONNEL							
VA	3.1-STO-01	01	Recruitment / Training of Personnel			11.01.00	
CH	3.1-STO-01	02	Employee Interview	X		05.03.03	
CH	3.1-STO-02	01	Instructing New Employees	X		16.12.99	
CH	3.1-HB Int-01	01	Training Assessment	X		05.05.03	
3.2 PROCUREMENT							
VA	3.2-HSB-01	01	Procurement of Services and Materials			11.01.00	
VA	3.2-HSB-02	01	Procurement / Provision of Plant and Equipment			11.01.00	
VA	3.2-HSB-03	01	Repair and Servicing of Plant and Equipment and Maintenance Facilities			11.01.00	
VA	3.2-HSB-04	01	Subcontractors and Suppliers - Qualification and Assessment			11.01.00	
VA	3.2-HB Int -01	01	Building Automation – Tender and Award BA and Electrical Engineering, Special Trades			22.08.01	
FB	3.2-STO-01	02	Negotiating Record	X		24.04.03	5.3.3
FB	3.2-STO-02	02	Negotiating Record – Short	X		24.06.03	5.3.3
FB	3.2-STO-04	04	Genenaral Condition of Trade for Contracts for Work - External Commissioning	X		31.05.04	5.3.2
FB	3.2-STO-05	02	Letter of Acceptance	X		24.04.03	5.3.2
FB	3.2-HSB-03	02	Proposal for Contract Award		X	12.02.02	5.3.3
FB	3.2-HB Int-01a	02	Subcontractor Assessment	X		02.06.03	5.3.8
FB	3.2-HB Int-01b	02	Supplier Assessment	X		02.06.03	5.3.8
FB	3.2-HB Int-02	01	Supplementary Contract	X		24.04.03	5.3.8
FB	3.2-HB Int-03	01	Commissioning - within the Holding	X		24.04.03	5.3.8
CH	3.2-QW-01	01	Supplier Questionnaire	X		16.12.99	1.3.6
3.3 INFORMATION							
VA	3.3-HB Int-01	01	Internal / External Communication			11.02.00	
VA	3.3-HB Int-01	01	Extra Sheet - Internal / External Communication			06.11.00	
FB	3.3-STO-08	01	Employee Register / Reference Initials List		X	16.12.99	4.2.1
CH	3.3-STO-01	01	Filing System - comprehensive	X		16.12.99	
CH	3.3-STO-02	01	Filing System - concise	X		16.12.99	
CH	3.3-STO-03	01	Abbreviations	X		16.12.99	
3.4 WORK ENVIRONMENT							
VA	3.4-STO-02	01	Waste Management			11.01.00	
CH	3.4-STO-08	01	Waste Disposal Concept for Construction Sites	X		10.10.01	4.2.5
3.5 WORK SAFETY (Work Environment)							
VA	3.5-STO-01	02	Work Safety			04.03.04	
FB	3.5-HB Int-01	01	Request for Implementation of Safety Measures	X		10.09.02	
FB	3.5-STO-01	02	Work Safety' Site Folder ~ Pursuant to Filing System Pt. 4.2	X		02.07.04	4.2.5
FB	3.5-STO-02	02	Instruction of Employees	X		02.07.04	4.2.3
FB	3.5-STO-03	02	Appointment of Employees to Replace Supervisor when Absent	X		02.07.04	4.2.5
FB	3.5-STO-04	02	Site Documents and Notices	X		02.07.04	4.2.5
FB	3.5-STO-06	01	Visitors' Information	X		07.01.04	4.2.5
FB	3.5-STO-07	02	Numbers in Case of an Emergency	X		02.07.04	4.2.5

Type	No..	Version	Title	Application must	Application can	Approval date	Filing Site file
FB	3.5-STO-08	02	Accident / Fire Alarm Plan	X		02.07.04	4.2.5
FB	3.5-STO-09	02	Reporting Process due to Working Accidents	X		07.01.04	4.2.5
FB	3.5-STO-10	01	Cause of Accident – Key Numbers	X		07.01.04	4.2.5
FB	3.5-STO-11	01	Cause of Accident – Evaluation	X		07.01.04	4.2.5
FB	3.5-STO-12	01	Reporting a Near Accident	X		07.01.04	4.2.5
CH	3.5-STO-02	01	Safety Checklist for UBL/DRL/BRL/GRL	X		07.01.04	4.2.5
CH	3.5-STO-04	02	Checking of Scaffolding from Erector	X		02.07.04	4.2.5
CH	3.5-STO-05	02	Checking of Scaffolding by User prior to Initial Use	X		02.07.04	4.2.5
CH	3.5-STO-06	02	Recurrent Checking of Scaffolding by User	X		02.07.04	4.2.5
4. INSPECTION AND IMPROVEMENT PROCESSES							
4.1 TESTS AND INSPECTIONS							
VA	4.1-HSB-01	01	Tests and Inspections			11.01.00	
FB	4.1-HB-Int-01	01	Quality Insurance Checklist Deutsch/Englisch		X	31.01.05	
FB	4.1-STO-01	01	Test Schedule	X		16.12.99	4.5.1
FB	4.1-STO-02	01	Test Flow Chart	X		16.12.99	4.5.1
4.2 CONTROL OF TEST INSTRUMENTS							
VA	4.2-HSB-01	02	Control of Test Instruments			09.05.01	
FB	4.2-HSB-01	01	Inspection of Measuring Instruments	X		16.12.99	4.5.3
FB	4.2-HSB-02	01	Measuring Record – Leveling Instrument		X	14.02.00	4.5.3
FB	4.2-HSB-03	01	Measuring Record – Laser Instrument		X	14.02.00	4.5.3
4.3 INTERNAL QUALITY AUDITS							
VA	4.3-QW-01	02	Internal Audits			09.05.01	
FB	4.3-QW-01	01	Audit Deviation	X		16.12.99	4.5.7
FB	4.3-QW-02	01	Audit Plan – Day Schedule		X	16.12.99	
FB	4.3-QW-03	03	Annual Audit Plan – Site Audits Year	X		10.05.01	
CH	4.3-QW-02	01	Checklist for Audit Planning		X	16.12.99	
CH	4.3-QW-03	01	Site Audit	X		17.04.00	4.5.7
4.4 DEALING WITH DEVIATIONS							
VA	4.4-STO-01	01	Handling of Errors			11.01.00	
FB	4.4-QW-01	01	Field Report	X		16.12.99	4.5.7
FB	4.4-HB Int-01	01	Final Project Report and Prject Key Data Sheet	X		05.05.03	
4.5 IMPROVEMENT PROCESSES							
VA	4.5-STO-01	01	Corrective and Preventive Measures			11.01.00	
FB	4.5-QW-01	01	List of Defects / Deficiencies (for BQM / ZQM only)		X	16.12.99	

This standard document has to be integrated into the Project Specific Quality Management System for the Niagara Tunnel Facility Project.

MANUAL

Management System for implementation of the Group Principles

FIMAG
Finanz Industrie Management AG

BAUHOLDING
STRABAG
SOCIETAS EUROPAEA

A=WAY

Februar 2005

Group Principles

Organisation and Management
Employees and Resources
Business Activities
Measurement, Analysis and Improvement

This Management Manual describes the system
for implementation of our Group Principles in all companies of
BAUHOLDING STRABAG SE.

The Boards of Directors commit themselves and the management to supporting the Management System and providing the resources for further development of Quality Assurance, Work Safety, Environmental Protection and the Management System as such.

All employees are obligated to organise and perform their tasks and duties in accordance with the guidelines specified in this Management Manual.

For the BHS Board

Signed Dr. Hans Peter Haselsteiner

Vienna, February 2005

GROUP PRINCIPLES

Our Group Principles provide the basis for the objectives, strategies and entrepreneurial activities.

Economic Success

In responsibility to our shareholders, customers, employees, suppliers, subcontractors and society, our prime aim is to ensure economic success on a long-term basis.

Targeted activities, early identification of chances and risks and their responsible consideration safeguard the continuity of our companies and protect our shareholders' interests.

Owing to systematic and constant improvement, we will also be able to meet the growing challenges of the future.

Customers

Our activities are focused on satisfying our customers' justified requirements and expectations.

We meet market demands through close customer contact, professionalism, innovative ideas, and competitive prices.

A frank exchange of information and experience with our business partners is also foreseen within the framework of our strategies and objectives, whereby we ensure the required degree of confidentiality and discretion.

Employees

In order to meet our corporate objectives, we rely on competent and efficient employees. We promote the level of know-how within the Group by professional development and training, support the personal development of our employees and provide adequate information and suitable working conditions.

Our employees keep themselves well informed, while harmonising their own objectives with those of the Group and giving Group interests priority.

The health and safety of our employees and all other parties to our activities are among our main concerns.

Suppliers and Subcontractors

For the purpose of furthering quality and the economic efficiency of our services, we also count on the experience and capacities of carefully selected suppliers and subcontractors.

Social Awareness

We respect human rights and promote public welfare.

We observe existing laws and recognise the rules of fair competition.

We are aware of our environmental responsibility. In the execution of our supplies and services, we make every effort to use energy and natural resources economically and reduce noxious emissions and waste.

The BHS Board's stated strategic objective for the 2003 – 2006 planning period:

„Achieving and/or maintaining market leadership in all defined markets and business fields by cost leadership, employee qualification and motivation, and innovative initiative."

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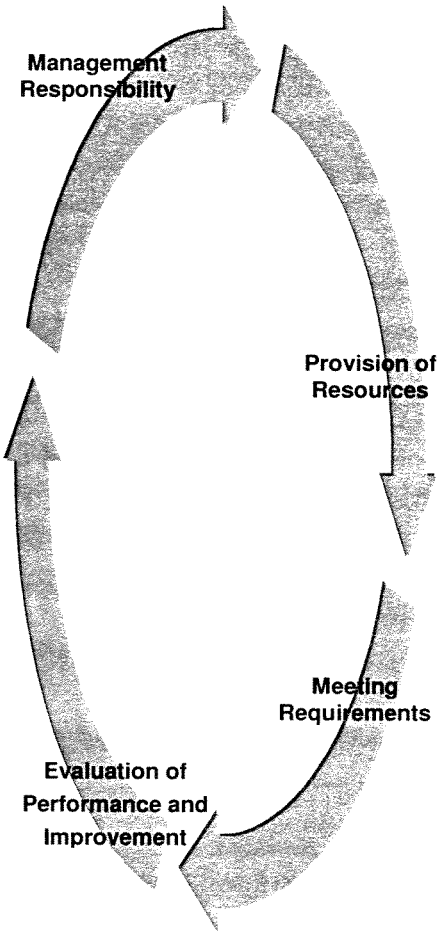

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Issued by:
Management System Co-ordination Committee of BAUHOLDING STRABAG SE and the Management System Representative in the Country

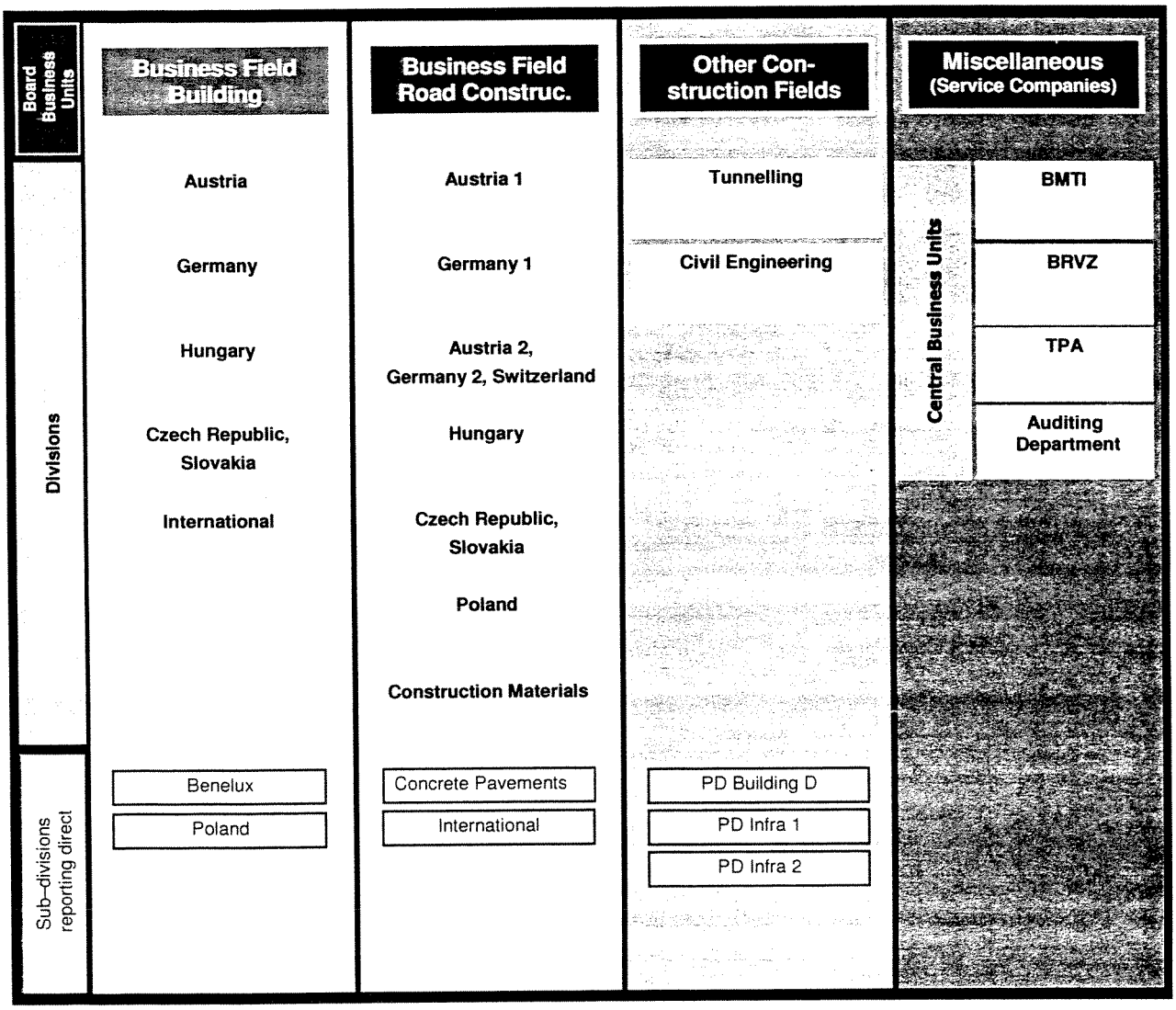
ORGANISATION AND MANAGEMENT

Organisational Structure

Under the auspices of BAUHOLDING STRABAG SE, controlling company of the Group, legally independent 'country' companies act in the market within the framework of the overall international organisation.

The Business Field represents the main Group structuring criterion.

The organisational structure permits close to market decisions and provides the co-ordinated and controlled management required for achieving Group objectives. It is detached from commercial law structures.



usiness Fields and Fields of Activity

ıe range of services of the business fields covers all stages of the construction process. The business fields provide co-dinated and complementary services.

location of the various spheres covered in the fields of activity to the business fields must be implemented on a blanket ıverage basis and adhered to. Regional changes to the allocation can only be undertaken with the agreement of the sponsible business fields' boards.

Building	Road Construction	Other Construction Fields	
ousing esidential Buildings and Es- ıtes **ommercial and Industrial acilities** hopping Centres and Business arks ffice and Commercial Buildings otels and Banks lulti-storey Car Parks inema Complexes wimming Pools, Thermal Baths tadiums irports and Railway Stations heds, Warehouses and Pro- ıction Facilities ıdustrial Facilities owers and Industrial Chimneys ıdustrial Flooring **ublic Buildings** ospitals, Rehabilitation Centres niversities, Schools, indergartens ire and Ambulance Facilities dministration Buildings **oduction of Prefabricated ements**	**Roads, Earthworks** Motorways, Roads and Paths Drilling and Jointing Technologies Paving and Milling Works Road Rehabilitation/Recycling Landfills Recycling of Building Materials Asphaltic Concrete for Hydraulic Structures Test Tracks **Landscape Architecture and Development** **Paving** **Large-Area Works** Runways and Taxiways Reloading and Parking Facilities **Sport and Recreation Facilities** **Sewerage Systems** Sewer Engineering and Pipeline Rehabilitation Pipeline Construction **Protective Structures** Protecting Slopes and Embankments **Production of Building Materials** **Bridges** Road and Railway Bridges, Foot Bridges	**Tunnelling** Cyclical and continuous tunnel driving Road and Railway Tunnels Galleries and Underground Chambers **Civil Engineering** Underground Traffic Routes **Bridges** Cantilevering and Incremental Launching Methods Special Technologies **Power Plants** Hydroelectric Power Plants River Power Plants Thermal Power Plants Concrete Dams, Earthfill Dams **Railway Structures** Embankments, Tracks **Environmental Engineering** Waste Management Regeneration of Polluted Soils Water and Waste Water Treatment Facilities Sewage Treatment Plants Landfill Operation **Special Foundation Engineering** Soil Investigations and Well Exploration Hydro-jetting and Anchoring Cutoff Walls and Piling Pipe Jacking Bore and Injection Techniques Deep Compaction Diaphragm Wall, Pile Driving	**Project Development Infrastructure** Transportation Motorways and Roads Railways Airports, Multi-storey Car Parks Energy Hydroelectric Power Plants Environmental Protection **Project Development Building** Residential Buildings (Freehold Flats) Multi-storey Buildings Terraced Houses Hotels Office and Commercial Buildings Shopping Centres Multifunctional Projects (Entertainment, Hotels, Shopping, Sports)

eally, project acquisition, planning and execution are performed after consultation and in co-operation with partners from thin the Group.

oject acquisition across regional borders requires the agreement of the respective BHS Board.

ɔ-operation with internal partners, customers or subcontractors is contractually agreed.

Responsibility and Authority (Management Structure)

The BHS Board practises uniform management, and is responsible for maintaining financial equilibrium throughout the Group and safeguarding Group interests.

After consultation with Division Managers, the Board also determines their programme and defines Group strategic objectives.

For management, co-ordination and control of the Divisions or of Sub-divisions reporting directly to the Board (without going through Division Management), the Board acts on the basis of code of procedure.

Within the framework of Group business policy, Division Managers carry out their business independently and on their own responsibility, i.e. it is incumbent on them to achieve objectives defined in the strategic and operative planning and realise the individual measures prescribed.

All operating business is undertaken by the Sub-divisions. They are responsible for the best possible result in the regional markets allotted to them and are usually managed, co-ordinated and controlled by Division Managers.

The supervision of managers of Sub-divisions reporting directly to the Board is the concern of the BHS Boards responsible.

The service companies are organised in Central Business Units and operated by Sub-divisions. Within their area of responsibility they work independently from the operative Divisions and Sub-divisions, with the Central Business Manager being responsible for co-ordination of the regional service companies.

Interfaces and co-operation between service companies and operative units are regulated with service agreements.

Responsibilities, assignments and authorisations of the Boards, Division Managers and Sub-division Managers are defined in the business rules of procedure.

The functions' objectives, and operating and management work within the Sub-divisions are laid down in descriptions of the functions.

For assurance and further development of the Management System representatives are appointed as follows:

Operating Area	Responsibility lies with	Representatives
Group	BHS Board	Co-oordinator (Co-ordinating Committee)
Country (all organisation units)	Division Manager or manager of a Sub-division reporting directly to the Board	Representative for the specific country
Sub-division	Sub-division Manager	Representative for the Sub-division

Group Guidelines

The Management System is documented in the Management Manual and further guidelines.

Management Manual

The Management Manual contains the comprehensive description of the complete Management System for implementation of the Group Principles.

Further Guidelines

- Internal Agreements
- Resolutions of Group's Board of Directors / Business Field Boards
- Group Guidelines / Procedures
- Resolutions of Division Managers
- Rules of Procedure according to Organisational Structure of the Group
- Service Agreements between Service Companies and Operating Units
- Resolutions of Sub-division Managers
- Directives issued at particular management levels

All guidelines can be identified by titles, dates of issue and, if necessary, number. Applicable guidelines are integrated into the Management System by the respective representative.

Corporate Planning and Evaluation (Corporate Management)

Planning and Controlling

Strategic and operative planning and controlling represent the main Group management instruments.

Strategic planning is aimed at long-term improvement of the market position and construction services and products offered by the targeted use of personnel, financial and technical resources. Sources of loss should be eliminated, existing profit potentials strengthened and new ones identified.

eveloped on the basis of analyses, the strategic concept, in which the strategic objectives and planned measures with the spective resources requirement and effects on performance are presented, is approved by the BHS Board after sessment and, if necessary, adjustment.

ie strategic framework is rounded off by operative planning comprising foreseen short and medium term business policy rgets and measures.

efore the end of the year operative planning for the following year is prepared by the Sub-division / Division Managements id approved by the BHS Board in the month of January of each year after planning meetings with the Division and/or Sub-vision Managements with direct reporting access.

ethodically harmonised with the above, controlling follows current business development in the comparison of target and erformance.

valuation

'hen undertaking Group assessment, the main indicative figures are compared with targets agreed for the respective anning period. Deviations are analysed and assessed and, if necessary, corrective action taken.

iprovement potential is highlighted and used for continuous further development. Analysis and improvement of the anagement System is a component of the Group evaluation.

iternal Communication

ternal communication and information flow are achieved within the defined structure of committees under agreed chains of formation through minutes, reports and electronic information systems. Communications outside the chain of information e identified by source and responsible function.

ommittees

articipants as per perating area: ...regularly ...at own discretion ...if necessary	Operating area	BHS Boards	Division Managers	Sub-division Managers	Business Unit Managers	Central Business Unit Managers	Managers of Country Service Companies	Group Co-ordinator	Company Representative	Sub-division Representative	Number per year
								Management System			
roup Conference	Group	X	X			X		X			2
usiness Fields onference	Business Field	X	X			X		X			1
ountry Meeting	Country	X	X	X	X	B	X		X		0,5
ub-division Manager onference	per country + busin. field	E	X	X		B	B		X		up to 12
usiness Unit Manager onference	per country + busin. field	E	X	X	X	B	B		X		1
usiness Unit Manager leeting	per Sub-division			X	X					X	acc. to plan

EMPLOYEES AND RESOURCES

Employees

'he systematic recruitment of qualified and competent employees, their promotion and the support of their personal irogress through professional development and training are effected based on a pre-determined procedure. Major personnel levelopment phases include:

Human Resources Planning

Recruitment

Introduction and Orientation

Consultations, Development and Succession Planning

Training

A defined distribution of tasks and co-operation between operating units and BRVZ – Human Resources – ensure effective esults.

n order to maintain and develop the Management System, the representatives responsible for quality management, health ind safety, environmental protection, hazardous materials etc. are trained, employed and authorised in accordance with heir sphere of responsibility.

Information

In addition to internal agreements, information also consists of statutes, regulations, standards, guidelines and market and trade data. For effective use of data and resulting information acquisition, transfer, assurance and confidentiality together with the respective terminology are defined as required.

Infrastructure

To ensure effectual performance by the operating units and economic efficiency throughout the Group, Central Business Units and Staff Units with cross-border competence are answerable to the BHS Board.

These have no authority to issue directives to Divisions or Sub-divisions reporting directly to the Board.

Matters of importance are harmonised by the managers of both Central Business Units / Staff Units and Division Management.

Assignments performed by the Central Business Units and Staff Units under BHS Board supervision:

BMTI

Plant and equipment management (investment policy, leasing and repair management, plant systems, form work management)

BRVZ

Annual financial statements, taxes and accounting, finance, Group controlling / risk management / insurance / real estate, personnel, information technologies

TPA

Technical development policy (quality management / quality assurance, technical know-how / research and development), management systems

Auditing Department

Control of all entrepreneurial function areas and systems with regard to regularity, expediency and profitability, technical-commercial checks of estimates and construction orders, cartel investigations

Work Environment

In order to provide our employees with suitable prerequisites for efficient performance and to fulfil the statutory requirements regarding health and safety and environmental protection, we monitor and maintain the required work environment.

Construction sites, operational facilities together with their premises and installations, operating procedures, plant and equipment including their erection and provision, utilisation and maintenance comply with the statutory and occupational medical requirements as well as accident prevention regulations.

Responsibilities and procedures are organised and documented in accordance with the relevant national requirements.

Construction Plant and Equipment

In order to perform services and produce materials economically and as required, we ensure that construction sites and production facilities are provided with suitable and reliable plant and equipment. Test and measuring devices are subject to regular monitoring.

BMTI units and locations with their REP workshops, service BOXes and mobile workshops are at the disposal of the operating units on an international basis providing management, maintenance, inspection and repair services and also profitability control for plant and equipment.

Procurement

The aim of procurement is to ensure timely and economic provision of products and services in the desired quality, as well as commitment of subcontractors, service providers and suppliers by long-term partnerships.

The operating units are responsible for procurement, if necessary supported by a central procurement management.

To ensure the success of our services and thereby customer satisfaction, the following activities are performed and documented:

- Clear and complete description of services and products to be procured
- Qualification and (initial) selection of subcontractors, service providers and suppliers
- Agreement on acceptance criteria for products and services
- Systematic evaluation of subcontractors, service providers and suppliers as a decision support for future contract awards.

USINESS ACTIVITIES

ır customer oriented business activities are the source of our company's success.

ır objective is to create added value through our activities on the construction market.

ır business activities are aligned and planned based on the Group Principles, strategic targets and requirements resulting ım corporate planning. Consequently, their efficiency is evaluated through the analysis of revenues.

ır business activities comprise:

- Acquisition of market data
- Development and marketing of projects
- Realisation of projects
- Production of building materials and components
- Operator / concession models

ıey are rounded off by fulfilment of our customers' requirements and optimal customer support services.

the Building sector, Strabag teamconcept integrates the customer as partner during all phases of a project.

ır business activities are performed in accordance with determined responsibilities and documented procedures with anned targets and tasks including related performance criteria.

ıe procedures are controlled technically, commercially and legally, utilising amongst others controlling tools.

elevant data are recorded.

usiness Processes

Building	Road Construction	Other Construction Fields (such as Tunnelling, Civil Engineering)
Acquisition / Tendering Execution / Production, Warranty and Customer Service		

Other Construction Fields (Project Development)	
Project Development Infrastructure Project Selection and Definition Development, Tendering and Contracting Realisation, Warranty and Customer Service Operation and Maintenance, Marketing	**Project Development Building** Development Design and Planning Preparations for Realisation Realisation, Warranty and Customer Service Operation and Maintenance, Occupancy

Building, Road Construction, Tunnelling, Civil Engineering

Added value is achieved mainly through development of technical design and execution of construction contracts.

Processes

- Acquisition / Tendering
- Execution / Production, Warranty and Customer Service

Acquisition / Tendering

The aim is to prepare offers which are profitable for the customer and the company, convince the customer and lead to the award of contracts.

Acquisition / Tendering comprises:

- Marketing / acquisition
- Review of documentation received from the customer regarding completeness, discrepancies and feasibility
- Technical, commercial and legal review of documentation regarding requirements listed
- Evaluation of the effects of contractual obligations on quality, deadlines and costs
- Determination of production costs
- Determination and listing of risks and opportunities, definition of surcharges for risk and profit
- Documentation of processes and results of contract reviews and estimation in order to ensure traceability of all pricing factors

Within the limits of the reporting obligations, the Business Unit concerned decides on acceptable projects.

Enquiries exceeding the core interests and capacities of the Business Unit are placed within the Group by the Sub-divisions in order to provide competent customer support at this very early stage.

Successful acquisition / tendering is concluded by preparation of the contract estimate.

Efficiency of acquisition / tendering is measured by the ratio of tenders submitted and contracts awarded.

Taking into consideration the targets determined in the corporate planning, further parameters may be evaluated.

Execution / Production, Warranty and Customer Service

The aim of job execution is to hand over the project to the customer in compliance with the contract, without defects, on time, and within the economic objectives for the project.

Depending on the requirements of the project, the working design is performed by the operating unit, supported by internal service companies or subcontracting to external design offices.

Subcontracted and / or customer-provided design services are reviewed in terms of completeness, technical feasibility, economic efficiency, and deadlines.

In order to create suitable conditions, the required works processes, responsibilities and resources are already determined during works planning:

- Ensuring information status of the persons responsible for execution of the work during an internal commencement meeting / kick-off meeting,
- Inspection and test plans and tests according to quality characteristics,
- Monitoring of costs and deadlines based on periodic performance and progress reports,
- Controlling action in case of deviations from target figures,
- Identification and processing of amendments / additions to the contract.

Adequate project documentation including monitoring of subcontractors' performance ensures traceability of relevant project data.

Risks, opportunities, defects and measures identified during project review and/or analysis of project data are evaluated and passed on to the respective functions.

Efficiency of performance is measured by adherence to deadlines and fulfilment of technical requirements, without exceeding the budget costs (work estimate).

Customer satisfaction is monitored systematically and evaluated by the managers in accordance with the management structure.

ject Development
rastructure

led value is achieved through acquisition of additional contracts by developing infrastructure projects (transportation, ver and waste management) including the procurement of funding and contract management in the realisation, operation marketing.

cesses

- Selection and Definition of Projects
- Development, Tendering and Contracting
- Realisation, Warranty and Customer Service
- Operation and Maintenance, Marketing

siness activities are performed in close co-operation with operating Group partners, observing the reporting obligations vards the Board of Directors.

hievement of the overall target is measured by the degree of customer satisfaction and the rate of return.

oject Development
ilding

ded value is the result of development, design, realisation, successful marketing and, if required, operation of immovable perty.

hievement of the overall target is measured by the degree of customer satisfaction and the rate of return.

ocesses

- Development
- Design and Planning
- Preparations for Realisation
- Realisation, Warranty and Customer Service
- Operation and Maintenance, Occupancy

e business activities are carried out in close co-operation with operative partners within the Group, based on pre-termined procedures.

ocess and results of individual stages are evaluated and controlled by comparison with the specified targets.

MEASUREMENT, ANALYSIS AND IMPROVEMENT

We measure the results of our processes and the achievement of our aims.

Following analysis and evaluation, control and/or corrective measures are implemented where necessary.

Inspections

Process performance is monitored through inspections.

In accordance with the contract and for the purpose of a responsible internal quality control, inspections are performed as follows:

- Inspections upon receipt of materials/equipment in order to verify conformity of both procured or customer-provided performances and supplies
- In-process inspections, if processes do not permit later inspections or risks can be detected and minimised at an early stage
- Final inspection of the contracted performance / supply prior to handing over to the customer.

Quality Audits

Quality audits assess the effectiveness of the Management System, determine whether procedures are suitable for the achievement of targets and are observed, and whether the processes can be improved.

Measures and results are recorded and distributed to the responsible functions for evaluation.

Corrective, preventive and improvement actions are monitored and evaluated with respect to their implementation and effectiveness.

Administrative Audits

As part of the risk management, process-independent and neutral internal administrative audits are performed to detect and avoid risks and assess the legality of our processes.

These assessments are performed during both tender stage and execution of construction works, in accordance with documented selection criteria.

Audit reports are distributed to the operating units, Division Management, Board of Directors and, if necessary, the public accountant.

Information regarding the Management System is distributed to the Country Representative.

Preventive and Corrective Action

Preventive and corrective actions shall ensure safeguarding or quick re-establishment of target conditions in respect to processes and systems.

Preventive measures are undertaken in particular in the field of work environment, environmental protection, and risk assessment during tendering, contracting and work planning.

Measures and results are recorded and passed on to the responsible functions for evaluation.

Improvement Process

By means of programmes and activities, we raise the level of performance, processes, systems and internal structures (infrastructure, information, communication) in order to further develop the company.

Targets, measures and results are recorded and passed on to the responsible functions for evaluation.

ITTACHMENTS

Code of Procedure
Behavioural Standards re Integrity in Business
Safety Regulations for IT Applications
Principles of Personnel Development
Agreement regarding Projects with overlapping Business Fields

(2. – 5. are available in German and filed in the data bank under "Management System")

OUNTRY-SPECIFIC ATTACHMENTS

om page 14]

Management Manual

Code of Procedure

When marked as **requiring approval**, the following business transactions of the Sub-divisions (Dir.) or Divisions (UB) call for prior consent by the Division Management or the BHS Board, if necessary following agreement with the Central Business Unit Manager.

Applications for approval re. business transactions must be submitted in writing to the Division Management or Executive Board. This is also applicable for lower level Group companies.

Application for approval must be made early enough to allow time for decision making.

Furthermore, certain business activities are marked as being expressly **prohibited** for Division and Sub-division Managements.

Within the framework of de-central and central reporting to the Division Management or the responsible BHS Boards and/or the regional service companies, Management must ensure that all data are reported in compliance with the dates foreseen throughout the complete organisation using the information and communication paths set up.

In addition, the following **reporting obligations** must be complied with.

No.	**Business transactions** (proh.=prohibited, req.app.=requires approval, rep.obl.=reporting obligation)	**for Dir.**	**for UB**
1	Strategic planning	req.app.	req.app.
2	Operative planning with investment and financial planning	req.app.	req.app.
3	Basic changes to the organisational structure	req.app.	req.app.
4	Procurement, production and sale of mobile tangible fixed assets where the costs exceed EUR X in an individual case and are not part of the approved investment planning	req.app. > 10 K	req.app. > 2 mill.
5	Acquisition and sale of participations and capital increases if the value exceeds EUR X in an individual case or an increase in capital results in a share majority being acquired	req.app.	req.app. > 1 mill.
6	Resolution on adoption of the annual accounts and appropriation of net income in shareholders' meetings or meetings of lower level Group supervisory boards	req.app.	
7	Acquisition, sale and encumbrance of land plots or leasehold rights where the value in an individual case exceeds EUR X	proh.	req.app. > 2 mill.
8	Business transactions which are to be submitted to the BHS Supervisory Board or General Meeting for decision	proh.	req.app.
9	Amendments to the Code of Practice and Business Distribution Plan for Division Management	-	req.app.
10	Personnel		
10.1	Appointment and dismissal of technical and commercial Business Unit managers	req.app.	
10.2	Appointment and dismissal of technical and commercial Sub-division managers	-	req.app.
10.3	Determination of management salaries and rises in as far as these deviate from the standard terms	req.app.	
10.4	Introduction and amendment of company pension schemes and exceptions therefrom	proh.	req.app.
10.5	Granting of powers of procuration	req.app.	
10.6	Introduction/amendment of or deviation from rules governing employee profit sharing, bonuses and voluntary social security benefits	req.app.	req.app.
10.7	Granting of loans or advance disbursements and standing surety for employees, in so far as these exceed the scope usual within the Group	req.app.	
10.8	Employer's pension commitments or other forms of employee pension schemes	req.app.	
10.9	Commencement and conclusion of negotiations re. accommodation of conflicting interests and social plans	req.app.	
11	Award of contracts to		
11.1	Management consultants, where the value per successful bidder exceeds a total of EUR X per annum	req.app.	req.app. > 250 K.
11.2	Personnel consultants	req.app.	
11.3	Chartered accountants	req.app.	req.app.
11.4	Independent lawyers (exclusively by Staff Unit 'Legal Affairs')	proh.	req.app.
12	Sale and assignment of receivables	proh.	req.app.
13	Conclusion of compensatory and triangular deals	req.app.	req.app.
14	Conclusion and termination of long-term tenancy and lease agreements	req.app.	req.app.
15	Transactions which, in individual cases, result in claims with a total life of over 4 years	req.app.	req.app.
16	Taking out credits, standing surety, or similar liability obligations and the assumption of obligations arising out of bills of exchange	proh.	req.app.
17	Taking on and granting of loans and the assumption of obligations of others and guarantees for such obligations in favour of third parties, in particular suretyships	proh.	req.app.

Management Manual

	Business transactions (proh.=prohibited, req.app.=requires approval, rep.obl.=reporting obligation)	**for Dir.**	**for UB**
3	Amendment of Group allocation principles	proh.	req.app.
9	Provisions in the operating result for structural measures and imminent losses	proh.	req.app.
0	Acceptance of contracts with specific risks, i.e. particularly		
0.1	Funding	req.app.	
0.2	Assumption of unrestricted building land risk not included in or over and above the soil investigation report	req.app.	
0.3	Exceptionally long or unusual warranty periods / special warranty of over five years (exception: 10 years in connection with maintenance contract)	req.app.	
0.4	Contract penalty of over 5%, per diem rates of over 0.1% of the contract sum with contracts of over EUR 2.5 million	req.app.	
0.5	Construction „for stock", i.e. to own account	req.app.	
0.6	Major contracts of over EUR 15 million for building, tunnelling, civil engineering and project development, and EUR 7.5 million for roadwork	req.app.	
0.7	Construction where clients must obtain official approval	req.app.	
1	With private clients, waiving of payment security in the case of contracts amounting to at least 10% of the gross contract value and where the contract sum exceeds EUR 1 million. The approval obligation does not apply to contracts from major European banks and bank-related companies, insurance companies, and major industrial or trading concerns.	req.app.	
2	Pre-tax assignment (in the form of bank / client guarantees)	req.app.	
3	Bringing on actions and filing of other petitions to courts and arbitrators, and defence of corresponding actions and petitions by others where the value exceeds or could exceed EUR 1 million for building and EUR 100.000 for roadwork	req.app.	
4	Transfer of ownership by way of security and pledging of fixed and current assets and rights	req.app.	
5	Conclusion of license and sub-license agreements	req.app.	
6	Purchase, sale or encumbrance of land or leasehold rights	req.app.	
7	Preparation of tenders with a contract value of over EUR 15 million for building, tunnelling, civil engineering and project development and EUR 7.5 million for roadwork	req.app.	
8	Conclusion of contracts outside the EU	req.app.	
9	Deviations from the basic capitalisation prohibition where variation orders have not been applied for in writing	req.app.	
30	Project-related co-operation (formation of construction teams) between several national and/or international Sub-divisions	req.app.	
31	Donations to political parties	req.app.	
32	All transactions outside the usual course of business, particularly stock market, futures or speculative transactions	proh.	proh.
33	Transactions where it is planned to make use of a tied financial credit and STRABAG is partially liable	proh.	proh.
34	Change of banking reference	proh.	
35	Inquiry reports for all tenders worth over EUR 3.5 million for building, tunnelling, civil engineering and project development and EUR 1.7 million for roadwork	rep.obl.	rep.obl.
36	Unusual events, individually and unfailingly	rep.obl.	rep.obl.

Appendix 2.12(c)(4)

Appendix 2.12(c)(4) - Non-Conformance Notice

QUALITY ASSURANCE NON-CONFORMANCE NOTICE

To: Ontario Power Generation Inc. ("OPG")	Contract: Design/Build Agreement dated •, 2005 between Strabag AG (the "**Contractor**") and OPG (the "**Agreement**") QA Non-Conformance Notice No.: • Date: •

Defined terms used in this Notice have the same meanings given to those terms in the Agreement. In accordance with Section 2.12(c)(4) of the Agreement, the Contractor hereby gives OPG notice that the following does not conform to the requirements of quality assurance program required by the Agreement as described below:

[Describe non-conforming item including nature of non-conformance]

The Contractor proposes:

(a)	to take the corrective action described in Appendix A to this Notice; or	■
(b)	to "use as is" for the reasons described in Appendix A to this Notice.	■

STRABAG AG

By: _____

Name:
Title

(a)	OPG consents to the Contractor's proposal on the terms set out in Appendix B, or	■
(b)	directs the Contractor to comply with the Contractor's Proposal Documents or the Final Submittals, as the case may be.	■

DATED ON _____ 200•

ONTARIO POWER GENERATION INC.

By: _____

Name:
Title

Appendix 2.13(f)

Appendix 2.13(f) - Non-Compliance Notice

NON-COMPLIANCE NOTICE

To: Ontario Power Generation Inc. ("OPG") Attn: ■ Fax: ■	Contract: Design/Build Agreement between OPG and Strabag AG (the "**Contractor**") dated ■, 2005 (the "**Agreement**") Non-Compliance Notice No.: ■ Date: ■

Defined terms used in this Notice have the same meanings given to those terms in the Agreement. In accordance with Section 2.13(f) of the Agreement, the Contractor hereby gives OPG notice that the following does not comply with the requirements of the Owner's Mandatory Requirements, the Contractor's Proposal Documents, the Final Submittals and/or the Agreement, as required by the Agreement as described below:

[Describe non-compliance item including nature of non-compliance]

The Contractor proposes:

(1)	to take the corrective action described in Appendix A to this Notice; or	■
(2)	to "use as is" for the reasons described in Appendix A to this Notice.	■

STRABAG AG

By:_____
Name:
Title:

(1)	OPG consents to the Contractor's proposal on the terms set out in Appendix B; or	■
(2)	directs the Contractor to comply with the Owner's Mandatory Requirements, the Contractor's Proposal Documents, the Final Submittals and/or the Agreement, as the case may be.	■

Dated on _____, 200■

ONTARIO POWER GENERATION INC.

By: _____
Name:
Title:

Appendix 2.14(c)

Appendix 2.14(c) - Subcontractors

Subcontractor	Summary of Work or Goods to be Provided for Subcontractor's Performing Work Exceeding 1% of Contract Price
Dufferin Construction Inc. 690 Dorval Drive Oakville, Ontario L6K 3W7	Nominated Subcontractor for: Accelerating Wall, Outlet Channel, Dewatering Shafts, Intake Structure, Outlet Structure, Demolition of Dewatering Structure, Supply of concrete and shotcrete
Bermingham Construction Ltd. Wellington Street Marine Terminal, Ontario L8L 4Z9	Cofferdams
McNally Construction Inc. 1855 Barton Street East Hamilton, Ontario L8H 7L8	Intake Channel blasting, Approach Walls
Allied Fabricators Inc. 6 Adams Street Paris, Ontario N3L 3X4	Water Control Gates
Geo Foundations Contractors Inc. 302 Main Street N. Acton, Ontario L7J 2M3	Drilling and grouting
Harris Rebar 318 Arvin Avenue Stoney Creek, Ontario L8E 2M2	Reinforcement steel
Bauveg U.S.A.	Tunnel waterproofing system
Atlas Copco Canada Inc. 30 Mont Rose Dollard-Def-Ormeaux, PQ H9B 3J9	Rockbolts
ILF Beratende Ingenieure ZT Gesellschaft mbH Feldkreuzstrasse 3, A-6063 Rum/Innsbruck	Design
Morrison Hershfield Ltd. 235 Yorkland Boulevard, Suite 600 Toronto, Ontario M25 1T1	Design

Appendix 2.14(e)

Appendix 2.14(e) - Labour Obligations

UNION OBLIGATIONS

Construction Collective Agreements

The Contractor will ensure that all construction trade Work performed at the Site will be carried out in accordance with the applicable construction collective agreements (collectively, the "**Collective Agreements**"), applicable labour relations laws and other Applicable Laws. The Contractor, not OPG, is responsible for identifying all Collective Agreements, applicable labour relations laws and other Applicable Laws. The Contractor will comply with the Collective Agreements, including fabrication clauses, and will not take any action that would cause OPG to fail to comply with any of its obligations under the Collective Agreements.

ACKNOWLEDGEMENT OF LABOUR REQUIREMENTS FORM

The Labour Acknowledgement Requirements Form forms part of this Appendix 2.14(e). The Contractor will advise all Subcontractors of the requirements in the Labour Requirements Clause and the Contractor will deliver to OPG a written acknowledgement substantially in the form of Appendix 2.14(e) from each Subcontractor before that Subcontractor commences to perform Work at the Site.

The acknowledgement of Labour Requirements Clause and the Labour Requirements Clause are incorporated into and form part of this Appendix 2.14(e). As between OPG and the Contractor, in the event of any inconsistency between this Agreement and a Collective Agreement, the provisions of this Agreement will prevail. As between

(a) the Contractor and/or Subcontractor, and

(b) any trade union that is a signatory to a Collective Agreement

in the event of any inconsistency between this Agreement and a Collective Agreement, the provision of the applicable Collective Agreement will prevail.

ACKNOWLEDGEMENT OF LABOUR REQUIREMENTS CLAUSE

_____

(Name of Proponent)

(hereinafter call the "Proponent") acknowledges and agrees that, should its Proposal with respect to

_____

_____

_____

_____

(Identification of Proposal and Work)

be accepted by the Owner:

the contract with the Owner resulting from that acceptance shall include all the terms and conditions of the attached Labour Requirements Clause.

all the terms and conditions of the Labour Requirements Clause shall form part of any subcontract which the Proponent enters into for the performance of any work covered by such contract with the Owner.

failure by the Proponent or any of its Subcontractors to comply with any of the terms and conditions contained in the Labour Requirements Clause, shall, at the option of the Owner, render such contract or any such subcontract, or any part of such contract or any such subcontract as determined by the Owner, null and void.

The Proponent shall give to the Owner on request evidence satisfactory to the Owner that it and any of its subcontractors are complying with the terms and conditions of the Labour Requirements Clause. It is understood that this acknowledgement of Labour Requirements shall form part of the Proponent's contract with the Owner.

Dated this _____day of _____, 200_

_____

LABOUR REQUIREMENTS CLAUSE

The following sets out the labour requirements (the "Labour Requirements Clause") pursuant to Section 2.14(e) of the Agreement.

I. WORK BY TRADE JURISDICTIONS

The Labour Requirement Clause is designed to reflect three major groupings of trade skills, as follows:

1. **Schedule I** - Work which can be described as coming within the trade jurisdiction of the following unions:

   (a) Power Council of Unions
   International Union of Operating Engineers
   Laborers' International Union of North America
   United Brotherhood of Carpenters and Joiners of America
   United Brotherhood of Carpenters and Joiners of America on behalf of Millwrights

   (b) Operative Plasterers' and Cement Masons' International Association of the United States and Canada

   (c) International Association of Heat and Frost Insulators and Asbestos Workers

   (d) International Union of Painters and Allied Trades

   (e) International Brotherhood of Teamsters

   (f) International Association of Bridge, Structural, Ornamental and Reinforcing Iron Workers for Ironworkers

   (g) International Association of Bridge, Structural, Ornamental and Reinforcing Iron Workers on behalf of Reinforcing Rodmen

   (h) United Association of Journeymen and Apprentices of the Plumbing and Pipe Fitting Industry of the United States and Canada

   (i) Electrical

      (i) International Brotherhood of Electrical Workers Construction Council of Ontario for Generation Projects Construction

      (ii) Canadian Union of Skilled Workers

   (j) International Brotherhood of Boilermakers, Iron Ship Builders, Blacksmiths, Forgers and Helpers

   (k) The Brick and Allied Craft Union of Canada

(l) International Union of Bricklayers and Allied Craftsmen and the Ontario Provincial Conference of the International Union of Bricklayers and Allied Craftsmen on behalf of the Marble, Tile, Terrazzo, Resilient Floor Layers and their Helpers

(m) Ontario Sheet Metal Workers' Conference

(n) The Built-up Roofers', Damp and Waterproofers' Section of the Ontario Sheet Metal Workers Conference

2. **Schedule II** - Work which can be described as coming within the trade jurisdiction of the following unions.

At present there are no unions in this category.

3. **Schedule III** - Work which cannot be described as coming within the trade jurisdiction of any of the unions listed in Paragraphs 1 and 2 above.

If any of the work which is the subject of a proposal will be the type of work described in Paragraph 1 of this Section I, Paragraphs B, C and D of Section II, but not Paragraphs E and F of Section II, of the Labour Requirements Clause specifically apply to such work.

If any of the work which is the subject of a proposal will be the type of work described in Paragraph 2 of this Section I, Paragraph E of Section II, but not Paragraphs B, C and F of Section II, of the Labour Requirements Clause specifically applies to that work.

In the case of any other type of work, as described in Paragraph 3 of this Section I, Paragraph F of Section II, but not Paragraphs B, C and E of Section II, of the Labour Requirements Clause specifically applies to such work.

With the exception of Paragraphs B, C, D, E and F of Section II, which are applicable as explained above. All other Paragraphs of the Labour Requirements Clause apply to any work which is the subject of a proposal.

4. (a) Notwithstanding anything set out above, the field construction by jump or slip method of hollow concrete columns (such as chimneys, silos and bins, exclusive of multiple-celled silos as used in cement and grain storage and including the construction of chimneys, chimney liners and the demolition or repair of any of the aforementioned structures) shall not be subject to the provisions of the Electrical Power Systems Construction Association Collective Agreements if the employer of employees performing such work is a party to the National Agreement for Canada - Stacks, Chimneys, Silos or any renewal thereof.

(b) Notwithstanding anything set out above, work coming within the trade jurisdiction of the International Union of Operating Engineers, Local 793, as that jurisdiction relates to Crane and Equipment Rentals, shall not be subject to the provisions of the Electrical Power Systems Construction Association/Power Council of Unions Collective Agreement if the employer of employees

performing work within such jurisdiction is a party to a collective agreement with the International Union of Operating Engineers, Local 793, with respect to Crane and Equipment Rentals.

II. LABOUR REQUIREMENTS

A. For the purpose of this Labour Requirements Clause, the following definitions shall apply:

1. "**Company**" shall mean any company, partnership, sole proprietorship, joint venture, contractor, subcontractor or person contracting to do the whole or any part of the work contemplated by this proposal document or contract, as the case may be, at the site described in this proposal document or contract, as the case may be.

2. "**EPSCA**" shall mean the Electrical Power Systems Construction Association.

3. "**EPSCA Agreement**" shall mean any collective agreement in existence now or in the future between EPSCA and any Trade Union or Council of Trade Unions.

4. "**CUSW**" shall mean the Canadian Union of Skilled Workers.

5. "**CUSW Agreement**" shall mean the collective agreement in existence now or in the future between CUSW and Ontario Power Generation Inc. or any other relevant CUSW agreement.

6. "**BACU**" shall mean the Brick and Allied Craft Union of Canada.

7. "**BACU Agreement**" shall mean the collective agreement in existence now and in the future between BACU and Ontario Power Generation Inc.

8. "**Work on Site**" shall mean work performed by any Company for Ontario Power Generation Inc. in the Province of Ontario on property acquired by Ontario Power Generation Inc. for:

   (a) the construction of generation facilities or microwave and repeater stations;

   (b) the supply of aggregate and concrete used in the construction of said facilities; and

   (c) ancillary material yards.

B. Any Company performing any non-electrical Work on Site which would come within the jurisdiction of any of the unions that are signatory to an EPSCA Agreement shall be required to conform to and adhere to the provisions of that EPSCA Agreement. If the EPSCA Agreement does not contain a wage rate for a trade classification required by any such Company, it shall request the General Manager of EPSCA for a wage rate and the wage rate so specified shall apply.

C. 1. Any Company performing any electrical Work on Site which would come within the jurisdiction of either the International Brotherhood of Electrical Workers ("IBEW") or CUSW shall be required to conform and adhere to the following:

(a) if the Company is in a contractual relationship with IBEW, the EPSCA/IBEW Generation Projects collective agreement will apply; and

(b) if the Company is NOT in a contractual relationship with IBEW, the CUSW Agreement will apply.

2. Any Company performing bricklaying or masonry Work on Site, which would come within the jurisdiction of BACU, shall be required to execute and comply with the terms and conditions of Appendix E of the BACU Agreement, a copy of which is attached to this Labour Requirements Clause.

D. The labour costs of any directly contracted Company falling within the provision of Paragraphs B or C of this Labour Requirements Clause which has submitted a proposal to Ontario Power Generation Inc. with respect to this contract and which has entered into a direct contract with Ontario Power Generation Inc. as a result of its proposal being accepted by Ontario Power Generation Inc. shall be based upon rates of wages and working conditions specified or incorporated by reference in the EPSCA Agreements, CUSW Agreement or BACU Agreement set out above. Any such Company shall give Ontario Power Generation Inc.'s auditors full access to all Company records considered by the auditors to be necessary for the purpose of determining the accuracy of any amounts contemplated by this paragraph. Ontario Power Generation Inc. shall have no liability to pay any amounts under this paragraph. Such Company will include in its proposal any allowance for daily travel, subsistence or travel and transportation as provided for in the relevant articles of the applicable collective agreement and will not receive from Ontario Power Generation Inc. a reimbursement for the direct cost it incurs for these items.

E. Any Company performing any Work on Site which would come within the jurisdiction of any trade union that is signatory to a collective agreement with Ontario Power Generation Inc. (other than an EPSCA Agreement or CUSW Agreement) shall, as a minimum, be required to conform to and adhere to those provisions set out in Schedule II, set out above. If Schedule II, set out above, does not contain a wage rate, overtime rate, shift differential rate or other information for a trade classification required by any such Company, it will request the Manager of Ontario Power Generation Inc.'s Construction Labour Relations Department, or his designate, for such rates and the rates so specified in writing shall apply.

F. Any Company performing any Work on Site which is not covered by either Paragraph B, C or E hereof, shall be required to pay all employees who perform such Work on Site as follows:

(a) (wage rates as are established by representative collective agreements existing with contractors working in the municipality or district concerned which are

appropriate for the classifications and kind of labour employed, and such revisions to the wage rates of the aforesaid collective agreements as may result from collective bargaining during the term of this contract;

(b) if no such collective agreements are in force, the rates currently paid to competent workmen in appropriate classifications in the municipality or district; and

(c) if no such collective agreements are in force, and no current rate is established, a fair and reasonable rate.

G. Any Company performing any Work on Site shall conform to such working conditions and administrative practices as are required by Ontario Power Generation Inc. from time to time at the work site.

H. If the applicable rates, schedules, working conditions and/or administrative practices change during the term of this contract any Company performing any Work on Site shall be required to conform to and adhere to any such revision or revisions.

I. Unless otherwise specified herein or by this Contract, no Company shall be entitled to payment or reimbursement for any increases resulting from any changes, revisions and/or additions or deletions in any rates, schedules, working conditions and/or administrative practices nor for payment or reimbursement for any resultant increases in workers' compensation assessments, employment insurance payments and/or vacation pay nor for payment or reimbursement for any other increase of any sort or type in any other matter.

J. If any Company subcontracts to any other Company any part of the Work on Site contemplated by this contract, it shall require any such Company to conform to and adhere to all terms and conditions contained in this Labour Requirements Clause and all such subcontracts shall incorporate all terms and conditions contained in this Labour Requirements Clause.

K. The Company shall specify to Ontario Power Generation Inc. that portion of the Work on Site that will be subcontracted and shall submit prior to the subcontractor's commencement of work the name of any Company that will be engaged to perform such Work on Site together with the amount and kind of work each will perform. No work shall be subcontracted by the Company until Ontario Power Generation Inc. is informed of the portion of the work to be subcontracted and the Company receiving the subcontract.

L. Any Company submitting a proposal with respect to this contract or any Company performing any Work on Site contemplated by this contract may consult with Ontario Power Generation Inc.'s Manager of Construction Labour Relations, or his designate, with respect to rates, schedules, working conditions and/or administrative practices which may be applicable to this contract. Any information given by Ontario Power Generation Inc. shall in no way obligate Ontario Power Generation Inc. with respect to any matter nor shall it in any way relieve any Company of its responsibility for determining any matter upon which to base its proposal.

M. Ontario Power Generation Inc.'s Manager of Construction Labour Relations, or his designate, may call meetings with respect to rates, schedules, working conditions and/or administrative practices or for discussion and clarification of any problem involving labour relations. Any Company making a proposal with respect to this contract and any Company performing any Work on Site contemplated by this contract shall attend such meetings when requested by Ontario Power Generation Inc.

N. Ontario Power Generation Inc. may require from time to time any Company making a proposal with respect to this contract to supply Ontario Power Generation Inc. forthwith with any and all collective agreements that it or any of its subcontractor Companies may have covering the area where the work is to be performed.

O. Any Company contracting or contracted to perform any Work on Site contemplated by this contract shall give to Ontario Power Generation Inc. immediately upon request evidence satisfactory to Ontario Power Generation Inc. of such Company's compliance with any or all of the terms and conditions contained in this Labour Requirements Clause. Failure to do so, or failure to comply with any of the terms and conditions contained in this Labour Requirements Clause shall, at the option of Ontario Power Generation Inc., render this contract or such part of it as is determined by Ontario Power Generation Inc., null and void upon notification in writing to the defaulting Company by Ontario Power Generation Inc.

III. VACATION AND STATUTORY HOLIDAY PAY

Vacation and Statutory Holiday Pay will be included on the employees' pay-cheques for all trades, with one exception - the Millwrights (see below). Companies should disregard the instructions in the International Brotherhood of Painters' and Allied Trades' Appendix (Article 15 - Paragraphs 1 and 2) as the Painters are now in line with the majority of trades having vacation and statutory holiday pay included on employees' pay-cheques.

MILLWRIGHTS

The successful Company is required to remit Vacation and Statutory Holiday Pay for employees working under the terms and conditions of the EPSCA/Millwright Appendix to the Union's respective Plan, as follows:

The Millwright Benefit Plan Trust Funds.

IV. MARK-UP MEETING

There is a contractual requirement for the successful Company to hold a mark-up meeting with all interested unions prior to the commencement of work.

The successful Company must inform the appropriate EPSCA Representative of the contract particulars at the time an award is made. The EPSCA Representative will then arrange the mark-up meeting with the contractor and the unions.

Appendix 2.14(f)

Appendix 2.14(f) - INTENTIONALLY DELETED

Appendix 2.18

Appendix 2.18 - Conflict of Interest Declaration

[See Attached]

ONTARIO POWER GENERATION

Amendment 5,, 26-Apr-05

CONFLICT OF INTEREST DECLARATION

The undersigned hereby declares that, except as disclosed, accurately and completely, in Schedule "A":

1. no director, officer or employee of Ontario Power Generation Inc. ("OPG"), or any of its affiliates, or any immediate family member of any such person, has any connection or relationship with, or any pecuniary interest in, the undersigned or any affiliate of the undersigned;

2. neither the undersigned nor any affiliate of the undersigned is in possession of, nor has it received, read or reviewed any confidential information relating to the project, whensoever or howsoever obtained (other than information made available to all Proponents by OPG, or its predecessor Ontario Hydro, as part of the tender for the tunnel diversion design/build contract issued on June 1, 1998);

3. no director, officer or employee or former director, officer or employee of, or advisor or former advisor to, OPG, its affiliates or its predecessor Ontario Hydro, with knowledge of the project not otherwise in the public domain has provided information to or assisted the undersigned in any manner whatsoever in the preparation of its response to the Invitation;

4. the undersigned does not now have nor has it ever had any other arrangement, contract, alliance, connection or relationship with OPG, its affiliates or its predecessor Ontario Hydro or any of their directors, officers or employees that may in any way affect or impair the integrity or public perception of the integrity of the proposal invitation process, or give rise to a conflict of interest or the appearance of a conflict of interest; and

5. the undersigned has made all necessary inquiries so as to enable it to make this declaration.

DATED THIS 13 day of May, 2005

STRABAG AG
Donau City Strasse 9
A-1220 Vienna, Austria

By:
Name: Ernst Gschnitzer
Title: Area Director

STRABAG
STRABAG AG
DONAU-CITY-STRASSE 9
A-1220 WIEN/AUSTRIA

ONTARIO POWER GENERATION

Harry Charalambu
Project Manager
Hatch Mott MacDonald

CONFLICT OF INTEREST DECLARATION

The undersigned hereby declares that, except as disclosed, accurately and completely, in Schedule "A":

1. no director, officer or employee of Ontario Power Generation Inc. ("OPG"), or any of its affiliates, or any immediate family member of any such person, has any connection or relationship with, or any pecuniary interest in, the undersigned or any affiliate of the undersigned;

2. neither the undersigned nor any affiliate of the undersigned is in possession of, nor has it received, read or reviewed any confidential information relating to the project, whensoever or howsoever obtained (other than information made available to all Proponents by OPG, or its predecessor Ontario Hydro, as part of the tender for the tunnel diversion design/build contract issued on June 1, 1998);

3. no director, officer or employee or former director, officer or employee of, or advisor or former advisor to, OPG, its affiliates or its predecessor Ontario Hydro, with knowledge of the project not otherwise in the public domain has provided information to or assisted the undersigned in any manner whatsoever in the preparation of its response to the Invitation;

4. the undersigned does not now have nor has it ever had any other arrangement, contract, alliance, connection or relationship with OPG, its affiliates or its predecessor Ontario Hydro or any of their directors, officers or employees that may in any way affect or impair the integrity or public perception of the integrity of the proposal invitation process, or give rise to a conflict of interest or the appearance of a conflict of interest; and

5. the undersigned has made all necessary inquiries so as to enable it to make this declaration.

DATED THIS 13 day of May, 2005

ILF

BERATENDE INGENIEURE
ZT GESELLSCHAFT MBH
A-6063 Rum bei Innsbruck • Feldkreuzstraße 3
Telefon 0512/2412-0 • Fax 0512/2412-5900

By:
Name: Klaus Lässer
Title: Chief Executive Officer

ONTARIO POWER GENERATION

Harry Charalambu
Project Manager
Hatch Mott MacDonald

CONFLICT OF INTEREST DECLARATION

The undersigned hereby declares that, except as disclosed, accurately and completely, in Schedule "A":

1. no director, officer or employee of Ontario Power Generation Inc. ("OPG"), or any of its affiliates, or any immediate family member of any such person, has any connection or relationship with, or any pecuniary interest in, the undersigned or any affiliate of the undersigned;

2. neither the undersigned nor any affiliate of the undersigned is in possession of, nor has it received, read or reviewed any confidential information relating to the project, whensoever or howsoever obtained (other than information made available to all Proponents by OPG, or its predecessor Ontario Hydro, as part of the tender for the tunnel diversion design/build contract issued on June 1, 1998);

3. no director, officer or employee or former director, officer or employee of, or advisor or former advisor to, OPG, its affiliates or its predecessor Ontario Hydro, with knowledge of the project not otherwise in the public domain has provided information to or assisted the undersigned in any manner whatsoever in the preparation of its response to the Invitation;

4. the undersigned does not now have nor has it ever had any other arrangement, contract, alliance, connection or relationship with OPG, its affiliates or its predecessor Ontario Hydro or any of their directors, officers or employees that may in any way affect or impair the integrity or public perception of the integrity of the proposal invitation process, or give rise to a conflict of interest or the appearance of a conflict of interest; and

5. the undersigned has made all necessary inquiries so as to enable it to make this declaration.

DATED THIS 13 day of May, 2005

Morrison Hershfield

By: _____
Name: Kevin Peck
Title: VP Transportation.

Appendix 2.20(d)

Appendix 2.20(d) - Preliminary INCW Part Project Specific Safety, Security, Public Safety and Emergency Response Plan

The INCW Part Project Specific Site Safety Plan will be prepared in accordance with Section 2.20(d). It will be a comprehensive plan and will incorporate the following elements to the extent that they are applicable to the Work being undertaken by the Contractor, considering the Contractor's means and methods for performance of the Work:

1. the safety hazard analysis described in Section 2.20(d);

2. the Preliminary Project Specific Site Safety, Security, Public Safety and Emergency Response Plan attached at Appendix 2.4(d);

3. the OPG policies and procedures identified below (copies of which have been provided to the Contractor) (the "OPG Policies"); and

4. any Contractor's safety procedures not included above.

The Contractor will ensure that the INCW Part Project Specific Site Safety Plan (1) incorporates those OPG Policies which are mandatory and (2) is, in all other respects, at least equivalent to the OPG Policies.

OPG Policies, Standards and Procedures

- Corporate Safety Rules
  - Part 1 - Common and Risk Based Rules
  - Part 2 - Management Requirement Rules
- OPG-SFTY-STD-005 - Safety Incident Management
- OPG / Electricity Production - Work Protection Code
- OPG Craning and Rigging Handbook
- Ontario Hydro Manual for Waterways Safety

- Electricity Production (EP) - Lead Plant Documents
  - LP-HS-003 - Safety Incident Management Procedure
  - NPG-LP-HS-007 - Work Protection Code Training Requirements
  - NPG-LP-HS-015 - Diving Operations Safety

- Electricity Production (EP) - Project Safe Work Practice Procedures
  - EP-MAN-004 - Safe Work Practice Procedures (Part 2)
    - Administrative Procedures A1 through A6
    - Safe Work Practice Procedures B1 through B47

- Niagara Plant Group (NPG) - Administrative Instructions
  - 2-1 - Health and Safety Incident Management
  - 2-2 - Personal Protective Equipment
  - 2-3 - Smoking Policy

- 2-9 - Lead Exposure Control
- 2-12 - Working Near Open Water
- 2-15 - Use of Crane to Raise / Lower Worker
- 2-16 - Hazardous Material Management
- 2-20 - Job Safety Planning Folder Instruction
- 2-27 - Silica Control Measures
- 2-28 - Housekeeping
- 2-30 - Interim Instruction for Site Excavation in the Vicinity of Buried and Embedded Sources of Energy
- 2-31 - Core Drilling
- Form F2-54 - Service Locate and Excavation Approval Form

Appendix 2.20(o)

Appendix 2.20(o) - Designated Substances Present at INCW Part Project Area

Silica and lead are present on the Site, as follows:

- Silica is present in the concrete at the INCW and the PGS Dewatering Structure and may be mobilized by the Contractor through concrete cutting, coring, demolition, etc.; and
- Lead may be present in lead-based coatings applied to handrails and embedded steel parts at the INCW and the PGS Dewatering Structure and may become mobilized through contractor operations such as sandblasting or saw-cutting these elements.

Appendix 4.1(a)

Appendix 4.1(a) - INTENTIONALLY DELETED

Appendix 4.1(b)

Appendix 4.1(b) - INTENTIONALLY DELETED

Appendix 4.1(d)

Appendix 4.1(d) - Letter of Credit

Letter of Credit

[Letterhead of Canadian Chartered Bank]

To: Ontario Power Generation Inc. 700 University Avenue Toronto, Ontario M5G 1X6 Attention: Director, Credit	Date of Issue: •, 2005 Irrevocable standby letter of credit No: • Amount: Not exceeding CAD $70,000,000 Date of Expiry: •, 200• (subject to automatic renewal)
	Applicant: •

Dear Sirs/Mesdames:

At the request of Strabag AG (the "**Customer**"), we hereby issue in your favour our irrevocable standby letter of credit for a maximum total amount not to exceed CAD $70,000,000).

This letter of credit is available against presentation of the following documents delivered to us at •:

(a) your written demand for payment under this letter of credit;

(b) the original of this letter of credit for notation hereon of the drawing or, if no further drawings are available under this letter of credit, for cancellation; or

(c) a certificate, signed by your Chief Financial Officer, Treasurer or Secretary stating that Ontario Power Generation Inc. is entitled to draw on this letter of credit pursuant to Section 4.1(d) of the Design/Build Agreement between the Customer and Ontario Power Generation Inc. dated ■, 2005

This letter of credit will be automatically renewed for a period of one year upon the expiration date set out above and thereafter each year upon each anniversary of such date, unless at least 45 days before such expiration date, or before any anniversary of such date: (a) we notify both you and the Customer in writing by registered mail that we elect not to so renew this letter of credit for any additional period; or (b) you or the Customer delivers to us written confirmation from you that this letter of credit is terminated. Upon your receipt of such notice of election from us not to renew this letter of credit, you may at any time before the expiration date, or anniversary of such date, draw under this letter of credit by your sight draft(s) drawn on us and bearing the statement "drawn under letter of credit no. •".

Partial drawings are allowed under this letter of credit.

We will honour each demand made by you under this letter of credit which is accompanied by the documents specified above, without inquiring whether you have the right, as between you and the Customer, to make such demand.

This letter of credit is irrevocable.

This letter of credit is subject to the Uniform Customs and Practice for Documentary Credits (1993 Revision), International Chamber of Commerce publication No. 500.

[NAME OF CANADIAN CHARTERED BANK]

By: _____

Name:
Title

By: _____

Name:
Title

Appendix 4.1(e)

Appendix 4.1(e) - Indemnity Agreement

INDEMNITY AGREEMENT

This Agreement is made as of August 16, 2005, between

> **ONTARIO POWER GENERATION INC.**, a corporation existing under the laws of Ontario ("**OPG**"),
>
> and
>
> **STRABAG AG**, a corporation existing under the laws of Austria ("**Subsidiary**"),
>
> and
>
> **[•]**, a **[corporation]** existing under the laws of Austria ("**Parent**").

RECITALS

(A) Subsidiary and OPG will enter into a design/build agreement in connection with the Niagara Tunnel Facility Project (the "**Underlying Agreement**").

(B) OPG will not enter into the Underlying Agreement unless Parent and Subsidiary execute this Agreement.

(C) Parent wishes to assist Subsidiary, its subsidiary, to obtain the Underlying Agreement. Accordingly, Parent has agreed to provide OPG with the indemnifications and other rights contained in this Agreement.

For value received, the parties agree as follows.

Obligation to Perform. If Subsidiary fails to perform in a timely manner any obligation under the Underlying Agreement or any other document delivered in respect of the Underlying Agreement (collectively, the "**Subsidiary Obligations**"), Parent will itself perform such Subsidiary Obligations, or cause the same to be performed, in each case as if Parent were itself Subsidiary with respect to such Subsidiary Obligations. Parent will perform such Subsidiary Obligations immediately following receipt of a notice from OPG indicating the Subsidiary Obligation(s) that Subsidiary has failed to satisfy in a timely manner, regardless of whether or not OPG has attempted to enforce any of the Subsidiary Obligations against Subsidiary. Any failure by Parent to perform in a timely manner any Subsidiary Obligations that Parent is obliged to perform will immediately entitle OPG to pursue all rights and remedies available to it in law, in equity or otherwise against each of Parent and Subsidiary.

Other Obligations. Parent irrevocably and unconditionally agrees to indemnify and save harmless OPG from and against all costs, damages, expenses, losses, liabilities, demands, claims, suits, actions, proceedings, judgments and obligations (including, without limitation, legal fees and expenses) arising in respect of any breach by Subsidiary of any Subsidiary Obligations (the

"**Indemnity Obligations**" and collectively the Subsidiary Obligations and the Indemnity Obligations are the "**Obligations**"). This indemnity does not extend, however, to impose any obligation on Parent that would not have been an obligation of Subsidiary under the Underlying Agreement, except that Parent will not be relieved of any of its obligations under this Agreement due to any relief of Subsidiary from any of the Subsidiary Obligations arising in respect of any bankruptcy, insolvency, reorganization, moratorium, arrangement, readjustment of debt, liquidation, winding-up or dissolution proceedings or legislation.

Obligations Absolute. The obligations of Parent under this Agreement are absolute and unconditional and continue regardless of any change or other modification to the Subsidiary Obligations from time to time and regardless of any other circumstance which might otherwise constitute, in whole or in part, a defence available to, or a discharge of Parent, Subsidiary or any other entity in respect of the Subsidiary Obligations or any of the obligations of Parent.

No Obligation for OPG. OPG will have no obligation to Parent whatsoever for any act, omission, matter, thing or circumstance whatsoever and OPG's obligations to Subsidiary are governed solely by the Underlying Agreement.

Parent's Representation. Parent represents and warrants to OPG that Parent has taken all necessary corporate action to authorize the execution and delivery of this Agreement and the performance of its obligations under this Agreement and that this Agreement constitutes a valid and binding agreement of Parent enforceable against it in accordance with its terms.

Financial Information of Parent. Parent authorizes OPG to make credit enquiries about Parent or any of its affiliates from time to time and to receive and exchange credit information from credit reporting agencies or other persons with which Parent or any of its affiliates has or may expect to have financial dealings. Parent has provided OPG with Parent's consolidated audited financial statements for the last three financial years. Such financial statements have been prepared in accordance with the International Financial Reporting Standards issued by the International Accounting Standards Board (and including the interpretations of the International Financial Reporting Interpretations Committee), consistently applied. Such financial statements fairly reflect the consolidated financial position and results of operations of Parent as at the dates and for the periods set out in such statements. Parent will provide OPG with its audited consolidated financial statements and unaudited quarterly consolidated financial statements promptly after each such statement becomes available. Parent will also provide OPG with any other financial information respecting Parent that OPG may reasonably request to assist OPG in its ongoing evaluation of the value of the indemnifications and other rights provided to OPG by Parent under this Agreement.

Subrogation. Until the Subsidiary has satisfied all of its liabilities, obligations and covenants under the Underlying Agreement and until repayment in full of the Obligations, all dividends, compositions, proceeds of security, security valued or payments received by OPG from the Subsidiary or others in respect of the Obligations shall be regarded for all purposes as payments in gross without any right on the part of the Parent to claim the benefit thereof in reduction of the liability under this Agreement and the Parent shall not claim any set-off or counterclaim against the Subsidiary in respect of any liability of the Subsidiary to the Parent, claim or prove in the bankruptcy or insolvency of the Subsidiary in competition with OPG or have any right to be

subrogated to OPG. The Parent shall have no right of subrogation in respect of payments made to OPG hereunder until such time as the Subsidiary has satisfied all of its liabilities, obligations and covenants under the Underlying Agreement and the Obligations have been fully satisfied. In the case of the liquidation, dissolution, winding-up or bankruptcy of the Subsidiary (whether voluntary or involuntary) or in the event that the Subsidiary makes an arrangement or composition with its creditors, OPG shall have the right to rank for its full claims and to receive all dividends or other payments in respect thereof until is claims have been paid in full. If any amount shall be paid to the Parent on account of any subrogation rights arising hereunder at any time before all of the Obligations have been fully paid and satisfied, such amount shall be held in trust for the benefit of OPG and shall forthwith be paid to OPG to be credited and applied against the Obligations, whether matured or unmatured.

Assignment and Postponement of Claim. All present and future indebtedness and liability of the Subsidiary to the Parent is hereby assigned by the Parent to OPG and postponed to the Obligations, and all monies received by the Parent in respect thereof after the occurrence of an event of default (as defined in the Underlying Agreement) which is continuing shall be received in trust for OPG and forthwith upon receipt shall be paid over to OPG all without in any way lessening or limiting the liability of the Parent under this Agreement. Until the occurrence of an event of default (as defined in the Underlying Agreement) which is continuing, OPG consents to the Parent retaining all monies received by the Parent from the Subsidiary. This assignment and postponement is independent of the guarantee and indemnity contained in this Agreement. Any claim of the Parent against the Subsidiary arising from payments made by the Parent pursuant to the provisions of this Agreement shall be in all respects subordinate to the full and complete payment, performance and discharge of the Obligations, and no payment hereunder by the Parent shall give rise to any claim of the Parent against OPG.

Notice. Every notice or other communication required or permitted under this Agreement must be in writing and may be delivered in person, by courier or by fax to the applicable party, as follows:

if to OPG,	if to Subsidiary,	if to Parent,
Ontario Power Generation Inc. 700 University Avenue, Toronto, Ontario, M5G 1X6 Attention: Director, Credit Fax: (416) 592-8335	Strabag AG Donau-City-Str. 9 1220 Wien (Vienna) Austria Attention: Ernst Gschnitzer Fax: +43 1 22422 1227	[■]

or to any other address, fax number or individual that a party designates. Any notice or other communication under this Agreement, if delivered personally or by courier will be deemed to have been given when actually received, if delivered by fax before 3:00 p.m. (Toronto time) on a business day in Toronto will be deemed to have been delivered on that business day and if delivered by fax after 3:00 p.m. (Toronto time) on a business day in Toronto or on a day which is

not a business day in Toronto will be deemed to be delivered on the next business day in Toronto.

Service. For the purpose of all legal proceedings, this Agreement will be deemed to have been performed in Ontario and the courts of Ontario will have jurisdiction to entertain any action arising under this Agreement. Each of the parties irrevocably submits to the non-exclusive jurisdiction of the courts of Ontario. No party will oppose the enforcement against it in any other jurisdiction of any judgment or order obtained from an Ontario court regarding this Agreement. Any party may effect service of summons or any other legal process that may be served in any action, suit or other proceeding by delivering any such process to such other party in accordance with the previous Section. Parent hereby nominates, constitutes and appoints Subsidiary its true and lawful agent to accept service of process and to receive all legal process in respect of any action arising in respect of this Agreement. Until lawful notice of the appointment of another and subsequent agent in Ontario has been given by Parent and accepted by OPG, service of any legal process upon Subsidiary will be accepted by Parent. Nothing in this Section will affect the rights of OPG to serve legal process in any other manner permitted by law.

General. The division of this Agreement into sections and the insertion of headings are for convenience of reference only and are not to affect the construction or interpretation of this Agreement. Unless otherwise specified, words importing the singular include the plural and vice versa. This Agreement is governed by, and is to be construed and interpreted in accordance with, the laws of Ontario and the laws of Canada applicable in Ontario. If there is a conflict between any term of this Agreement and any term of the Underlying Agreement, the relevant term of this Agreement is to prevail. If any term of this Agreement is or becomes illegal, invalid or unenforceable, the illegality, invalidity or unenforceability of that term will not affect the legality, validity or enforceability of the remaining terms of this Agreement. For every term of this Agreement, time is of the essence. This Agreement and the Underlying Agreement constitute the entire agreement between the parties with respect to the subject matter and supersede all prior agreements, negotiations, discussions, undertakings, representations, warranties and understandings, whether written or verbal. Neither Parent nor Subsidiary may assign this Agreement in whole or in part without the prior written consent of OPG. This Agreement enures to the benefit of and binds the parties and their respective successors and permitted assigns. No waiver of any term of this Agreement is binding unless it is in writing and signed by the party entitled to grant the waiver. No failure to exercise, and no delay in exercising, any right or remedy, under this Agreement will be deemed to be a waiver of that right or remedy. No waiver of any breach of any term of this Agreement will be deemed to be a waiver of any subsequent breach of that term. Subsidiary and Parent will from time to time promptly execute and deliver all further documents and take all further action reasonably necessary or appropriate to give effect to the terms and intent of this Agreement and to satisfy all of the Subsidiary Obligations. The rights and remedies under this Agreement are cumulative and are in addition to and not in substitution for any other rights and remedies available at law or in equity or otherwise. No single or partial exercise by a party of any right or remedy precludes or otherwise affects the exercise of any other right or remedy to which that party may be entitled. This Agreement and any amendment, restatement or termination of this Agreement in whole or in part may be signed and delivered in any number of counterparts, each of which when signed and delivered is an original but all of which taken together constitute one and the same instrument. This Agreement and any amendment, restatement or termination of this Agreement

in whole or in part may be delivered by fax. Except as expressly provided in this Agreement, no amendment, restatement or termination of this Agreement in whole or in part is binding unless it is in writing and signed by each party.

Parent and Subsidiary have duly sealed and the parties have duly executed this Agreement.

ONTARIO POWER GENERATION INC.

_____

STRABAG AG (SEAL)

_____

Authorized Signatory

■ (SEAL)

_____

Authorized Signatory

Appendix 4.1(f)

Appendix 4.1(f) - Maintenance Bond

No. **[■]**

[■] as Principal, hereinafter called the Principal, and **[■]** a corporation created and existing under the laws of **[■]** and duly authorized to transact the business of Suretyship in **[■]** as surety, hereinafter called the Surety, are held and firmly bound unto **[■]** as Obligee, hereinafter called the Obligee, in the amount of **[■]** Dollars ($**[■]**) lawful money of Canada, for the payment of which sum, will and truly to be made, the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a written contract with the Obligee, dated **[■]** day of **[■]**, in the year **[■]** for **[■]**, which contract is by reference made a part hereof and is hereinafter referred to as the Contract.

The condition of this obligation is such that if the Principal shall promptly and faithfully perform the obligations under Sections 7.4(a), 7.8(d), 9.7, 9.8, 9.9 and 9.10 of the Contract then this obligation shall be null and void; otherwise it shall remain in full force and effect.

Whenever the Principal shall be, and declared by the Obligee to be, in default under the Contract of any of the Principal's obligations under Sections 7.4(a), 7.8(d), 9.7, 9.8, 9.9 and/or 9.10 the Contract, the Obligee having performed the Obligee's obligations thereunder, the Surety shall promptly:

(a) remedy the default, or;

(b) complete the Contract in accordance with its terms and conditions, or;

(c) obtain a bid or bids for submission to the Obligee for completing the Contract in accordance with its terms and conditions and upon determination by the Obligee and the Surety of a bidder acceptable to the Obligee, acting reasonably, arrange for a contract between such bidder and the Obligee in form and content acceptable to Obligee, acting reasonably, and make available as work progresses (even though there should be a default, or a succession of defaults, under the contract or contracts of completion, arranged under this paragraph) sufficient funds to pay to complete the Principal's obligations in accordance with the terms and conditions of the Contract and to pay those expenses incurred by the Obligee as a result of the Principal's default relating directly to the performance of the work under the Contract, less the balance of the Contract price; but not exceeding the Bond Amount. The term "balance of the Contract price" shall mean the total amount payable by the Obligee to the Principal under the Contract, less the amount properly paid by the Obligee to the Principal, or

(d) pay the Obligee the lesser of (i) the Bond Amount or (ii) the Obligee's proposed cost of completion, less the balance of Contract price.

It is a condition of this Bond that any suit or action must be commenced before the expiration of two (2) years from the earlier of (i) the expiry of the Warranty Period (as defined in the Contract and as such period may be extended in accordance with Section 9.8(d) of the Contract) or (ii) the

date on which the Principal is declared in default by the Obligee of any of the Principal's obligations under Sections 7.4(a), 7.8(d), 9.7, 9.8, 9.9 and/or 9.10 of the Contract.

The Surety will not be liable for a greater sum than the Bond Amount.

No right of action shall accrue on this Bond, to or for the use of, any person or corporation other than the Obligee named herein, or the heirs, executors, administrators or successors of the Obligee.

This Bond and the obligations created hereby are in addition to and not in substitution for any other rights and remedies available to the Obligee at law or in equity including, without limitation, any other rights and/or remedies which the Obligee may have under any other bond, letter of credit, holdback or security now or hereafter held by the Obligee. None of the other rights or remedies of the Obligee at law or in equity will delay or in any way prejudice the Obligee's rights and remedies under this Bond and the Surety shall not be entitled to require the Obligee to enforce such other rights and remedies prior to enforcing the Obligee's rights and remedies under this Bond.

IN WITNESS WHEREOF, the Principal and the Surety have Signed and Sealed this Bond dated **[■]** date of **[■]**, in the year **[■]**.

SIGNED and SEALED in the presence of:	**Principal**
	Name:
	Surety
	Name:

Appendix 5.3

Appendix 5.3 - Notice of Change in Applicable Laws

NOTICE OF CHANGE IN LAW

To: Ontario Power Generation Inc. ("OPG")

Contract: Design/Build Agreement dated •, 2005 between Strabag AG (the "**Contractor**") and OPG (the "**Agreement**")

Change in Law Notice No. •

Date: •

Defined terms used in this Notice have the same meanings given to those terms in the Agreement. In accordance with Section 5.3 of the Agreement, the Contractor hereby gives OPG notice that there has been:

(a)	a change in Applicable Laws as described on Appendix A to this Notice;	■
(b)	a change to a standard, specification, manual or code of a technical organization or Governmental Authority as described on Appendix A to this Notice; or	■
(c)	a new Canadian federal or provincial sales, use or excise tax or a change in the rate of such tax as described on Appendix A to this Notice	■

The change will have the following impacts on the Contract Price, the Work and the Contract Schedule:

• ***[Describe impact]***

STRABAG AG

By: _____

Name:

Title:

Appendix 5.4

Appendix 5.4 - Geotechnical Baseline Report

[See attached]

Appendix 5.4 – Geotechnical Baseline Report

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1 INTRODUCTION

1 Ontario Power Generation Inc. (OPG) is implementing the Niagara Tunnel Facility Project, the key element being a water delivery tunnel. The project will be constructed following the Design/Build delivery method.

2 This Geotechnical Baseline Report (GBR) includes descriptions of the tunnel and other underground works to be constructed; interpretations of the geological and geotechnical information obtained for the Project, and a summary of expected geotechnical and groundwater conditions to be encountered.

3 The designs, means, methods, sequences, timing or level of workmanship required to construct the project in accordance with the Contractor's design will influence the behaviour of the subsurface materials during construction. This GBR is intended to assist the Contractor in evaluating the requirements for excavating and supporting the ground, and in preparing the design.

4 The GBR will be used during the execution of the Contract for comparison of the assumed subsurface conditions with actual subsurface conditions as encountered during construction. Consequences associated with subsurface conditions consistent with, or less adverse than, the baseline conditions represented in the Contract Documents are the responsibility of the Contractor. Those consequences associated with subsurface conditions more adverse than the baseline conditions are accepted by OPG. The GBR is intended to assist the parties in the resolution of contractual disputes.

5 Documents and reports that were prepared during the development of the project and other studies in the project area, including the GDR, are reference documents for information only. None of the information contained in these reference documents constitutes a representation by OPG or any Person (whether in tort or contract), and the Contractor must make its own assessment of the relevance and validity of such information.

6 This GBR presents the soil, rock and groundwater conditions expected to be encountered in the surface and subsurface excavations. While the actual conditions encountered in the field are expected to be within the ranges as given in the GBR, the distribution of geologic conditions encountered will likely vary from those presented in this GBR. Where an average value is given without a range or histogram, the given value shall be considered to be the 50% probability of occurrence averages, and the range shall include extreme values at 10% probability of occurrence that are 30% greater and 30% lower than the average.

7 Where the values are presented as a range, the range shall be considered to include all values at 25% probability or higher. The extreme values in the range shall be increased or decreased by 10% to address values at 10% probability of occurrence for a normal distribution. The distribution will be assumed to be skewed so that the

average value of the distribution will be an amount equal to the arithmetic mean of the values given for the range plus 10% of the arithmetic mean, except in the cases of rock strength and deformability characteristics for surface, where it shall be taken as minus 10% of the arithmetic mean.

2 PROJECT DESCRIPTION

1 The Niagara Tunnel Facility Project comprises the design and construction of an approximately 10.3-km long water conveyance tunnel, and associated intake and outlet structures. The intake is located upstream from the Niagara Falls and the outlet is near the canal system feeding the existing Sir Adam Beck (SAB) and Pumping Generating Station (PGS) hydroelectric plants, generally as shown on the Concept Drawings.

3 SOURCES OF GEOLOGICAL AND GEOTECHNICAL INFORMATION

3.1 Site Investigations

1 The geotechnical investigations for the Project were carried out in stages. Concept phase geotechnical investigations for various potential development schemes were carried out by Ontario Hydro from 1983 to 1989. Investigations were also carried out during both the Definition Phases 1 and 2 Engineering Studies in 1990 and 1992/1993 respectively. The Phase 2 investigations included the excavation of an adit and a 12-m diameter trial enlargement in the Queenston Formation in an area about 500 m from the outlet area for this project.

2 Although a second additional diversion tunnel and an additional generating station were considered in all stages of the investigations, the Niagara Tunnel Facility Project consists only of a diversion tunnel. Site investigations have been generally separated into 'Generation' and 'Diversion' areas of interest. Data from the Diversion area investigations are covered in the following sections, with inclusion of relevant data from the Generation area investigations. The data presented herein for the Generation area are considered to be applicable to the tunnel outlet area.

4 GEOLOGIC SETTING

4.1 Regional Geology

1 The Niagara Region is underlain by Cambrian, Ordovician and Silurian sedimentary rocks having a total thickness of approximately 800 to 900 m. The strata include dolostones, dolomitic limestones, sandstones, and shales. All units are subhorizontal, gently dipping uniformly southward. The present Niagara River Gorge was formed by erosion during the last major ice retreat, about 12 000 years ago. The buried St. Davids Gorge represents an earlier river course that has been infilled with glacial outwash materials. Away from gorge areas, the bedrock is covered almost entirely by glacial lake sediments.

4.2 Overburden and Buried Glacial Valleys

1 The Project area is covered almost entirely with glacial lake sediments with some deposits of sandy silt and sandy silt till. The thickness of soils along the corridor of the diversion tunnel alignment as shown on the Concept Drawings, excluding St. Davids Gorge, varies from less than 1 m to up to 35 m near Dufferin Islands as shown in Figure 4.1.

2 The buried St. Davids Gorge is similar in shape to the Niagara River Gorge and extends from Lake Ontario through the village of St. David's to the Whirlpool Rapids area. The St. Davids Gorge is oriented in a northwest direction and varies in width from 350 to 630 m in the vicinity of the Niagara River. Depth to bedrock is in the order of 125 m in the vicinity of the alignment as shown on the Concept Drawings and in excess of 200 m where it intersects with the present Niagara River at the Whirlpool Rapids. The gorge is completely infilled with deposits of glaciolacustrine, glacial and glaciofluvial origin.

4.3 Bedrock Stratigraphy

1 In descending order from surface, the sequence of rocks is as follows:

Guelph	2 to 3 m
Lockport	43 to 45 m
DeCew	2 to 3 m
Rochester	17 to 19 m
Irondequoit	2 to 4 m
Reynales	3.5 to 4.5 m
Neahga	1.5 to 2 m
Thorold	2 to 3.5 m
Grimsby	12.5 to 15 m
Power Glen	10 to 12 m
Whirlpool	4.9 to 8.5 m
Queenston	>300 m

The Queenston Formation extends well below the deepest section of the tunnel as shown on the Concept Drawings, with thicknesses greater than 300 m being reported in the literature. These major stratigraphic units are presented and described in Table 4.1.

2 Variations in thickness of some units, particularly the Whirlpool Formation, are primarily due to irregularities in unconformable and weathered contacts between units. Variations are also dependent on bedrock structure. Noted thicknesses are approximate only and will vary along the tunnel route.

3 Various phases of surface drilling have been undertaken along the tunnel alignment. All data has been utilized to generate the geological sections as shown in Figures 4.1 and 4.2. For the rock formations above the Queenston Formation, division of the stratigraphy is relatively straightforward, as formation boundaries are lithologically distinctive. Within the Queenston Formation, it is more difficult to define lithologically distinct marker units. However, six major stratigraphic divisions have been identified from geophysical logging in the Queenston Formation, which are bounded by correlatable bedding planes. These group divisions can be separated into subdivisions, designated Q1 to Q10, by fairly distinctive primary bedding planes. Each of these subdivisions exhibits subtle characteristic changes that allow them to be considered as correlatable divisions within the Queenston Formation (refer to Table 4.1).

4.4 Bedrock Characteristics

4.4.1 Bedding Planes

1 Bedrock in the Project area has generally well-defined bedding with a southerly dip of about 6 m/km and an east-west strike. Sheared, weak bedding planes exist between many of the rock formations and within the Queenston Formation.

2 Primary bedding planes are defined as major bedding planes between lithological units above the Queenston Formation and between subunits within the Queenston Formation. Sheared primary bedding planes refer to those planes where some differential displacement has occurred. The approximate elevations, at various borehole locations, of the primary bedding planes are given in Tables 4.2 and 4.3. Within the Queenston Formation, the primary bedding planes are major discontinuities occurring at spacings of about 5 m to somewhat greater than 20 m and locally affect the rock mass quality. These planes often exhibit features such as gouge or breccia (a few millimetres to 2 to 3 cm) and slickensides that are consistent with lateral structural dislocation. Most of the primary bedding planes encountered in the test adit excavations up to about 400 m from the Niagara Gorge are sheared. Striae measurements in the test adit suggest movement trends towards the Niagara River. It is unknown whether these planes are sheared at greater distances from the gorge.

3 The primary bedding planes will affect the excavation of the tunnel as many are clay rich and form weak discontinuity surfaces that, because of the shallow dip of the tunnels, may follow the excavation for considerable distances. Their locations can be estimated from Figure 4.1. However, because only two boreholes are available with geophysical trace information, detailed correlation of all the bedding planes within the Queenston Formation across the complete length of the tunnel alignment has not proved possible.

4.4.2 Faulting and Discontinuities

1 There are no known occurrences or reports of any major faulting within the Project area. Some near-surface, low angle thrusts with minor vertical displacement are known to occur and are probably related to stress relief associated with the gorge formation and the high horizontal residual stresses in the area. Some shearing of this type can be expected in the area of the St. Davids Gorge.

2 Regional joint measurements indicate the jointing to be high angle or vertical with the dominance of three major joint directions and a subordinate fourth set. In addition to these high angle sets, there is another set parallel to bedding. Based on strike directions the most prominent subvertical joint sets are

(a) a 005deg joint set which parallels the general trend of the Niagara River, particularly in the area of the tunnel outlet

(b) a 045deg joint set which approximately parallels the Niagara River, downstream from the Whirlpool

(c) a 085deg joint set which approximately parallels the Niagara Escarpment

(d) a 135deg joint set which approximately parallels the buried St. Davids Gorge.

3 Gypsum and calcite, and dolomite mineralization occur along joint sets of 085deg and 135deg orientations.

4 The joint sets vary in spacing, frequency and continuity depending on location and lithology. Vertical joints are generally widely spaced. The joint surfaces are generally rough and fresh to slightly weathered.

4.4.3 In Situ Stresses

1 High in situ stresses exist in the Project area bedrock. Measurements show that maximum horizontal stress in the Queenston Formation range from 10 to 24 MPA, with a maximum horizontal/vertical stress ratio varying from 3 to 5. Higher stress ratios are measured in the overlying rock units. In general, the orientations of the maximum horizontal stresses along the alignment of the diversion tunnel lie within the NE-SW quadrant. The orientations of the local stresses are influenced by the

presence of major physiographic features, namely the buried St. Davids Gorge and the Niagara River Gorge.

4.4.4 Bedrock at St. Davids Gorge

1 The geological profile of and below the buried St. Davids Gorge, interpreted from boreholes and geophysical investigations, is shown in Figure 4.2.

2 For the purposes of this GBR, the width of the St. Davids Gorge is 800 m.

3 Figure 4.3 represents the baseline for the bottom of the St. Davids Gorge. This figure is based on available seismic (Niagara River Hydroelectric Development, Seismic Reflection Survey, Niagara Falls, Ontario, multiVIEW Geoservices Inc., January 1991) and borehole data from the St. Davids Gorge area. Elevations shown are equal to the interpreted seismic elevations minus an amount equal to a 20% error in depth calculations (as compared to 15% that was recommended in the seismic report). Elevations are given as ellipses consistent with the original seismic report. Borehole information is given as top of rock minus 5 m. The baseline represents spot elevations of the bottom of the gorge, defined as the top of bedrock (fractured or otherwise). Contouring of this data does not represent a baseline.

4 The bedrock (Queenston Formation) over the width of the St. Davids Gorge is slightly weathered and relatively more fractured to a depth of between 15 to 25 m below the bottom of the gorge. Below this depth, the rock is generally fresh and of excellent quality. No evidence of a major fault or other major discontinuities underlying the St. Davids Gorge has been found to date either by drilling or from geophysical surveys.

4.4.5 Geological Profile

1 The geological profile and the lithology as shown in Figures 4.1 and 4.2 of the GBR has been projected horizontally and is applicable to the alignment selected by the Contractor.

4.5 Hydrogeologic Setting

1 Groundwater conditions in the Project area are influenced by depth and lithology, and vary between the rock formations above the Queenston Formation, but are relatively consistent in the Queenston formation. The only known aquifers are the Lockport and DeCew (dolostone) Formations, whereas the remaining strata below the DeCew are generally considered to be aquitards. The groundwater below the DeCew Formation is highly corrosive.

4.6 Natural Gas

1 Natural gas has been encountered in some of the formations, particularly in the Rochester and Grimsby Formations, with some minor amounts of gas being encountered in other formations, including the Queenston.

5 GROUND CHARACTERIZATION – SOILS

5.1 General

1 The Project area is covered almost entirely with glacial lake sediments consisting mostly of alternating layers of grey to reddish-brown silt, clayey silt or silty clay. The silt is locally sandy. A silty or clayey till occurs at depth locally, generally overlying bedrock.

2 At the buried St. Davids Gorge, the thickness of overburden intersected by boreholes drilled in the vicinity of the diversion tunnels is up to 125 m. Broadly, two distinct overburden zones were identified in the St. Davids Gorge, an upper zone, about 56 m in thickness, consisted of fine, reddish-brown, dense, silty sand to sandy silt glacial till with occasional layers of gravel, cobbles, and boulders. A lower zone consisted of alternating layers of silt, sand, and gravel, cobbles and boulders of talus-like material. Pervious layers are common and shale fragments are frequently found in the glacial till.

3 The soils encountered in the outlet area have been deposited in a glaciolacustrine environment and consist mostly of fine grained deposits of silty clay/clayey silt, silt/sandy silt and sandy silt till.

5.2 Characteristics

1 Testing results for soil samples from boreholes in the PGS area are summarized in Table 5.1.

2 Soils that will be encountered in the following areas are:

(a) Intake Excavation—minimal river bottom sediments of 0.3 m or less in thicknessOutlet Excavation—8 m in thickness

(c) Dewatering Shafts—17 m in thickness if located east of the St. Davids Gorge.

3 Properties given in Table 5.1 are applicable to all soils east of the St. Davids Gorge.

6 GROUND CHARACTERIZATION – ROCK

6.1 Mineral Composition and Detailed Lithology of the Queenston Formation

1 Table 6.1 details the mineralogical composition of the various bedrock units above the Queenston Formation.

2 Table 6.2 details the mineralogical composition of the Queenston Formation. Detailed lithology of the Queenston Formation was discerned from logging in the test adit. In approximately decreasing order of grain size, the lithological types are as follows:

I - sandstone and crystalline carbonate units
II - reddish-brown siltstone/interbedded siltstone
IIA - siltstone, containing >40% greenish-grey bands
IIB - siltstone, containing <40% greenish-grey bands/mottling
IIIA - muddy siltstone, containing >40% green bands, in places mottled
IIIB - muddy siltstone, containing <40% green bands or mottling
IV - reddish-brown silty mudstone; with some more weathered, weaker zones than other types
V - mudstone, with compaction features dipping at 45º to 75º, often associated with shears and/or weak zones.

3 Based on mapping in the test adit, the majority of the upper six subdivisions (Q10 to Q4) comprise muddy siltstone (Type IIIB); however, in the upper Q10 division of the Queenston Formation, a significant percentage of Type V (mudstones) occurs. Type I rocks have only been encountered in the SD borehole series in the area of the St. Davids Gorge below the elevation of the concept tunnel.

4 The above classification is shown in the figures and borehole logs, which indicate the non-uniformity of the Queenston Formation. The non-uniformity of these types is directly related to the variation in intact rock strengths as discussed in the following section. Note that borehole logs completed prior to excavation of the test adit do not describe the individual Queenston lithological types.

5 Gypsum nodules and green banding occur within the Queenston Formation. Both may be used as lithographic marker beds. Green coloured, Type IIIA rocks are not common, but where they do occur they are found as bands or sometimes isolated pockets. The green colouration is due to a reduction process referred to as reduction banding. Gypsum occurs mainly in the form of disseminated nodules below approximately el 55 m.

6.2 Intact Strength and Deformation Properties

6.2.1 Rock Above Queenston Formation

1 A summary of average strength and deformation data and other mechanical properties for rocks above the Queenston Formation is given in Table 6.3. A histogram of all unconfined compressive strength testing for the sandstone units is given in Figure 6.1. Punch penetration tests were carried out on Whirlpool sandstone core samples and results ranged from 3777 to 5260 kN.

6.2.2 Queenston Formation

1 A summary of average strength and deformation data is given in Table 6.4. The following subsections pertain to the Queenston Formation only.

(a) Uniaxial Compression

(i) Laboratory strength testing of intact rock samples has shown a wide range of strength values, most likely due to variations in lithotypes as given in the previous section. All relevant uniaxial compressive strength data are shown graphically as histograms for 5 MPa strength intervals in Figures 6.2 to 6.4.

(ii) No clear trend of strength variation with depth is apparent due to the variability of the test results for vertically oriented core, however, there is some indication that the range of strength values increases at depth in horizontal and inclined specimens. The Phase 2 testing results are combined with all available previous uniaxial data for non-vertical Queenston Formation samples (15 tests in 1990 and 46 tests in investigations prior to 1990) in Figures 6.3 and 6.4.

(iii) The variability of the test results is believed to be partly a result of variations in the composition of the rock. The variability in strength has previously been established to be a function of the siltstone or conversely, the 'shale' content of the rock. In addition, the mode of failure under uniaxial loading has been observed to vary from classical diagonal shear to predominantly tensile axial splitting, with some samples exhibiting mixed modes of failure. This mode of failure is also believed to be partially responsible for the variations in the measured uniaxial strength of the rock.

(iv) In view of the variations in modes of failure in the uniaxial compression tests, uniaxial strengths were obtained by taking the intercept at zero confining pressure from fitting an envelope to the results of triaxial tests at various confining pressures. These fitted values were only used later in assessing rock mass strengths as discussed in later sections.

(b) Tensile Strength

(i) The tensile strength was tested using different methods, including split tensile testing, biaxial extension and direct tension testing. Testing results ranged from 0.8 to 13.6 MPa. The range of values is likely to be a function of the natural variability of the rock, since no evidence was seen of splitting on pre-existing planes of weakness. Tensile strengths are shown in Figure 6.5.

(c) Triaxial Compression Tests

(i) Results from Triaxial Compression testing undertaken in the Definition Engineering Phase 1 are given in Table 6.5 and are also plotted in Figures 6.6 and 6.7. The failure planes in the test specimens were generally inclined between 20º to 30º to core axis. At very low confining stress, the failure planes were vertical to subvertical. Two conclusions were drawn from these results

- the intact strength of the Queenston shale is generally higher in the diversion tunnel area than in the generation facilities area
- considerable strength variation was noted particularly at higher confining pressures, probably as a result of material variability.

(ii) Additional triaxial testing was undertaken during the Definition Engineering Phase 2. This testing was mainly on cores from the boreholes drilled downstream from the proposed tunnel alignment in the area of the underground trial enlargement. The data set also included results from Boreholes NF-38 and NF-43 along the tunnel alignment.

(iii) The triaxial test results were grouped into test 'suites' for limited ranges of elevation in each borehole, including the appropriate uniaxial and tensile test results, to define strength envelopes. The results of each suite of triaxial, uniaxial compression and indirect tensile strength tests were then fitted with a strength envelope by means of both a linear regression and simplex technique using the program ROCKDATA from the University of Toronto. The geometry of each intact rock strength envelope is described in terms of the Hoek-Brown 'mi' parameter together with a uniaxial compressive strength (σc) intercept. The results for each suite of tests are presented in Table 6.6. The range of 'mi' values is 4.6 to 36 with uniaxial compressive strength intercepts ranging from 10.6 to 56 MPa. Patterns can be seen, however, in this apparently wide range of values, when results are plotted with respect to core orientation as is done in Figures 6.8 and 6.9. In addition, Figure 6.10 shows results of all strength testing in the area of the trial enlargement.

(iv) The following general trends are noted:

- the strength of vertically oriented core increases with depth, as seen in Boreholes NF-31, NF-38 and NF-43. Results from Borehole NU-13 do not fit this trend, however, it is most likely that these results are influenced by the close proximity of major sheared bedding planes to the sampling elevations.
- a similar trend of increasing strength with depth can be seen for inclined core samples
- for any particular elevation range, lower triaxial strengths were obtained in samples recovered from the inclined boreholes, indicating the influence of bedding
- the strength of horizontally oriented core is approximately equivalent to the strengths for vertically oriented core at any particular elevation.

(d) Modulus of Deformation

(i) Deformation moduli for the Queenston Formation were measured by five different methods, namely

- dial gauge measurements during uniaxial compressive tests
- strain gauge measurements during uniaxial compressive tests
- biaxial test measurements by USBM gauge on overcore samples
- biaxial test measurements by USBM gauge on redrilled laboratory specimens
- in situ measurements by dilatometer.

(ii) All test results are summarized in Table 6.7 and average results from the table are plotted with respect to the elevation of the sample or the measurement in Figure 6.11. As can be seen, there is a wide variation in these results, ranging from less than 5 to almost 55 GPa.

(iii) The results of dilatometer testing, USBM biaxial testing and strain gauged laboratory samples are fairly consistent, however results from dial gauged laboratory samples are consistently lower, being in the order of 10 GPa. The probable reason for this discrepancy is due to measurement system inaccuracies. All dial gauge results were thus omitted from interpretations of the modulus.

(iv) The shales in the Niagara area are generally considered to be anisotropic in deformation behaviour, therefore the modulus of deformation is interpreted dependent on the test method, in either the vertical or horizontal plane as follows:

For Moduli in the Horizontal Plane	For Moduli in the Vertical Plane
Vertical dilatometer results	Horizontal dilatometer results
Vertical USBM samples	Horizontal USBM samples
Horizontal strain-gauged samples	Vertical strain-gauged samples

(v) The averaged results from the above testing are plotted with respect to elevation in Figures 6.12 and 6.13, for results in the vertical and horizontal plane respectively. As can be seen in these figures, the intact moduli in the vertical plane is fairly consistent, ranging from about 19 to 25 GPa. In the horizontal plane, a definite trend of increasing modulus with depth is seen.

(vi) Thus, in general, the Queenston Formation exhibits an anisotropic stiffness, with a vertical modulus in the order of 20 GPa. There is an apparent increase in stiffness in the horizontal plane with depth, resulting in increasing anisotropy with depth. The modulus ratio Eh/Ev ranges between one and two over the elevations as shown on the figures. This greater stiffness in the horizontal plane would be expected in horizontally bedded rocks.

(vii) The modulus values discussed in the preceding paragraphs are modulus values of essentially intact rocks and must be adjusted to obtain rock mass modulus values. Stress-dependent stiffness will be considered.

(viii) In the upper 10 to 15 m of the Queenston Formation where lower rock mass quality is found, lower vertical and horizontal moduli would be expected. This observation is based on

- geophysical data along the test adit within a few hundred metres of the Niagara River Gorge
- dilatometer results within 1.5 times the test adit excavated diameter (about 3.5 m)
- empirical relationships between Rock Mass Rating (RMR) values and modulus.

(ix) Based on these methods, it has been assumed that the modulus is in the order of 10 GPa for the upper 10 to 15 m of the Queenston Formation.

(e) Shear Strength of Bedding Planes

(i) The overall shear strength envelope for the Bedding Plane BP8, based on five test results with normal stresses up to 4.7 MPa, is shown in Figure 6.14. The nonlinear failure envelope shown on the figure will be assumed when assessing shear strength at low normal stresses.

(ii) Average Joint Roughness Coefficients (JRC) ranged from 11 to 15, with a micro roughness angle of 9º to 11º.

6.3 Rock Mass Classification

1 In order to provide an index of the relative behaviour of rock mass surrounding the proposed tunnel, the RMR system (Bieniawski 1976) has been used. Rock Quality Designations (RQD's) were used in the development of the RMR values. In estimating the ratings, the groundwater condition 'dry' has been assumed for units with low hydraulic conductivities and for units below the Thorold sandstone. The condition 'Damp' was assumed for other rock units.

2 Table 6.8 summarizes the RMR values for each of the rock units. The RMR values are fairly uniform across the site with the exception of the rock units in the Lockport Formation in the Generation area which are influenced by the stress relief effects of the Niagara River Gorge. Within the main part of the diversion tunnel area, the RMR values are slightly lower than average below the Whirlpool/Queenston contact primarily due to a slightly higher joint frequency. Below this zone, the joint spacing is wide and the RMR values increase.

3 Table 6.8 also covers information from the Generation area to provide a further assessment of the Queenston Formation near the contact with the overlying Whirlpool. In this location, the RMR value is relatively low within the first 10 m below the Whirlpool/Queenston contact and gradually increases with depth. There is a significant increase in quality below subdivision Q4. This latter variation is also partially reflected in the changes in lithological character to more silty rocks at depth.

4 The RMR values given in Table 6.8 are used to assess rock mass strengths in the next section.

6.4 Assessment of Rock Mass Strength

1 The Hoek-Brown (Hoek, 1988, 1992, 1997) rock mass strength failure criterion has been used to assess the rock mass strengths of the various rock units in the concept design. The Hoek-Brown criterion is as follows:

(a) When the discontinuity spacing of a rock mass is small compared with the size of the excavations under consideration, the rock mass is considered to behave in a pseudo-homogeneous manner and its strength can be defined by

$$\sigma_1 = \sigma_3 + (m\sigma_c\sigma_3 + s\sigma_c^2)^{1/2}$$

where
σ_1 is the major effective principal stress at failure
σ_3 is the minor effective principal stress or confining pressure
'm' and 's' are material constants for the rock mass
σ_c is the uniaxial compressive strength of the intact rock.

(b) In order to provide a basis for relating the above criterion to field observations, the RMR values are slightly modified where required to account for water

pressure and structural orientation terms. The modified value is denoted the Geological Strength Index (GSI). A set of empirical relationships are then used relating GSI values and the constants 'm' and 's'.

(c) Mohr-Coulomb parameters will be estimated from the constants 'm' and 's' following the instantaneous approach suggested by Hoek (1997), at the applicable actual effective horizontal stresses, in consideration of pore water pressures.

6.4.2 Rock Formations Above Queenston Formation

1 The rock mass strengths were estimated on the basis of the average uniaxial compressive strength of the rock and m_i values recommended by Hoek (1988) for the various rock types. The resulting 'm' and 's' values given in Table 6.9 were based on RMR values that were adjusted for the purpose of rock mass strength estimates as per Hoek (1988).

6.4.3 Rock Mass Strength of Queenston Formation

The Queenston rock mass strength has been evaluated in the Definition Engineering Phase 2 investigations, based on the 'm_i' (intact) values from triaxial testing and RMR values. Results of laboratory triaxial strength testing were used to estimate the intact rock strength as previously discussed. Rock mass strengths are given in Table 6.10.

1 The RMR values noted in Table 6.8 were similarly grouped into simplified 'generic' classes to provide approximate values for specific areas. These RMR values were then combined with the 'm_i' and compressive strength evaluations to estimate the strength of the in situ rock mass as given in Table 6.10.

2 The subdivision of the Queenston rock mass strengths into particular depths in Table 6.10 does not take into account any weaker or close jointed zones such as those under the St. Davids Gorge.

6.5 Groundwater and Gas

6.5.1 Hydrogeology

1 The rock strata form an interlayered succession of relatively pervious and relatively impervious rocks. The impervious formations impede flow, whereas the more permeable formations serve either as recharge or discharge horizons for adjacent formations. Within the more permeable formations, the hydraulic conductivity is principally related to the presence of a few open fractures which are predominantly horizontal. Vertical connectivity of these fractures is low, except in the upper rock units. Thus, formations which exhibit high hydraulic conductivity from packer testing may have a low vertical hydraulic connectivity.

2 In addition to areas of increased weathering and discontinuities as given in Section 4, zones of increased jointing and higher hydraulic conductivity in the area will potentially occur where the tunnel alignment crosses the trend line of the crest of Horseshoe Falls (the east-west trending jointing at the Canadian Falls area is parallel to this trend line).

3 Piezometric levels in the Guelph and Upper Lockport formations are controlled by recharge from nearby bodies of water such as the Niagara River, the PGS reservoir, and the existing power canals into which these strata daylight. High hydraulic conductivity was measured for some of these rocks and the flow is largely confined to near-horizontal bedding fractures. Discharge is primarily toward the lower Niagara River, the buried St. Davids Gorge, and the Niagara Escarpment. Adjacent to the Niagara River, the lower Clinton Group and the Whirlpool sandstone are dry.

4 In the rocks underlying the DeCew Formation, the piezometric levels are largely governed by regional recharge. In most cases, the piezometric levels are significantly lower than those in the Lockport Formation or the water levels in nearby bodies of water. Some of the high piezometric levels which have been measured are assumed to be associated with the presence of gas in the formation. The groundwater levels are given in Table 6.11.

5 The hydraulic conductivity results measured by packer testing in the rock formations during drilling are summarized in Table 6.12. This table gives a summary of the general jointing and hydraulic conductivity along the tunnel alignment. Histograms of available data from borehole testing are given in Figures 6.19 to 6.22.

6 Two pumping tests were carried out on the south bank of the Niagara River adjacent to the International Niagara Control Works. The results of the pump tests indicate the following:

(a) the upper Lockport Formation at a depth of 15 to 16 m below bedrock surface contains open joints and permeable bedding partings. This zone is hydraulically connected to the Niagara River. The associated hydraulic conductivity of this zone is in the order of 10^{-2} cm/s and the transmissivity was estimated to be within the range of 120 to 420 m^2/d.

(b) a deep water bearing zone of about 4.5 m thick occurs within the Gasport member (Unit 3) of the Lockport Formation. Pumping test in this zone indicated a broad, comparatively flat cone of drawdown. The associated hydraulic conductivity of this zone is in the order of 10^{-3} cm/s and the transmissivity ranges from 14 to 23 m^2/d.

7 The Lockport Formation in the outlet area is also an area of open jointing and relatively high hydraulic conductivity as given in Table 6.12.

6.5.2 Groundwater Quality

1 Groundwater from the primary bedding planes in the Queenston Formation is generally of connate origin. This connate water is supersaturated with salts. Seepage waters are acidic (lowest measured pH of 4.65) and have high chloride and sulphate levels, as well as high concentrations of some metals (including iron, magnesium, manganese, potassium, aluminum), ammonia, calcium, fluoride and phosphate. Chloride contents up to 296 000 mg/L and sulphate contents up to 1860 mg/L have been measured. Significant salt precipitation occurred along some primary bedding planes and also formed hollow stalactite-like precipitation features hanging from the crown of the adit in areas where bedding planes were exposed.

2 Generally, the percent difference between cations and anions in groundwater testing is less than 5%. However, in these brines, the differences in some cases are much greater, probably due to supersaturated conditions. In general, the chloride and metals levels were related to the amount of seepage at any location, with higher levels associated with less seepage: the higher the chloride concentration, the lower the sulphate concentration. The high chloride and sulphate contents are indicative of very corrosive groundwater conditions. Table 6.13 summarizes the groundwater quality.

3 Adjacent to the Niagara Gorge, the groundwater is relatively fresh and percolates from the surface through a system of open jointing into the rock formations.

6.5.3 Gas

1 During investigations for this project, methane gas was encountered along all those primary bedding planes encountered below the elevation of the Niagara River and St. Davids Gorges as shown in Figure 4.2. Gas pressures, however, were insignificant and flow usually reduced to insignificant levels within a few hours. However, minimal gas seepage was ongoing from some of the bedding planes intersected in the test adit for some months after its completion. Pockets of gases were encountered in Borehole NF-32 in the Rochester Formation and in the upper Lockport Formation near the proposed intake area.

6.6 In Situ Stress Conditions

1 The sedimentary rock strata in the Niagara Region are known to possess relatively high horizontal in situ stresses. The in situ stresses in the project area were determined using the overcoring method for shallow measurements of up to 40 m and the hydrofracturing method for tests at greater depth. In general, the horizontal stresses in the Niagara area are three to five times greater than the overburden stresses for the majority of the tunnel but the ratio can be greater than 5 at the inlet and outlet ends due to reduced overburden pressure.

6.6.2 In Situ Stress Orientations

1 Figure 6.15 shows locations of boreholes with stress determinations and illustrates the average orientation of the stresses within the Queenston Formation. Results indicate that the orientation of the maximum principal stress in the central north-south segment of the diversion tunnel, obtained from impression packer tests on unambiguous vertical fractures, consistently lies within the northeast quadrant for all the rock formations. This is consistent with the regional stress trend in the Niagara area. Modifications of the regional stress regime by significant topographic features are evident from the results of measurements near the buried St. Davids Gorge and the Niagara River Gorge. These features tend to align the maximum horizontal stress parallel to the gorges.

6.6.3 Stress Magnitudes

1 The stress regime along the tunnel alignment can be divided approximately into three sections, namely,

(a) upstream curved section from the proposed intake to Borehole NF-32

(b) central straight section from Borehole NF-32 to a point at the buried St. Davids Gorge, near Borehole SD-6

(c) downstream section from SD-6 to Borehole NF-33.

2 Figures 6.16 to 6.18 summarize in situ stresses in these three sections, plotted against elevation.

3 Different modes of fractures have been observed in the impression packer tests performed following hydraulic fracturing. These modes include vertical fractures, horizontal fracture and mixed mode fractures. Interpretations for vertical fractures following conventional analyses provide a single value of stresses. In other modes of fracturing, conventional interpretation methods result in large range of stresses giving very high maximum horizontal stresses. Interpretation by the modified stress path method results in a narrow range of horizontal stress as indicated in the figures. The high values shown in the figures are considered to be unrealistic because of the inherent limitation of the conventional methods. The lines shown in Figures 6.16 to 6.18 were assumed to be the major and minor horizontal stresses during various earlier studies.

(a) Central Section (Approximately Sta 2+000 to Sta 7+600)

(i) The maximum and minimum horizontal stress values in this section of the tunnel alignment (up to 19 and 23 MPa, dependent on elevation; Figure 6.16) are substantially higher than the overburden stress by factors of about five and three, respectively. Both the maximum and minimum horizontal stresses increase with depth. At the St. Davids Gorge, the

magnitudes of the maximum and minimum stress in the Queenston Formation below the bottom of the gorge are comparable to those in this section.

(b) Upstream Section (Approximately Sta 7+600 to Sta 10+000)

(i) The horizontal stress values are plotted against elevation as shown in Figure 6.17. The maximum and minimum horizontal stresses in this section are about 17 and 10 MPa, respectively, and are relatively constant in the Queenston Formation.

(c) Downstream Section (Approximately Sta 0+000 to Sta 2+000)

(i) Results shown in Figure 6.18, including one test from Borehole NF-33, indicate that the maximum and minimum horizontal stresses at the elevation of the tunnel alignment as shown on the Concept Drawings are about 24 and 14 MPa, respectively.

(d) Stress Regime near the Trial Enlargement

(i) The boreholes for stress measurement in the downstream area are located in an area bounded by the Niagara River, the Niagara Escarpment and the St. Davids Gorge. The measured stress near the trial enlargement is lower than values in the diversion tunnels area due primarily to the stress relief effects of the Niagara River Gorge as all the measurements in the generation area are above the river bed

(ii) The three-dimensional (3D) in situ stress components were determined by the overcoring technique at the powerhouse area and at a stub near the trial enlargement area. The average in situ stresses in the area close to the trial enlargement are as follows:

Principal Stresses	**Azimuth (deg)**	**Dip (deg)**
$\sigma 1$ = 11.9 MPa	133	-13
$\sigma 2$ = 9.6 MPa	050	-15
$\sigma 3$ = 4.6 MPa	008	-70

(iii) The resolved vertical stress from the overcoring tests is 5.3 MPa which is about 30% higher than the overburden stress calculated by the weight of the overburden material. This difference in magnitude is considered to be within the expected range of variation of vertical stresses from the overburden pressure in sedimentary rock deposits. This result is considered to be applicable to the entire tunnel alignment.

(e) Stresses Above the Queenston Formation

(i) In the upstream sections, maximum and minimum horizontal stresses above the Queenston Formation are about 10.5 and 4.5 MPa, respectively, measured in the Power Glen Formation in Borehole NF-3. Stresses are higher in the central segment; up to 18 and 6.5 MPa for maximum and minimum horizontal stresses, respectively, measured in the Grimsby Formation. No stress measurements were made in the upper formations at the outlet.

4 Based on the selection of principal stresses along the designated sections of the tunnel alignment, four stress regimes were developed for purposes of various studies. These regimes were based on the following criteria:

(a) magnitude and orientation of the measured principal stresses given in Figures 6.16 to 6.18

(b) direction of the tunnel with respect to the stress field

(c) confidence level in the data available

(d) major topographic features such as the St. Davids Gorge

(e) changes in tunnel vertical and horizontal alignments

5 The stress regimes for tunnel design purposes are presented in Table 6.14. Where there is greater confidence in orientation data, the stresses have been resolved with respect to tunnel orientation. However in some of the regimes, the maximum stress magnitudes are presented in the table.

6 Above the Queenston formation, stresses at the intake area will be a maximum horizontal stress of 10.5 MPA and a minimum stress of 4.5 MPA. Stresses in the outlet area will be 17 and 11 MPA (maximum and minimum horizontal values).

7 The vertical stresses are 30% higher than stresses calculated on the basis of overburden pressure. The horizontal stress values given in this section will be used as input into analyses and then reduced appropriately until no overall plastification of the rock mass occurs. These modified values for horizontal stress will be used in subsequent analyses.

6.7 Particular Characteristics of Shale Units

6.7.1 BTEX Occurrences

1 Four shale units were tested for the presence of naturally occurring hydrocarbons, in particular benzenes, toluenes, and xylenes (BTEX, also formerly referred to in the literature as BTX). The tests indicated that Queenston Formation appears to be inert with respect to BTEX but that the Rochester, Power Glen and Grimsby Formations

(bituminous type shales) do contain measurable concentrations. Using high temperature thermal desorption tests, the range and average concentrations BTEX for the upper three shales were determined.

2 The amount of BTEX in samples of these three shale units was measured in the low parts per billion range (i.e., 5 to 70 nanograms/gram). These hydrocarbons readily volatilise on exposure.

3 Disposal of all excavated rock containing Rochester, Power Glenn and Grimsby material is covered in the Owner's Mandatory Requirements (Appendix 1.1(vv)).

6.7.2 Shale Degradation

1 All shale and shaley units will degrade to various degrees with changes in humidity. The Type II (siltstone) and Type III (silty mudstone) rocks within the Queenston do not generally deteriorate on drying, whereas the Types IV and V rocks and zones, where compaction features occur, are the most prone to such degradation. Results from slake durability testing of two samples from the Queenston Formation showed

(a) 9 to 11.5% weight loss on the 2nd cycle

(b) 4.9 to 7.2% weight loss average per cycle over 5 cycles.

6.8 Time Dependent Deformations

6.8.1 General

1 High horizontal stresses are prevalent in the rock formations in Southern Ontario. Rock excavation at surface and underground relieves the initial state of stresses, providing an initiating mechanism for time-dependent deformation to occur. Refer to Section 7 for a summary of local experience dealing with this phenomenon.

2 In many publications, the time dependent deformation phenomenon is described in terms of 'rock squeeze' and 'swelling', however these processes are interrelated, and the individual effects of each are difficult to distinguish. Both effects can continue for many years.

3 Squeeze is usually associated with the long-term creep behaviour of rock, initiated by the relief of high in situ horizontal stresses. There is a well documented history of rock 'squeeze' affecting surface excavations in the upper dolostones and dolomitic limestones. Refer to Section 7. This squeeze, however, may include the effects of swelling of the shale interbeds in these rock units.

4 Swelling potential of the shale units in the Niagara Area is well documented. Swelling involves a volume increase in shale units, and is also initiated by the relief of the high in situ stresses. However, swelling also requires the presence of fresh water. The process is associated with ionic diffusion of salts from the connate pore water in the rock. The swelling phenomenon is suppressed under applied stress.

6.8.2 Swelling Potential

1 The index which is used to describe time-dependent deformation characteristics of the shale is called the 'free swell potential', defined as the amount of expansion strain measured within one logarithmic cycle (10 to 100 days) of time in a specimen which is either fully submerged in water or kept at 100% relative humidity in unconfined conditions.

2 The free swell potential for the shale layers of the Lockport and the Rochester formations is generally low but the deformation is known to occur over a lengthy period of time. The shale layers in the Power Glen and the Grimsby Formations have higher swelling potential. However, the presence of the sandstone interbeds, which are nonswelling, tend to inhibit the overall deformation. The Queenston shale possesses the highest swelling potential of all shale formations in the Niagara area. The swelling potential is affected by the calcite content of the rock.

3 Based on laboratory measurements of time-dependent deformation by a number of researchers, the following conclusions have been drawn:

(a) the horizontal swelling potential of the Queenston Shale is isotropic and is the highest among the shales for Southern Ontario

(b) the vertical swelling potential is up to 1.6 times the horizontal swelling potential

(c) for a specimen under applied stress, the application of stress in one direction not only suppresses the swelling in that direction but also reduces the swelling in the orthogonal directions

(d) the swelling deformation response of shales from Southern Ontario is stress-dependent. The nonlinear behaviour may be reduced to a linear relationship between swelling potential and applied stress in a semi-log plot.

4 It was further concluded that for swelling to occur, the necessary conditions are

(a) the relief of initial stresses, which serves as an initiating mechanism

(b) the accessibility to fresh water

(c) an outward salt concentration gradient from the pore fluid of the rock to the ambient fluid.

6.8.3 Variability of Swelling Potential

1 The Queenston Formation is composed of complex layering of mudstone, shale, siltstone and sandstone. A test specimen is therefore a composite material. For a specimen containing predominantly shale and mudstone, high swelling will occur. In contrast, little or no swelling occurs in a specimen composed of siltstone and sandstone. On a macroscopic scale, the shale (mudstone) content governs the amount

and rate of swelling. On a microscopic scale within the shale (mudstone) layers, swelling will be influenced by the calcite content which acts as a cementing agent inhibiting swelling.

2 Based on the results of various investigations, the stress-dependent characteristics of the swelling potential of Queenston Formation have been developed. As the applied pressure is increased, the swelling potential decreases logarithmically until a critical pressure is reached at which the swelling is entirely suppressed. Various types of tests including the semi-confined swell test and the null deformation test (in which no displacement was allowed and the build-up in stress was measured) have been performed to measure this suppression pressure. Owing to the natural variability of the rock, ranges of values are expected. A suppression pressure of 4 MPa is considered to be the average case. However, results indicate that higher values in the order of 5 MPa can be expected to occur for samples with high mudstone content and low calcite content.

3 Swelling to be assumed for design purposes in the Queenston Formation is given in the Owner's Mandatory Requirements.

4 There are no available data regarding suppression of swell potential for the other shaly units.

7 PREVIOUS CONSTRUCTION EXPERIENCE

7.1 Time-Dependent Deformations Observed in Surface Excavations

1 The phenomenon of time dependent deformation in surface excavations (often referred to as 'rock squeeze') was first recognized in the early 1900s during the construction of the wheel pits of the Canadian Niagara and Toronto Power Plants in Niagara Falls. The wheel pits are 5.5 m wide, 50 m deep slots to house the penstocks and turbines. The wheel pits extend through the upper carbonate units into the Rochester Formation. Measurements of the closure of the pit walls at the Canadian Niagara Plant began in 1903. Sum total inward movement of both walls over a 68-yr period at the turbine deck opposite the DeCew/Lower Gasport units was 7.2 cm.

2 Extensive concrete cracking occurred in the Thorold Tunnel west bulkhead wall shortly after construction associated with the shaly limestone bed of the Gasport member. A major remedial program involving excavation of a slot in the rock and backfilling with a clay/bentonite mixture was carried out.

7.2 Grouting at the International Control Works and PGS Dyke

1 A review of the existing grouting records compiled during foundation grouting for the excavation of the International Control Works indicates that the average grout take of the primary holes, spaced at 6-m centres drilled to about 10 m below rock surface was 30 bags/m, with much larger takes over particular intervals. Records of grout takes for secondary and tertiary split-spaced holes are not available.

2 Grouting for the construction of the PGS dyke is considered applicable to the tunnel outlet area. Primary and secondary grout holes were spaced 12 m apart and extended 3 m into the Rochester Formation. Tertiary and fourth stage holes were split-spaced. Overall average grout takes were about 8.9 and 3.7 bags/m for the primary and secondary holes, respectively, with about 1.6 bags/m take in the tertiary and fourth stage holes. Grout takes varied significantly from interval to interval, with up to 82 bags/m take being recorded.

7.3 Gas Encounters

1 There is a long history of natural gas occurrence and exploitation in the Niagara Peninsula. Records of gas occurrences have been compiled from previous boreholes drilled for the construction of existing tunnels and the SAB2 Generating Station and from the observations made during the recent investigations. Pockets of gas were encountered near the intake end of the tunnel in the Rochester and overlying formations. Gas was also detected during sampling of groundwater in rock formations below the Rochester shale. Methane gas was encountered in Queenston shale in boreholes and in sheared primary bedding planes in the test adit. Gas was encountered during excavation of the existing diversion tunnels in the 1950s but the amount was small. It appears that the ventilation system in the tunnel was capable of

handling the volume of gas involved. Minor quantities of gas were also encountered in the exploratory adit.

7.4 Observed Performance of the Trial Enlargement

7.4.1 General

1 A 12-m diameter trial enlargement was excavated in the Queenston Formation as part of the Definition Engineering Phase 2 Investigations. Observations of road header performance during the underground excavations indicate that the Queenston Formation can be successfully excavated by this means, however, productivity and efficiency of excavation depends on proper ventilation and dust suppression, and the selection of an appropriately sized machine to attain adequate power and capacity for cutting in relatively massive, uniform, unjointed rock conditions. In addition, experience showed that temporary support measures are problematic due to rock mass behaviour as noted below.

2 The following summarizes the observed performance of the excavation.

(a) numerous instances of stress-induced and excavation geometry controlled sidewall spalling developed. Significant arcuate cracking and subsequent sidewall spalling in the range of 0.1 to 0.5 m deep were noted soon after excavation. Similar, but somewhat deeper, stress controlled spalling was observed adjacent to and at the end wall of the enlargement.

(b) the presence of sheared primary bedding plane above the crown contributed to instability at the crown of the enlargement. The rock broke back to a secondary bedding plane within a few hours after excavation. The depth of crown slabbing (up to 0.5 m) was controlled by the presence of the overlying bedding plane.

(c) excavation related, stress controlled slabbing of the rock in the invert, up to 1.4 m in depth, was noted upon excavation of the second bench when the invert was excavated to a horizontal, rather than curved, excavation profile

(d) where spalling and slabbing did not take place, the zone of active movement around the trial enlargement was limited to the first 1 to 2 m from the surface of the excavation. The cumulative measured displacements beyond 1 m from the surface of the excavation were generally less than 6 mm.

(e) a pattern of on-going, very small ‘creep’ movements were measured in the first few months after excavation, in the order of 5mm or less measured from 7 to 70 days following excavation

(f) due to the high salinity of the groundwater, premature rusting of mesh and/or bolts had the effect of weakening the support

(g) cyclical changes in moisture content of the rock mass brought about by temperature changes, changes in ventilation patterns, changes in humidity conditions, etc, all contribute to a degradation process, and the frequency of cycles controls the rate of degradation. In most cases, it takes some months before the pattern of small-scale cracking develops sufficiently that a larger block is able to delaminate from the crown. Typically where loose rock was cleared from the mesh and the mesh was retied to the fresh rock surface, evidence of further degradation would develop within days.

(h) where applied, no degradation of the shotcrete occurred, and based on observations of holes drilled through such shotcrete, little or no deep degradation of the rock mass occurred

(i) spin lock type rock anchorages did not perform satisfactorily in the Queenston Formation. Mechanical bail-type anchors and resin anchored bolts provided acceptable anchorages. However, rock bolts at 1.5-m centres were unsuccessful in controlling stress-induced slabbing.

7.5 Previous Experience Constructing Existing Tunnels

1 The two existing parallel tunnels were excavated by drilling and blasting using the heading and benching method. Each has an excavated diameter of 15.5 m and a finished internal diameter of 13.7 m . Tunnel 1 has a length of 8705 m and Tunnel 2 has a length of 8321 m. Tunnelling was carried out from five working shafts located midway between the two tunnels. The two tunnels are 76 m apart, centre to centre and are located up to 100 m below the ground surface. The intake consists of two 152 m long gathering tubes. The tunnels discharge into an open cut canal immediately upstream from the buried St. Davids Gorge.

2 The temporary tunnel support consisted of half circle 0.20 m (8 in.) steel 'I' beams spaced at 1.2-m intervals, with steel lagging. The permanent support consists of cast in place concrete lining with a minimum thickness of 0.76 m.

3 From the intake the tunnels are inclined downward at a slope of 30° (to a depth of 98.5 m below the ground surface. From here the tunnel alignment slowly rises, following the bedding of the rock formations, until emerging with a 30° slope at the outlet. The tunnels were excavated through a heterogeneous mixture of nearly flat lying sedimentary rocks. The tunnels traverse, in descending order, the Guelph and Lockport dolostones, DeCew dolostone, Rochester shale, Irondequoit limestone, Reynales dolostone, Neagha shale, Thorold sandstone and half way into the Grimsby sandstone. For most of their length, the tunnels are located between the massive Irondequoit limestone (about 3 m thick, forming the roof) and the Grimsby sandstone (interlayered sandstone and shale). The Grimsby sandstone hosts the lower one-third of the tunnel (the invert).

4 The Rochester and Neagha shales tended to deteriorate when subjected to prolonged exposure. These rocks were considered to be among the least competent encountered.

In general, the Irondequoit limestone served well as the roof of the tunnel due to its high strength and absence of joints and fractures. The bedding in the Reynales dolostone was found to be remarkably uniform throughout the tunnels. It contains at least two thin and continuous shaly bedding partings that are locally infilled with a thin gypsum coating. Local warping of the Reynales unit is reported, resulting in overbreak at the crown. During construction, this problem was made worse by the deterioration of the underlying Neagha shale causing undermining of the Reynales. The weak Reynales and Neagha shale beds necessitated the use of continuous roof support.

5 Tape extensometers were used to measure inward convergence in the two tunnels. Horizontal inward movements of up to 60 mm were recorded over a 6-mo period in Tunnel 1 (first tunnel to be excavated). Most of the movement occurred immediately after installation of the instrument. About half of the movement occurred following removal of the advancing heading and half after removal of the bench. The creep movement appears to be a logarithmic function of time. The horizontal movement of the rock walls of the second tunnel was only about one-half to one-third of that measured in the first tunnel. The long-term vertical movement of the crown was extremely small (about 1 mm). No instruments were installed to monitor deformations of the rock mass during initial excavation of the tunnels.

6 No attempt was made to measure the upward movement in Tunnel 1. In Tunnel 2, upward movement or invert heave was measured during bench removal. Bench removal resulted in an upward movement of about 12 mm creating voids in the invert rock to a depth of about 6 m, or to the top of the underlying Power Glen shale. As a result, extensive grouting was carried out to consolidate this zone. No such voids were encountered in the crown rock.

7 Water and gas ingress were not noted as problematic during the tunnel drives.

7.6 Previous Experience Constructing Queenston-Chippawa Canal (Canal 1)

1 Rock was excavated to a depth of 18.3 m into the Lockport Formation, and the bottom lined with 15-cm thick concrete lining, poured in three slabs without expansion joints. One floor heave failure occurred during construction in 1921 over about 70-m length of canal. When the canal was unwatered in 1964, a 915-m length of floor was heaved up to 0.9 m. It was assumed that the failure was due to buckling loads built up due to ‘rock squeeze’ over time.

7.7 Previous Experience Constructing Canal 2

1 The existing twin tunnels daylight immediately upstream of the buried St. Davids Gorge, as at the time, it was considered inadvisable to cross the buried gorge with the tunnels. The solution adapted for crossing the buried gorge was similar to that used for Canal 1 (constructed for SAB1 station) by means of a concrete lined canal with a trapezoidal cross section. Canal 2 was constructed between 1951 and 1954 to convey a flow of 1130 m^3/s of water. It is located about 305 m northwest of Canal 1. The

two canals run parallel to each other for about 3200 m before they cross at the cross over near the forebays. Canal 2 consists of two cross sections, a concrete lined trapezoidal cross section and an unlined rectangular cross section excavated in rock. The depth of water flowing in the canal is about 8.5 m.

2 Soil was excavated and paved with a smooth graded bed of riprap and crushed stone and lined with concrete up to a few feet above the operating water level. The trapezoidal section is 670 m in length and has a width of 28.6 m at the invert and about 150 m at the top having side slopes of two horizontal to one vertical.

3 On the north side of the buried St. Davids Gorge, the canal has a rectangular cross section of about 60 m wide and consists of close drilled vertical rock walls. The rock was not lined with concrete. Along most of its length, the canal bottom follows the contact of Gasport limestone and DeCew dolomite to utilise the natural, smooth and nearly horizontal bedding plane. The width of the canal was modified locally to accommodate variations in the elevation of the above contact and, at the same time, to maintain the same cross section area of flow.

4 The rectangular section of the canal was excavated through some 3 to 4.5 m of soil and about 23 m of rock. The bedrock was excavated in two passes. The top 7.5 m of rock were removed in the first pass and the next 15 m were removed during the second pass. The amount of over break was held to a minimum during blasting.

5 The Pumped Storage Forebay Canal is located just upstream of the cross over. It is identical in its construction characteristics to the rock portion of Canal 2 described above. An Interconnecting Canal was constructed to hydraulically connect the forebays of the two SAB powerhouses. It is 30.5 m wide and 213.5 m long, and was constructed in the same manner as the rock portion of Canal 2.

6 The excavations extend about 18 m into the Lockport/Decew Formations. Elastic deformation at the top of the rock cut amounted to about 1 to 1.3 cm on the first lift, with an additional 1.3- to 1.8-cm closure immediately following final excavation. Small creep movements of up to 0.33 cm/yr were noted for the 2 years that measurements were taken.

7 To date, no significant problems regarding the above rock cut canals have occurred that required any sort of remedial treatment. They have been performing in a satisfactory manner, since construction. The only known maintenance work occurred as a result of relatively minor soil erosion/slumping on the soil slopes (left bank) above the trapezoidal section in the late 1970s.

8 CONSTRUCTION CONSIDERATIONS

8.1 Diversion Tunnel

8.1.1 Alignment

1 The Owner's Mandatory Requirements define the mandated aspects of the tunnel alignment. These requirements allow the Contractor to modify the diversion alignment both horizontally and vertically.

2 The proposed alignment is as shown on Drawing PD-01-1001, Rev 00 in Appendix 1.1 (s) Draft Drawings.

8.1.2 Construction Methodology

1 The Owner's Mandatory Requirements define the mandated aspects of the construction methodology for the diversion tunnel.

2 For the rocks above the Queenston Formation, primary bedding planes exist at all major lithological boundaries. The major effects of these bedding planes on tunnel excavations will be to promote delamination, crown slabbing and instability when they are located in the immediate vicinity of the tunnel crown. The grade of the tunnel drive with respect to the dip of the rock bedding along the tunnel is such that the tunnel will often be intersecting the rock strata at a shallow angle. As a result, there is a potential for thin rock wedges to develop at any bedding plane.

3 The Queenston Formation is generally massive. However, construction of the tunnel in the Queenston Formation will have to allow for high in situ stresses and variations in rock mass strength. In addition, the presence of major sheared bedding planes at specific elevations must be accounted for. The weathered zone below the contact with the Whirlpool Formation and below the St. David's Gorge represents a weaker zone. Sheared bedding planes have developed within the Queenston Formation along Type IV (reddish-brown silty mudstone) and Type V (mudstone) rocks. These sheared planes are of low strength, are planar on a large scale and observed to be continuous throughout the test adit. There is potential for these sheared bedding planes to be continuous throughout the tunnel alignment. The performance of the trial enlargement has shown that significant slabbing can occur in the crown, in areas where sheared bedding planes exist some 2 m or less above the crown elevation, and on the sidewalls, particularly in areas immediately below such planes. These planes will be intersected by the tunnel at a low angle for a substantial portion of the tunnel length.

4 All shale formations through which the diversion tunnel passes will degrade when subject to changes in humidity.

5 Slabbing and plucking of rock blocks around and above the TBM shield and cutterhead can be expected to occur throughout the tunnel due to the occurrence of weak bedding planes in combination or not in combination with joints.

6 Stability in the Queenston Formation will be further influenced by stress-induced failure. Over stressing will occur at the crown and at the invert. Stress induced spalling will occur at the sidewalls and will be exacerbated by the presence of sheared bedding planes. A maximum of 3-m thick crown slabbing and 1 m thick sidewall spalling will occur. Crown slabbing can occur immediately upon excavation, while sidewall spalling of 0.1 - to 0.2 -m depth due to overstressing will occur within ½ hr of excavation. Invert heave is expected.

7 Total rock overbreak will be 30 000 m^3 where overbreak refers to rock beyond the maximum tunnel excavation diameter.

8.1.3 Rock Support Requirements

1 Note that rock bolts at 1.5 m centres were unsuccessful at controlling stress induced slabbing in the Queenston Formation.

2 In the Queenston Formation, the initial support must be installed within or immediately behind the shield of the TBM and must provide full coverage to the rock surface. In the rocks above the Queenston Formation, the initial support must be immediate and full where there is potential for slabbing and in other areas support can be delayed and reduced from full coverage.

3 Rock support will be required over the entire tunnel length. In the Queenston Formation, the support must be full and immediate.

4 In the rocks above the Queenston Formation, the support must be full and immediate for a 25 -m length of tunnel before and after the intersection, at the tunnel crown, of a major lithological boundary.

5 The formations above the Queenston Formation will be supported by steel profiles in the crown, systematic rock bolting and wire mesh reinforced shotcrete. The rock in the Queenston Formation will predominantly be supported by closely spaced steel sets and reinforced shotcrete. The thickness of the shotcrete and the spacing of rock bolts and steel sets will depend on the rock support class to be applied.

6 The rock support will be designed to accommodate 3 m thick crown slabbing and 1 m thick sidewall spalling.

7 Tunnel rock support will be designed to accommodate the Rock Conditions as given below. The in-situ Rock Condition shall be determined based on the closest match to the Rock Characteristics within each Rock Condition defined below.

	Rock Condition	Rock Characteristics	% of Total Bored Tunnel Length
Formations above Queenston Formation	1	• stable rock	0.16
	2	• loosening of rock in crown or localized area	2.73
	3	• unstable or closely broken rock • frequent overbreak due to discontinuities	10.59
	4	• unstable or closely broken rock • continuous overbreak due to any of: o discontinuities o sidewall spalling o invert heave	5.28
Queenston Formation	4Q	• continuous overbreak due any of: o sidewall spalling o invert heave • crown is more than 3m from bedding plane	23.69
	5	• continuous overbreak due to any of: o sidewall spalling o invert heave o slabbing • squeezing rock conditions • rock pressure generally exceeding rock mass strength • crown is within 3m of bedding plane	46.90
	6	• continuous overbreak due to any of: o sidewall spalling o invert heave o slabbing • squeezing rock conditions • rock pressure generally exceeding rock mass strength • closely broken shear and thrust zones • crown is within 3m of bedding plane • all other conditions requiring greater support than under Conditions 4Q and 5	10.65

8.1.4 Rock Mass Boreability

1 A linear cutter test was carried out on a single block sample from the Queenston Formation to evaluate the basic requirements of a TBM system. Note that the block sample was taken from the test adit excavation, and that no uniaxial strength data is available for this particular block sample for comparative purposes.

2 This cutter test is not considered to be representative for the full range of conditions in the Queenston Formation and obviously does not address the rocks above the Queenston. The the linear cutter test shall not be used solely to assess the boreability.

3 Instantaneous penetration rate above the Queenston is an average of 2.70 m/h; instantaneous penetration rate within the Queenston is an average of 2.40 m/h. Average penetration rates are based on average thrust values of 150 kN per cutter..

8.1.5 Groundwater and Seepage

1 The most significant impacts of groundwater on tunnelling are seepage into the excavation and the groundwater quality. For the ramp arrangement shown in the concept design, the tunnel will intersect all the water-bearing rock units along the decline and the incline sections.

2 At the outlet end of the tunnel, the main seepage area will be in the vicinity of the ramp portal as the tunnel crown intersects Gasport, DeCew, and Upper Rochester. These rock units and the overlying Lockport formations will allow inflow into the excavation. Mitigation measures, such as a grout curtain or a pressurized face TBM, must be implemented, and must be applied beyond the tunnel portal to below the DeCew/Rochester contact. For the rest of the length of the decline and within the Queenston shale, the tunnel drive is anticipated to be relatively dry.

3 At the buried St. Davids Gorge, the hydraulic conductivity of the Queenston shale below the buried gorge at the elevation of the alignment shown on the Concept Drawings is low (as given in Table 6.12) and there is no evidence of vertical jointing from the limited drilling data. The thickness of the shale at this location is anticipated to provide an adequate seal against groundwater infiltration from the water-bearing sediments in the buried gorge. Drilling ahead of the tunnel face to identify the potential of water inflow when tunnelling below the St. Davids Gorge should be considered.

4 Between the buried St. Davids Gorge and the start of the incline to the tunnel intake, the alignment shown on the Concept Drawings has the tunnel driven primarily under a cover of between 20 to 90 m of fairly uniform Queenston shale. The hydraulic conductivity of the shales is low.

5 As the tunnel is driven up the incline to the intake end, seepage into the tunnel is expected when the tunnel comes close to the contact of DeCew/Rochester. Results of pumping tests confirm that the Lockport Formation is a water-bearing strata. Thus, there is a need for mitigative measures to cut off the seepage prior to the tunnel drive or to provide TBM features to address the seepage.

6 As the tunnel is excavated further upward, it will intersect the highly permeable upper fractured zone that is directly connected to the river. Substantial potential for inflow into the tunnel from this zone is anticipated. Extensive mitigation measures and seepage control will be necessary and will be required to protect the intake excavation. A grouting gallery will be constructed over the upstream tunnel end section for this purpose. A total of 3400 tonnes of cementitious material will be used in the grouting program at the gallery. Grouting procedures will follow best modern practices, using stable cement/bentonite grout mixes with additives, together with electronic monitoring equipment for real-time control of pressures and volumes, in order to optimize grout takes and migration.

7 The water inflow is 500 l/s for the whole tunnel, after completing the grouting gallery at the intake end of the tunnel alignment.

8 The other significant effect of groundwater on the tunnel construction is the high salinity of the groundwater. The chloride concentrations are given in Table 6.13 and it should be noted that these values range up to 30% salinity. The potential corrosion of the tunnel support components and the tunnel excavation equipment must be considered in the design and construction phases.

8.1.6 Gas and Dust

1 Pressurized gas trapped in rock formations could be released suddenly upon excavation.

2 Dust was a major construction problem during excavation of the test adit with roadheaders.

3 A total of 12 events at 6 hours lost production time each will occur during the TBM tunnel drive.

8.2 Tunnel Intake

1 The excavation for the intake and the intake channel are located upstream from the INCW. Excavation in lifts utilizing controlled blasting techniques must be adopted in all excavations in this area to reduce overbreak and to prevent blast damage to the rock and to the INCW.

2 The investigation in this area indicates a strong pattern or orthogonal and oblique joints in the dolostone and limestone units in the upper formations. Many of these joints are iron stained as noted in the rock core from these units, thus, high hydraulic conductivity and connectivity are anticipated. Blocky ground conditions are also likely. Based on the results of the pumping tests and the water-bearing horizon identified from the borehole information, previous studies assumed a grout curtain around the excavation extending below the bottom of the excavation and into the Rochester shale.

3 Grouting of the intake area and the Intake Channel will be carried out to reduce the amount of seepage water, which has to be pumped out of the construction pit. Up to four stages of cement based grouting will be envisaged. For each phase, grout holes spacing max. 12 m shall be drilled.

4 A total of 3400 tonnes of cementitious material will be used for all grouting phases. Seepage of water into the outlet excavation works and the adjacent channel will be reduced to 50 l/s following completion of the grouting. Grouting procedures will follow best modern practices, using stable cement/bentonite grout mixes with additives, together with electronic monitoring equipment for real-time control of pressures and volumes, in order to optimize grout takes and migration.

5 Rock support for the exposed rock face will be required in areas where adverse jointing would produce potentially unstable blocks. In view of the depth of the excavation, wire mesh or equivalent will be required on the exposed face to provide safety within the excavation.

8.3 Tunnel Outlet and Canal

8.3.1 Excavation

1 The outlet area is the site proposed for the start of the tunnel excavation. The outlet comprises an open channel which will connect to the existing canal system.

2 The construction of the outlet will comprise an open channel excavation through both soil and rock leading to the tunnel portal. Soil overburden consists of sandy silt, silty clay and possibly some local fill. Excavation in overburden slopes of 2.0H:1.0V and 2.5H:1.0V were considered in previous studies for temporary and permanent slopes, respectively. Permanent slopes in overburden will require protection by rock fill and filter materials. The excavation in rock will be through the Lockport, DeCew and Rochester formations. Controlled blasting techniques must be implemented throughout rock excavations. In view of the depth of the excavation, it must be undertaken in lifts to reduce blast induced vibrations.

8.3.2 Grouting

1 On the basis of the water pressure testing in the boreholes drilled in the vicinity of the tunnel outlets and the previous records of remedial grouting at the PGS reservoir dyke, the Lockport Formation at this location consists of open joints that form seepage horizons for potential inflow into the excavation.

2 Grouting of the outlet area and Canal will be carried out to reduce the amount of seepage water, which has to be pumped out of the construction pit. A total of 700 tonnes of cementitious material will be used in the grouting program. Seepage of water into the outlet excavation works and the adjacent channel will be reduced to 30 l/s. Grouting procedures will follow best modern practices, using stable cement/bentonite grout mixes with additives, together with electronic monitoring equipment for real-time control of pressures and volumes, in order to optimize grout takes and migration.

8.3.3 Rock Support

1 Rock support will be required in areas where adverse intersection of joints would give rise to potentially unstable blocks. Since the excavation is deep, wire mesh or equivalent must be considered for installation on the exposed walls of the ramp to provide safety during construction. In addition, shotcrete will be required to protect the exposed Rochester shale from degradation along the ramps and in the initial sections of the tunnels. Drainage holes must be provided to prevent the build-up of water pressure behind the shotcrete.

8.4 Expected Deformations in Surface Excavations

1 Surface excavations and structures for the intake and outlet located in shaly zones of Gasport and DeCew Formations, as well as any shale formations, will have to account for long-term time-dependent deformations which will result in wall inward movements and potential invert heave.

9 REFERENCES

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Table 4.1
Major Stratigraphic Units

Formation Name	Thickness (m)	Petrographic Description
Guelph	2 - 3	Dolostone, brownish-grey to dark grey, medium-grained, massively bedded, with local thinly bedded zones and shaly partings, occasional gypsum occurs throughout.
Lockport	43 - 45	Dolostone, medium grey to medium dark grey, thin- to thick-bedded, with numerous bituminous and carbonaceous, and irregular shale and stylolitic shaly partings in the Goat Island member. The rocks vary from relatively pure to dolomitic limestone, slightly argillaceous. Chert nodules and white dolomite crystals are common, particularly in the finely crystalline and sugary textured units. Vugs commonly are filled with calcite, gypsum and sphalerite. Stromatolites are occasionally present.
DeCew	2 - 3	Dolostone, medium to dark grey, thin- to medium-bedded with an occasional thick bed; argillaceous with wavy irregular shale partings that contain well-developed slickensides. Stylolites and stylolitic shale partings are common; occasionally zones and/or nodules of gypsum occur. The member is finely crystalline to crystalline with a well-cemented mosaic texture.
Rochester	17 - 19	Shale, medium to dark grey; laminated, slightly dolomitic, dense and moderately hard. Clay minerals are illite, chlorite, kaolinite and traces of mixed layer montmorillonite clays. Some zones contain pyrite and gypsum, some carbonaceous stringers also exist.
Irondequoit	2 - 4	Limestone, light grey with pinkish tint, medium-bedded to massive with frequent wavy irregular green or black shale partings near the top. The member is coarsely crystalline. A few vugs and small pores are present.
Reynales	3.5 - 4.5	Dolostone, generally light to medium grey, carbonate-rich, although argillaceous and/or siliceous in some zones. Numerous wavy, dark grey shale partings. The texture of the member is very finely crystalline to dense.
Neahga	1.5 - 2	Shale, dark greenish-grey; platy to fissile. Some areas of pyrite and gypsum partings occur along bedding planes; calcite and dolomite occur in small amounts and quartz is the most abundant non-clay mineral. Illite is the dominant clay mineral with lesser amounts of chlorite, kaolinite and mixed layered clay. The rock is soft and flakes readily during wet-dry cycles. Slickensides are present.

Table 4.1
Major Stratigraphic Units

Formation Name	Thickness (m)	Petrographic Description
Thorold	2 - 3.5	Sandstone, light grey to greenish-grey; medium-bedded to massive; irregular green shale partings occur throughout. The sandstone is orthoquartzitic. The texture of the formation is very fine-grained. Silt-size to fine-grained quartz particles are cemented with secondary silica.
Grimsby	12.5 - 12	Sandstone, to reddish-brown; thin- to thick-bedded, often calcareous with interbedded shale. The sandstone texture varies from fine to medium grained. A weathered zone frequently occurs at the top of the formation.
Power Glen	10 – 13	Shale with siltstone beds and stringers; dark grey to greyish-green shale and siltstone, and light grey limestone and dolomite. Quartz is the most abundant non-clay mineral. Clay minerals consist of illite, chlorite and small amounts of montmorillonite and mixed layered clays.
Whirlpool	4.9 - 8.5	Sandstone, light grey to white; medium-bedded and cross-bedded; fine- to medium-grained. The quartz grains are well rounded, and are well cemented by secondary silica. Feldspar grains altered to kaolinite are abundant. Occasional green shale inclusions and chloritic shale partings occur throughout.
Queenston	>300	Shale (technically classified as a silty mudstone or siltstone), reddish-brown with interbeds and nodules of green. The shale is silty and is cemented in many situations by dolomite and calcite. In many places it is massive to blocky, however some fissile sections occur. Scattered gypsum nodules occur throughout lower sections of the unit; quartz is a common constituent. Clay minerals are illite, chlorite, kaolinite, montmorillonite and other clays. Numerous small, high angle slickensides occur, often stained with iron oxide.
Subdivisions of the Queenston Formation		
Q10 Q9 Q8 Q7	45 - 50	Generally upwards fining sequence of reddish brown mudstones and silty mudstones with about 30% green muddy siltstone interbeds and blebs. Division Q10 commonly shows weathered surfaces within which numerous slickensided partings occur.
Q6 Q5	30 - 35	Reddish brown muddy siltstones with distinct bedding partings and marked bands of green siltstone and occasional bands and areas of distinctive gypsum nodules. Some zones contain slickensided compaction features. A zone of phosphate nodules occurs at base.
Q4	15 - 20	Reddish brown muddy siltstone with frequent green siltstone.

Table 4.1
Major Stratigraphic Units

Formation Name	Thickness (m)	Petrographic Description
Q3 Q2 Q1	45 - 55	Reddish brown siltstone, with frequent green siltstone bands.

Note:
Descriptions extended and modified from those presented in published reports with additional data from detailed petrography of Queenston and other rocks (some originally undertaken for assessment of the American Falls).

Table 4.2
Primary Bedding Planes with Respect to Principal Lithologies

Formation Contact Horizon	Bedding Plane/ Contact Condition	Approximate Elevations in Representative Boreholes (m)							
		Intake Area	Canadian Falls Area		St. Davids Gorge Area		Pen-stock Area	Power house	Outlet Area
		NF-2	NF-45	NF-28	NF-43	NF-30	NF-44	NF-38	NF-42
Eramosa/ Goat Island	Shaly unit, fissile								
Gasport/ DeCew	Undulating, unconformable contact, possible shale below								
Rochester/ Irondequoit	Fissile, often fractured bedding surface	100.5	106.5	131.4	135.1	136.9	142.3	143.7	137.5
Neahga/ Thorold	Fracture zone, clay occasionally on bedding surface	91.7	98.5	123.2	126.7	129.0	133.0	134.6	128.8
Grimsby (Central Unit)	10 m above Power Glen, identified by high gamma count*	85.0	87.0	116.0	115.0	115.0	117.6	121.6	115.0
Whirlpool/ Queenston	Unconformable lower contact, clay zone, fragmented	57.7	62.6	89.0	93.4	96.3	100.7	102.6	N/C
Queenston									
Q10/Q9	Contact, Zone V mudstone, clay, high gamma count	N/C	58.0	80.0	87.2	90.0	94.0	93.6	N.C
Q9/Q8	Fragmented zone, clay, high gamma	N/C	51.7	71.0	81.2	80.0	88.0	86.6	N/C
Q8/Q7	Contact, Zone V mudstone, fragmented zone, some clay	N/C	38.0	55.0	59.4	N/C	65.0	64.6	N/C
Q7/Q6	Fractured zone, clay reported in some cases, high gamma count	N/C	11.0	50.0	(52.2)	N/C	58.0	58.6	N/C
Q6/Q5	Fractured zone, low RQD, clay	N/C	(0.0)	23.0	(28.2)	N/C	N/C	39.6	N/C
Q5/Q4	Clay infilled bedding plane or fractured zone, occasional phosphate nodules, high gamma count	N/C	(-7.0)	13.6	(22.2)	N/C	N/C	33.6	N/C
Q4/Q3	Clay zone or fractured	N/C	-15.0	3.4	N/C	N/C	N/C	N/C	N/C
Q2/Q1	Clay zone or fractured	N/C	N/C	N/C	N/C	N/C	N/C	N/C	N/C

* Gamma count based on geophysics logging of holes NF-38 and NF-43.
N/C No correlation due to insufficient lithological or correslatable data.
( ) Elevations in brackets are inferred from adjacent boreholes where correlations possible.
Note: this table lists primary bedding planes that are identifiable by downhole geophysical survey techniques and are assumed to be sheared.

Table 4.3
Location of Primary Bedding Planes
Identified Within the Queenston Formation

Sub-units	Zones	Tunnel Alignment												Penstock Area		Powerhouse Area			
		NF-45		NF-32		NF-28		NF-4A		NF-43		NF-33		NF-44		NF-31/31E		NF-38	
		Depth (m)	El (m)	Depth (m)	El (m)	Depth (m)	El (m)	Depth (m)	El (m)	Depth (m)	El (m)	Depth (m)	El (m)	Depth (m)	El (m)	Depth (m)	El (m)	Depth (m)	El (m)
	F G C L	152.87 153.17	C64.14 F63.90 58.00	121.20 126.33	F76.93 F71.80 66.00	96.74 96.94 100.98 103.97	C88.65 F88.45 F84.41 F81.42				93.40	90.05	F95.05	89.20 91.19 92.00	F98.79 F97.14 C96.47	71.43 71.56 71.77 71.80 71.88 72.34 77.54	F100.97 C100.84 C100.63 C100.60 C100.52 F100.06 C 94.86	69.43 69.71 70.10 70.49 70.82 71.66 77.43 77.96	102.60 F102.26 F101.98 C101.59 C101.20 C100.87 F100.03 C94.26 F93.73
Q10/9						105.25	F80.14		85.00		87.20	98.71	90.00 L86.39	93.94	C94.86	79.57 84.15	C92.83 L88.25	78.01 84.19	C93.68 F87.50
Q9/8		168.37 174.50	C51.76 C46.87	137.33 141.07	F60.80 F57.06	114.32 118.78	C71.07 C66.61	114.75 114.80	77.00 G66.90 L66.85		81.20		83.00	104.40 110.06 110.55 124.47	F86.19 F81.50 F81.09 C69.55	86.87	C85.53	85.28 85.80	C86.41 C85.89
Q8/7		185.18 189.60	F38.34 F34.81	151.74 154.75	C46.39 C43.38	130.29 130.32	L55.10 C55.07	120.07	C61.58	122.84	F59.38		64.00	135.00 136.10	66.00 F60.82 C59.91		66.00	107.13	F64.56
Q7/6			11.00	160.63 161.80 167.06 172.25	F37.50 F36.33 F31.07 C25.88	139.52 140.51 142.35 142.79 145.60 149.98 150.51 154.96	50.00 C45.87 F44.88 F43.04 F42.60 C39.79 F35.41 F34.88 F30.43		56.00		52.20	130.92	F 54.18	147.22 148.00	59.00 F49.27 C48.62	131.31	58.00 F41.09	123.31	58.00 F48.38
Q6/5			0.00	187.05	F 11.08		23.00	150.18 150.49 151.32 151.51 151.56 151.66 153.66 154.69 158.06	F31.47 G31.16 F 30.33 G30.14 C30.09 G29.99 F27.99 F26.96 F23.59		28.20		26.00	159.41	40.00 F39.05		38.00	135.28	40.00 F36.41
Q5/4			-7.00	199.88 206.98	2.00 C-1.75 C-8.85	171.70 181.95 205.33	C13.69 F3.44 C-19.94				22.20	199.22 211.52 216.83	F-14.12 F-26.42 F-31.73			143.20 155.27 158.50	31.00 F28.67 F16.60 F13.37		33.60
Q4/3			-15.00																

Table 4.3
Location of Primary Bedding Planes
Identified Within the Queenston Formation

Sub-units	Zones	Tunnel Alignment												Penstock Area		Powerhouse Area			
		NF-45		NF-32		NF-28		NF-4A		NF-43		NF-33		NF-44		NF-31/31E		NF-38	
		Depth (m)	El (m)	Depth (m)	El (m)	Depth (m)	El (m)	Depth (m)	El (m)	Depth (m)	El (m)	Depth (m)	El (m)	Depth (m)	El (m)	Depth (m)	El (m)	Depth (m)	El (m)
	Gypsum Nodules	218.19	11.98	167.00	31.13	141.00	44.39	173.66 193.94	F7.99 G-12.29	134.00	48.22	134.00	51.10	142.00	53.65	119.00	52.87	117.00	54.69
	Interbedded Siltstone	229.60	2.86	184.00	14.13	169.00	16.39	142.00	39.65	201.20	-18.98	180.00	5.10	-	-	177.30	-5.43	-	-

Notes:
F Fracture
G Gouge
C Clay/Silt
L Core Loss
Holes near the diversion inlet/outlet do not intersect the Queenston Formation.

Table 5.1
PGS Reservoir Area Summary of Soil Properties

Soil Classification	Grain Size Distribution				Natural Density (kg/m^3)	Natural Moisture Content (%)	Atterberg Limits		Perme-ability k* (cm/s)
	Gravel (%)	Sand (%)	Silt (%)	Clay (%)			Liquid Limit (%)	Plasticity Index	
Silty clay	0-4	1-12	36-40	48-62	1951-2174	13-29	34-47	18-27	$6.2x10^{-8}$
Clayey silt	0-2	1-16	56-75	24-29	2065-2175	16-22	23-34	6-9	na
Silt	0-1	1-18	72-88	6-15	2104-2073	13-24	Non-plastic	Non-plastic	$2.5x10^{-6}$ $7.4x10^{-7}$
Sandy silt (till like)	3-18	15-36	41-66	7-16	na	11-15	na	na	na

* Does not refer to soil/rock interface.

na – Not available

Table 6.1
Mineral Composition of Rock Formations Above Queenston Shale

Sample	Rock Formation	Mineral Compositions (%)			
		Quartz	Calcite	Dolomite	Other
NF28-1	Lockport (Goat Island Member)	2	-	95	3 (chalcedony)
NF28-2	Lockport (Gasport Member)	3	3	94	-
NF28-3	Rochester	10	-	90	-
NF28-4	Irondequoit	-	35* 5**	60	-
NF28-5	Reynales	-	2	98	-
NF28-6A	Neahga	2	-	1	97 (clay minerals)
NF28-9	Thorold	80-85	-	-	10-15 (feldspar) 3-5 (clay minerals)
NF28-7	Grimsby	86	4-5	-	2 (feldspar) 8-10 (clay minerals)
NF28-8	Power Glen	70-85	5-15	-	2-4 (feldspar) 5-7 (clay minerals)
NF29-10	Whirlpool	85	-	-	5-10 (feldspar) 3-6 (others)

Note:
Mineral compositions are based on petrographic analysis of thin sections.

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* Fe - poor calcite

** FE - rich calcite

Table 6.2
Mineral Composition of Queenston Shale

Mineral Type	Content Range (%)	Average (%)
Quartz	8 to 57	24
Calcite	0.1 to 42	16
Other minerals	36 to 93	60
• Felspar*	2 to 5	3
• Dolomite*	2 to 5	4

* Included in total percentage of other minerals.

Table 6.3
Typical Physical and Mechanical Properties of Rock Formations Above the Queenston Formation

Rock Formation	Rock Type	Moisture Content (%)	Unit Weight (Mg/m^3)	GPa		MPa		Poisson's Ratio	Compressive Wave Velocity (km/s)	MPa σ_{TB}
				E_d	E	σ_c	σ_t			
Lockport	Dolostone Limestone	1.9 1.2	2.62 2.65	70.0 63.0	62.5 67.0	(125) (151)	12.7 11.4	0.37	na	6.3-19.1 (12.3)
DeCew	Dolostone	0.6	2.67	60.0	51.0	(128)	na	0.30	na	na
Rochester	Shale	1.9	2.66	36.0	10.5	12.1-65.5 (40.6)	na	0.18-0.44	3 – 4.6	na
Irondequoit	Limestone	0.9	2.63	68.0	59.5	60.3-105.2 (89)	na	0.32	na	na
Reynales	Dolostone	1.0	2.67	46.5	33.0	45-140.8 (101)	na	.025	na	na
Neahga	Shale	3.1	2.54	na	4.0	12-24 (18)	na	0.45	na	na
Thorold	Sandstone	2.0	2.47	na	52.5	117.4-141.3 (129)	na	0.22	na	14.3-17.6 (15.6)
Grimsby	Shale	1.7	2.52	7.3	8.3 *	12.8-64.4 (35)	na	0.1-0.39	3 – 4	na
	Sandstone	2.2	2.51	55.2	43.0	73.5-242.2 (146)	11.0	0.16-0.32	4.3 – 4.7	11.1-22.1 (15.0)
Power Glen	Shale	2.5	2.56	27.8	8.4	11.9-33.9 (22)	na	0.37-0.47	3.3 – 4.3	na
	Sandstone	na	2.66	55.5	58.5	71.7-223.8 (152)	na	0.14-0.27	3.8	na
Whirlpool	Sandstone	1.7	2.51	39.0	49.5	108-234.5 (180)	10.0	0.15-0.22	4.2	7.9-19.1 (11.9)

Legend

E_d Dynamic modulus
E Young's modulus
σ_c Uniaxial compressive strength
σ_t Split tensile strength
m,s Material constants for Hoek and Brown (1980) failure criterion
σ_{TB} Brazilian tensile strength

Notes

\+ Shale and sandstone interbed
na Not available
* Based on Definition Engineering Phase 1 testing
( ) Average values for baseline

Table 6.4
Typical Strength and Deformation Properties of Queenston Formation

Definition Engineering Phase 1 Testing	Number of Tests	Young's Modulus (GPa)	Poisson's Ratio (v)
Diversion facilities	9	6.0-17.1 (8.2)	0.25-0.41 (0.35)
Generation facilities	6	5.4-12.6 (9.6)	0.29-0.48 (0.38)
Previous Testing			
1981 to 1988 (Shale)	23	6.5-18.9 (11.8)	0.22-0.49 (0.4)
1989 (Shale and siltstone)	23	15.0-23.0 (18.6)	0.36-0.39 (0.37)

	Uniaxial Compressive Strength (MPa)	Tensile Strength on Wet Core (MPa)
Range and Average Values for Baseline	7.5 -117.5 (45)	0.8-13.6 (5.5)

Notes
1 Average values shown in brackets.
2 See Figures 6.2 to 6.5 for histograms of all relevant uniaxial compressive and tensile data.

Table 6.5
Triaxial Compression
Strength of Queenston Shale

Depth (m)	Confining Pressure (MPa)	Compressive Strength (MPa)
Diversion Facilities Borehole NF-4A		
176.35	1.0	50.7
183.87	2.0	24.8
179.57	5.0	71.4
176.47	7.5	68.3
180.00	10.0	49.5
176.65	15.0	61.5
174.30	15.0	49.8
170.40	15.0	92.3
180.23	20.0	50.4
174.06	20.0	59.7
211.00	20.0	74.3
Generation Facilities Borehole NF-37		
69.60	1.0	14.4
69.41	3.0	23.6
71.96	7.5	21.6
71.82	15.0	50.9
116.58	2.0	37.2*
118.50	5.0	83.2*
118.73	10.0	67.9*
117.81	15.0	42.4*

* Partially dried prior to testing. Results from vertical core, Definition Engineering Phase 1 investigations. Refer to Figures 6.8 and 6.9 for Phase 2 investigation results.

Table 6.6
Interpreted Hoek-Brown (m) Parameter and Comprehensive Strength Intercept

BH	Depth		Elevation		Confining Stresses (MPa)	Linear Regression			Simplex Technique	
	From (m)	To (m)	From (m)	To (m)		M	σc (MPa)	Regres-sion Coefficient	M	σc (MPa)
Vertical Holes										
NF-31	160.00	160.60	11.87	11.27	T,0,0.5,1,2,4,8	7.50	57.52	0.6393	8.81	55.94
NF-31	161.38	162.50	10.49	9.37	T,0,0.5,1,2,4,8	15.56	53.11	0.7483	35.97	35.02
NF-31	Combined data from above (160.00 to 162.50)					11.10	55.58	0.6524	17.63	47.22
NF-38	76.08	77.77	95.61	93.92	T,0,0.5,1,2,4,8	8.09	24.80	0.9300	11.31	22.37
NF-38	102.00	103.63	69.69	68.06	T,0,0.5,1,2,4,8	7.03	36.50	0.7900	11.00	33.23
NF-43	98.20	99.40	84.02	82.82	T,0,0.5,1,2,4,8	5.33	41.30	0.5200	6.21	39.87
NF-43	179.33	180.71	2.89	1.51	T,0,0.5,1,2,4,8	13.78	36.50	0.8300	23.60	27.15
NU-13	0.00	2.53	31.14	28.61	T,0,0,1,3,5,15,30,30	8.66	31.64	0.9607	8.67	30.47
NU-13	7.18	14.30	23.96	16.84	T,1,3,5,15,30,30	4.29	41.99	0.8042	4.64	39.95
Inclined Holes										
NF-39	242.93	244.07	-12.81	-13.72	T,0,0.5,1,2,4,8	6.2	50.60	0.7900	6.16	49.71
NF-45	205.41	206.96	-22.18	-23.31	T,0,0.5,1,2,4,8	11.1	21.10	0.8500	10.14	20.89
NU-11	28.75	31.85	91.84	94.18	T,0,1,5,15	5.05	21.24	0.8404	10.08	15.27
NU-12	27.15	66.90	77.17	89.13	T,0,1,5.15	8.19	14.67	0.8969	13.36	10.62
NU-16	5.88	7.80	37.56	38.52	T,0,0,0,3,5,15,30	5.76	21.22	0.9756	5.76	20.53
Horizontal Holes										
NU-6	15.56	16.88	68.57	68.59	T,0,1,3,5,15,30	9.49	28.31	0.9601	10.79	26.07
NU-15	5.6	6.97	33.45	35.23	T,0,0,1,3,5,15,30	5.82	29.19	0.8455	8.33	23.63

T = Tensile Strength Test

T_c = Fitted uniaxial compressive strength from failure envelope

Table 6.7
Summary of Deformation Moduli Values
Definition Engineering Phase 2 Investigations

Location	Elevation	No. of Samples	Measurement Method	Modulus of Deformation (GPa)	
				Range or Single Test Result	Average or Single Test Result
Vertical Holes					
NU-1	40.92 - 50.64	2	USBM	27.60 - 36.50	32.05
NU-4	28.93 - 39.69	2	USBM	20.50 - 20.90	20.70
NU-7	81.87 - 89.07	1	USBM	26.00	
		2	USBM, lab	na	17.80
	82.03 - 82.34	1	Dial gauge	7.71 - 8.06	7.92
NU-13	18.64	1	USBM	38.90	
	19.76 - 29.28	12	Dial gauge	2.39 - 10.99	7.61
	30.89 - 30.99	1	Strain gauge	10.91 - 14.26	13.12
NU-14	20.63	1	USBM	24.70	
	24.04 - 24.17	1	Strain gauge	20.47 - 28.14	25.43
In Situ	21.48 - 23.48	9	Dilatometer	35.63 - 53.06	42.75
Near Horizontal Holes					
NU-2	72.61 - 73.03	3	USBM	19.40 - 25.20	21.60
NU-6	68.48 - 68.56	3	USBM	23.00 - 27.50	24.50
	68.49	1	USBM, lab	23.00	
	68.59	1	Dial gauge	6.04	
NU-9	68.50	2	Dial gauge	3.51 - 4.85	4.23
NU-15	33.40	1	USBM	25.30	
	33.15 - 33.20	6	Dial gauge	4.17 - 7.38	6.09
	33.22 - 33.23	1	Strain gauge	36.09 - 39.65	37.70
In Situ	33.20	16	Dilatometer	14.34 - 23.34	18.96
Inclined Holes at 30°					
NU-3	77.89 - 80.28	3	USBM	20.00 - 20.70	24.40
NU-16	39.96 - 41.23	1	USBM	24.80	
	37.56 - 38.67	6	Dial gauge	3.09 - 21.79	10.14
		1	Strain gauge	44.82 - 55.52	52.05
Inclined Hole at 17.5°					
NU-12	38.31 - 38.42	3	Dial gauge	5.36 - 8.84	19.59
Inclined Hole at 49°					
NU-11	93.57 - 94.18	4	Dial gauge	4.65 - 6.5	5.60

na – not available

Table 6.8
Rock Mass Classification - RMR Values
(Based on Surface Drillhole Evaluations)

Area	Diversion Facilities																Generation Facilities									
	Inlet				Tunnel Length				Tunnel Length St. Davids Gorge Area				Outlet				Penstock				Powerhouse				Tailrace	
	1992		1991[1]		1992		1991[1]		1992		1991[1]		1992		1991[1]		1992		1991[1]		1992		1991[1]		1992	
Formation	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range
Guelph	69	-	68	-	-	-	-	-																		
Lockport	64	-	70	-	73	61-74							69	-	72	-	66	-	65	-	-	-	45	-	-	-
DeCew	64	-	64	-	69	61-74							69	-	69	-	61	-	69	-	66	-	59	-	-	-
Rochester	64	-	67	-	69	64-69							69	-	67	-	64	-	64	-	69	-	64	-	-	-
Irondequoit	80	-	79	-	78	75-85							70	-	77	-	85	-	72	-	72	-	69	-	-	-
Reynales	70	-	74	-	71	70-75							80	-	67	-	75	-	67	-	75	-	64	-	-	-
Neahga	62	-	69	-	59	-							57	-	56	-	62	-	59	-	62	-	52	-	-	-
Thorold	75	-	80	-	72	70-75							80	-	78	-	80	-	77	-	80	-	74	-	-	-
Grimsby	64	-	72	-	68	60-72							72	-	70	-	62	-	67	-	72	-	70	-	-	-
Power Glen	69	-	59	-	68	64-69							47[2]	-	61	-	64	-	64	-	64	-	65	-	-	-
Whirlpool	-	-	82	-	76	75-80							-	-	85	-	80	-	85	-	72	-	82	-	-	-
Queenston																										
Q10			66	-	54	49-59	69		56		57				57		44		57		49		56		45	
Q9					66	-			49		66						49				47					
Q8					64	-											64		66		59		66			
Q7					71	69-74											74				64		77			
Q6					71	69-74			67		77				77		59		77		69					
Q5					67	64-69															59					
Q4					67	64-69	77		57																	
Q3					82	-																				
Q2					82	-			72																	
Q1					82	-																				
Source	NF-41		NF-2 NF-5		NF-45 NF-43		NF-32 NF-28 NF4A		NF-39		SD-6 SD-8 SD-7 NF-30		NF-42		NF-33		NF-44		NF-31 NF-6 NF-34		NF-38		NF-35 NF-37		NF-40 NF-47	

NOTES:
1 1991 Mean: RMR assessed for average across thickness of lithological unit.
2 Presence of clay infilling.
3 Due to zones of local disturbance, detailed subdivision of the Queenston was not attained in the area of the St. Davids Gorge.
4 Ratings for Borehole NF-39 are based on equivalent elevations from Borehole NF-30.
5 RMR values prior to adjustment for use in estimating Hoek-Brown failure criterion.

Table 6.9
Rock Mass Strength Parameters for
Rock Formation Above Queenston Shale

Formation	RMR	Adjusted RMR*	Compressive Strength (MPa)	m_i	m	s
Lockport Dolostone						
- Eramosa	69	79	151	7.0	3.3	0.0970
- Goat Island	69	79		7.0	3.3	0.0970
- Gasport	72	82		7.0	3.7	0.1353
DeCew Dolostone	69	79	128	7.0	3.3	0.0970
Rochester Shale	64	77	42	10.0	4.4	0.0777
Irondequoit Limestone	72	82	106	7.0	3.7	0.1353
Reynales Dolostone	67	77	95	7.0	3.1	0.0777
Neahga Shale	56	66	14	10.0	3.0	0.0229
Thorold Sandstone	78	83	163	15.0	8.2	0.1524
Grimsby Sandstone	70	75	155	10.0	4.1	0.0622
Shale			33			
Power Glen						
• Sandstone/Shale	61	66	172	10.0	3.0	0.0229
• Shale	65	70	24	10.0	3.4	0.0357
Whirlpool Sandstone	85	87	216	15.0	9.4	0.2359

* Adjusted RMR values are equivalent to GSI.

Table 6.10
Rock Mass Strength of Queenston Formation

Area	RMR	σ_c (MPa)	m_i	m	s
Inlet area	66	33	6.5	1.93	.0229
Tunnel alignment (general)					
Q10	55	33	6.5	1.30	.0067
Q8,9	65	33	6.5	1.86	.0205
Q6,7	71	33	6.5	2.31	.0399
Q4,5	67	46	14.5	4.46	.0256
Q1,2,3	82	46	14.5	7.62	.1353
Tunnel Alignment in area of St. Davids					
Gorge	67	33	6.5	2.00	.0256
Q6	67	46	14.5	4.46	.0256
Q5	73	46	14.5	5.53	.0498
Q3,4	76	46	14.5	6.15	.0695
Q1,2					
Outlet Area					
Q7-10	57	33	6.5	1.40	.0084
Q5-6	77	46	14.5	6.38	.0776

σ_c = uniaxial compressive strength
m,s = Hoek-Brown constants for rock mass
m_i = Hoek-Brown constants for intact rock

Notes:
1 Above values based on Definition Engineering Phase 2 investigation results for intact core. Phase 1 results of $m_i = 10$ and $\sigma_c = 45$ MPa were superseded by this work.
2 RMR values have been adjusted and are equivalent to GSI.

Table 6.11
Piezometric Levels Along the Tunnel Route

Rock Unit	Borehole and Date of Reading							
	8/2/84 NF-2[1]	7/31/84 NF-3[1]	12/12/90 NF-32[2]	1/8/91 NF-28[2]	12/12/90 NF-4/4A[2]	1/7/91 SD-0[2]	1/8/91 NF-30[2]	1/22/91 NF-33[2]
Eramosa	152.0	170.5						
Lockport	**147.7**	170.8						164.50
DeCew	(el 140.0)	162.5		179.26			169.81	_
Rochester	148.2	162.5		183.26			169.41	164.70
Irondequoit	_	174.0		157.76			142.01	149.80
Reynales	159.9	_		_			142.01	148.70
Neahga	_	169.1		_			_	_
Thorold	_	_		_			_	_
Grimsby	147.0	168.5		167.26			155.81	_
Lower Grimsby	161.9							(EL 100)
Power Glen	142.3	_		_			_	**149.80**
Whirlpool		168.9		152.16			116.31	130.90
Queenston Q10		140.6		_			116.31	_
Q9		198.6		169.76			_	_
Q8				_			121.61	170.20
Q7		_		_			_	_
Q6		(el 27.0)	**178.87**	_			_	_
Q5			(el 20)	_			_	_
Q4				_			_	_
Q3				(el 10)	**160.43**		_	_
Q2				145.56	(el 0)	**141.36**	**101.51**	134.40
Q1				_		(el 10)	(el 10)	_

Notes:
1 Bold Font Piezometer Readings at/near tunnel centre line
2 Approximate elevation of tunnel centre line given in parenthesis
3 All elevations in metres

Table 6.12
Jointing and Hydraulic Conductivity of Rock Formations

Formation	Joint Spacing (m)	Joint Condition	Hydraulic Conductivity Range (cm/s)	Baseline Average (cm/s)
Guelph and Upper Lockport Dolostone (at intake)	>0.2	Slightly rough surfaces. Some slickensides. Minor weathering.		1×10^{-2}*
Lower 30 m of Lockport (at intake)	>0.6	Slightly rough surfaces. High angle slickensides in partings.		5×10^{-3}*
Lockport Dolostone (outlet)	>0.2	Slightly rough surfaces. Minor weathering.	$<1 \times 10^{-7}$ to 7×10^{-3}	9.8×10^{-4}
DeCew Dolostone	>0.2	Slightly rough surfaces. Some slickensides.	3×10^{-6} to 3×10^{-5}	1.3×10^{-5}
Rochester Shale	>0.2	Slightly rough surfaces. Slightly weathered walls.	$<1 \times 10^{-7}$ to 9×10^{-5}	1.4×10^{-5}
Irondequoit Limestone	>0.6	Rough and irregular surfaces. Slightly weathered walls.	$<1 \times 10^{-7}$ to 2×10^{-5}	9×10^{-6}
Reynales Dolostone	>0.2	Rough and planar to slightly irregular surfaces. Slightly weathered to fresh walls.	$<1 \times 10^{-7}$ to 1×10^{-5}	4.5×10^{-6}
Neahga Shale	<0.2	Smooth and planar surfaces. Slightly weathered to fresh walls.		
Thorold Sandstone	>0.6	Rough and slightly irregular surfaces. Fresh to slightly weathered walls.		
Grimsby Sandstone, Siltstone, Shale	>0.2	Slightly rough and irregular surfaces. Some slickensides.	$<1 \times 10^{-7}$ to 5×10^{-5}	7.3×10^{-6}
Power Glen Sandstone, Shale	>0.2	Slight rough and irregular surfaces	$<1 \times 10^{-7}$ to 8×10^{-5}	2.8×10^{-5}
Whirlpool Sandstone	>0.6	Rough and irregular surfaces.	$<1 \times 10^{-7}$ to 9×10^{-5}	1.7×10^{-5}
Queenston Shale				
Upper 30 m	>0.2	Rough and slightly irregular surfaces. Slightly weathered walls.	$<1 \times 10^{-7}$ to 2×10^{-4}	3.6×10^{-5}
St. Davids Gorge Area	>0.2		$<1 \times 10^{-7}$ to 6×10^{-5}	6.5×10^{-6}
Other Areas below upper 30 m	>0.6		$<1 \times 10^{-7}$ to 2×10^{-5}	3.6×10^{-6}

* from pump test results

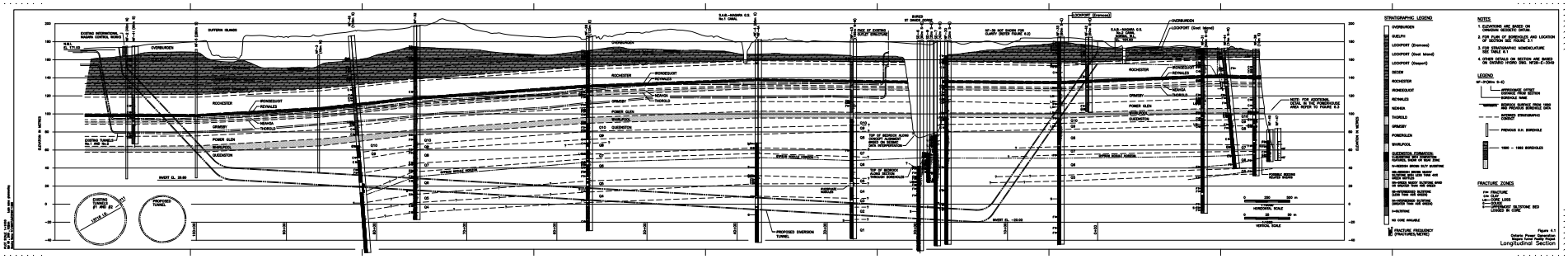
Table 6.13
Groundwater Quality

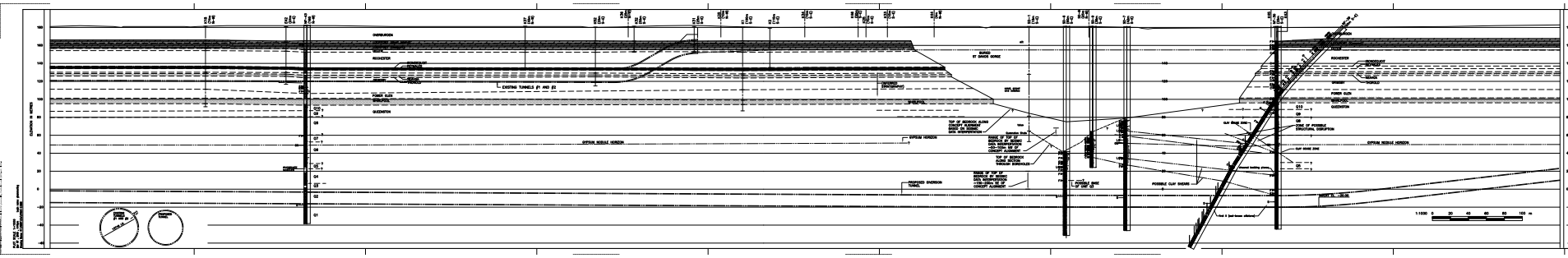
Rock Formation	Ph	Average Values		
		Conductivity (µs/cm x 10^3)	Chloride (mg/L x 10^3)	Sulfate (mg/L x 10^3)
Guelph	7.8		26	
Lockport				0.6 to 1.6
• Eramosa	7.7	1.1 to 2.8	0.9 to 1.5	
• Goat Island	7.6	2.4 to 9.8	0.5 to 29	
• Gasport	7.3	10 to 32	17 to 55	
DeCew	7.7	17	12.4	
Rochester	6.6	67 to 76	48 to 60	
Irondequoit	6.4	84	166	
Reynales	-	-	-	
Neahga	-	-	-	
Thorold	6.5	57 to 77	45 to 104	
Grimsby	5.4	95 to 110	110 to 244	
Power Glen	5.4	77 to 98	90 to 296	
Whirlpool	6.9	5.6 to 76	1.1 to 109	
Queenston	6.7	22 to 99	26 to 152	

Table 6.14
Stress Regimes for Design Purposes

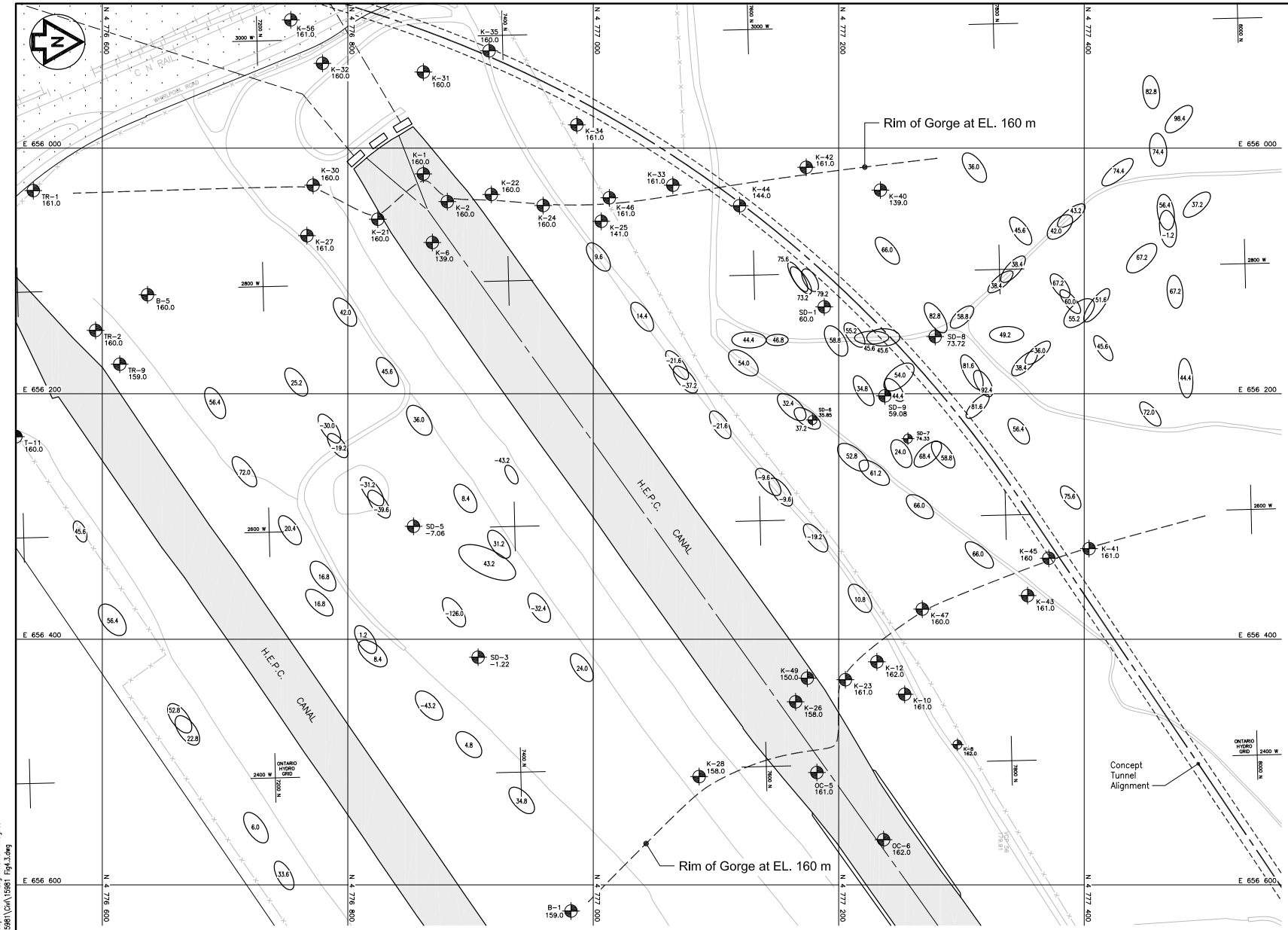
Approxi-mate Station	Queenston Subunits	Horizontal Stress (respect to tunnel) (MPa)		Remarks
		Radial	Axial	
0+000 to 1+700	Q2 to Q10	15	23	tunnel is nearly parallel to minimum stress, transformed stresses quoted
1+700 to 3+800	Q2 to Q3	22	16	orientation of stress field uncertain and tunnel curves in this section; maximum values quoted
3+800 to 7+800	Q4 to Q5	19	17	stress orientation is known and consistent with regional stress field; transformed values quoted
7+600 to 10+000	Q6 to Q10	17	11	stress orientation uncertain and tunnel curves, maximum values quoted

Figures 4.1
4.2
4.3


STRATIGRAPHIC LEGEND
OVERBURDEN
GUELPH
LOCKPORT (Eramosa)
LOCKPORT (Goat Island)
LOCKPORT (Gasport)
SECORD
ROCHESTER
RONDEAUX
REYNALES
NOHDA
THOROLD
GRIMSBY
POWERGLEN
WHIRLPOOL
QUEENSTON FORMATION
GREY SHALE, MINOR SILTSTONE, SANDSTONE, BLACK AT BASE ONLY
G=GREEN BROWN SILTY SHALE
BROWNISH GREEN SILTY SHALE, SILTSTONE MAY BE ABSENT
BROWNISH GREY SILTSTONE, SANDSTONE MAY BE ABSENT OR MINOR THIN ZONE
BLACK SHALE MAY BE PRESENT OR ABSENT
BROWNISH GREY SILTSTONE, SANDSTONE MAY BE MINOR, GREEN TINT AND MICAS
S=SILTSTONE
NO CORE RECOVERY
FRACTURE FREQUENCY (FRACTURES/METRE)
NOTES
1. ELEVATIONS ARE BASED ON CANADIAN GEODETIC DATUM.
2. FOR PLAN OF BOREHOLES AND LOCATION OF SECTION SEE FIGURE 3.1
3. FOR STRATIGRAPHIC NOMENCLATURE SEE TABLE 4.1
4. OTHER DETAILS ON SECTION ARE BASED ON CANADA HYDRO DWG. W32-E-C-3424
LEGEND
W7-P12Km 3-40
APPROXIMATE OFFSET DISTANCE FROM SECTION
BOREHOLE NAME
BEDROCK SURFACE FROM 1988 AND PREVIOUS BOREHOLE DATA
INFERRED STRATIGRAPHIC CONTACT
PREVIOUS D.H. BOREHOLE
1990 - 1992 BOREHOLES
FRACTURE ZONES
Fm FRACTURE
CAVITY
LW= CORE LOSS
S= SEAM
Ss= SHALE/SILTSTONE BED LEAKED IN CORE
HORIZONTAL SCALE
VERTICAL SCALE
ELEVATION IN METRES
OVERBURDEN
ROCHESTER
RONDEAUX
REYNALES
NOHDA
THOROLD
GRIMSBY
POWER GLEN
QUEENSTON
LOCKPORT (Eramosa)
LOCKPORT (Goat Island)
LOCKPORT (Gasport)
SAR-NIAGARA G.S. IN-T CANAL
SURFACE GRADE
EXISTING INTERNATIONAL RAINBOW CONTROL BUILDING
EXISTING TRAINS EL. 184.30
MAST EL. 26.00
MAST EL. -20.00
PROPOSED DIVERSION TUNNEL
NOTE: FOR ADDITIONAL DETAIL IN THIS CROSSCUT AREA REFER TO FIGURE 6.3
Figure 4.1
Ontario Power Generation
Niagara Tunnel Facility Project
Longitudinal Section



ELEVATION IN METRES
OVERBURDEN
GULEPH
LOCKPORT (Eramosa)
LOCKPORT (Goat Island)
LOCKPORT (Gasport)
DECEW
ROCHESTER
BONNECHERE
REYNALES
NEAHGA
THERALD
GRANBY
POWERGLEN
WHIRLPOOL
QUEENSTON
GYPSUM MIDDLE HORIZON
GYPSUM HORIZON
EXISTING TUNNELS #1 AND #2
PROPOSED DIVERSION TUNNEL
POSSIBLE CLAY SEAMS
CLAY SEAM ZONE
ZONE OF POSSIBLE CIRCULATION DISRUPTION
1:1000 0 20 40 60 80 100 m
STRATIGRAPHIC LEGEND
NOTES
1. ELEVATIONS ARE BASED ON CANADIAN GEODETIC DATUM
2. FOR PLAN OF BOREHOLES AND LOCATION OF SECTION SEE FIGURE 3.1
3. FOR STRATIGRAPHIC NOMENCLATURE SEE TABLE 6.1
4. OTHER DETAILS ON SECTION ARE BASED ON ONTARIO HYDRO DWG. W-28-E-3049
5. SECTION TRACEN ALONG CONCEPT ALIGNMENT
LEGEND
W-31(Rm 5-2)
APPROXIMATE CONCEPT ALIGNMENT FROM SECTION BOREHOLE NAME
BEDROCK SURFACE FROM 1992 AND PREVIOUS BOREHOLE DATA
INFERRED STRATIGRAPHIC CONTACT
PREVIOUS BOREHOLE
1992 BOREHOLE
FRACTURE ZONES
FRACTURE FREQUENCY (FRACTURES/METRE)
Figure 4.2
Ontario Power Generation
Niagara Tunnel Project
Cross Section at Buried St Davids Gorge
Showing Inferred Bedrock Geology



Notes

1. This drawing shall be read in conjunction with all relevant Concept Drawings and Documents for this Project and Ontario Power Generation drawings for the existing works. Details of existing canals and services are not shown, for clarity.
2. All coordinates and elevations are in metres. Vertical Datum: GSC (83) 5th. Edition Major horizontal datum: NAD83 Minor horizontal datum: OPG Local Datum
3. Arrangement shown are is for a D=12.65 m (nominal) inside diameter tunnel and is for reference only, or to convey the concept of the work.
4. Refer to GBR. Section 4.4.4 for details on top of bedrock baseline assumptions.

Legend

56.4 — Baseline bedrock elevations (metres) based on Seismic Interpretation

K-41 161.0 — Borehole location and baseline bedrock elevation (metres)

0 60 120 180 240 300 Metres

Scale 1:3000

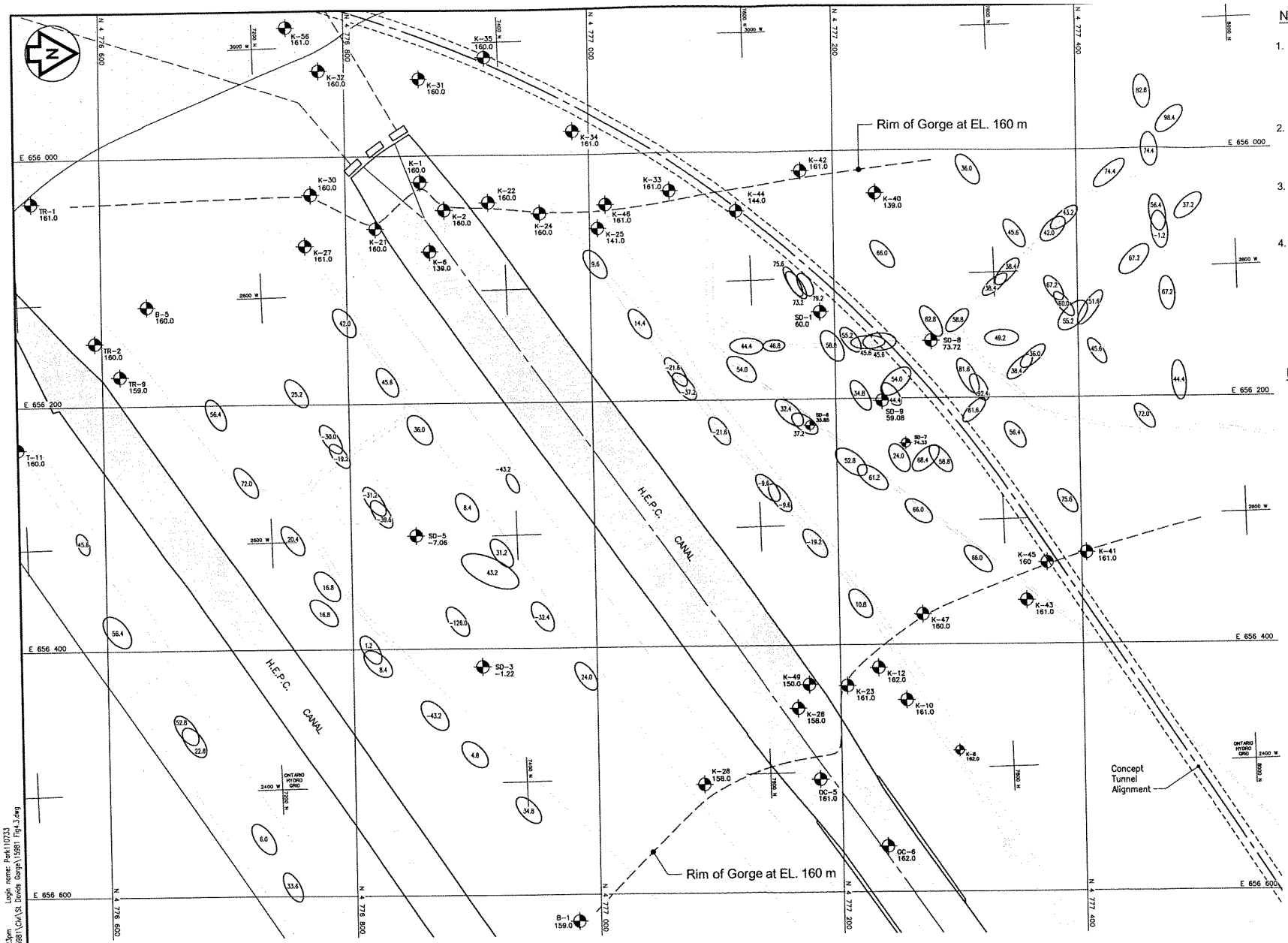
Mar 21 , 2005 4:55pm Login name: MHughes
Drawing Name: R:\15981\Civil\15981 Fig4.3.dwg

Figure 4.3

Ontario Power Generation

Niagara Tunnel Facility Project

Buried St. Davids Gorge - Baseline Elevations for Bottom of Gorge



Notes

1. This drawing shall be read in conjunction with all relevant Concept Drawings and Documents for this Project and Ontario Power Generation drawings for the existing works. Details of existing canals and services are not shown, for clarity.
2. All coordinates and elevations are in metres. Vertical Datum: GSC (83) 5th. Edition Major horizontal datum: NAD83 Minor horizontal datum: OPG Local Datum
3. Arrangement shown are is for a D=12.65 m (nominal) inside diameter tunnel and is for reference only, or to convey the concept of the work.
4. Refer to GBR. Section 4.4.4 for details on top of bedrock baseline assumptions.

Legend

56.4 — Baseline bedrock elevations (metres) based on Seismic interpretation

K-41 161.0 — Borehole location and baseline bedrock elevation (metres)

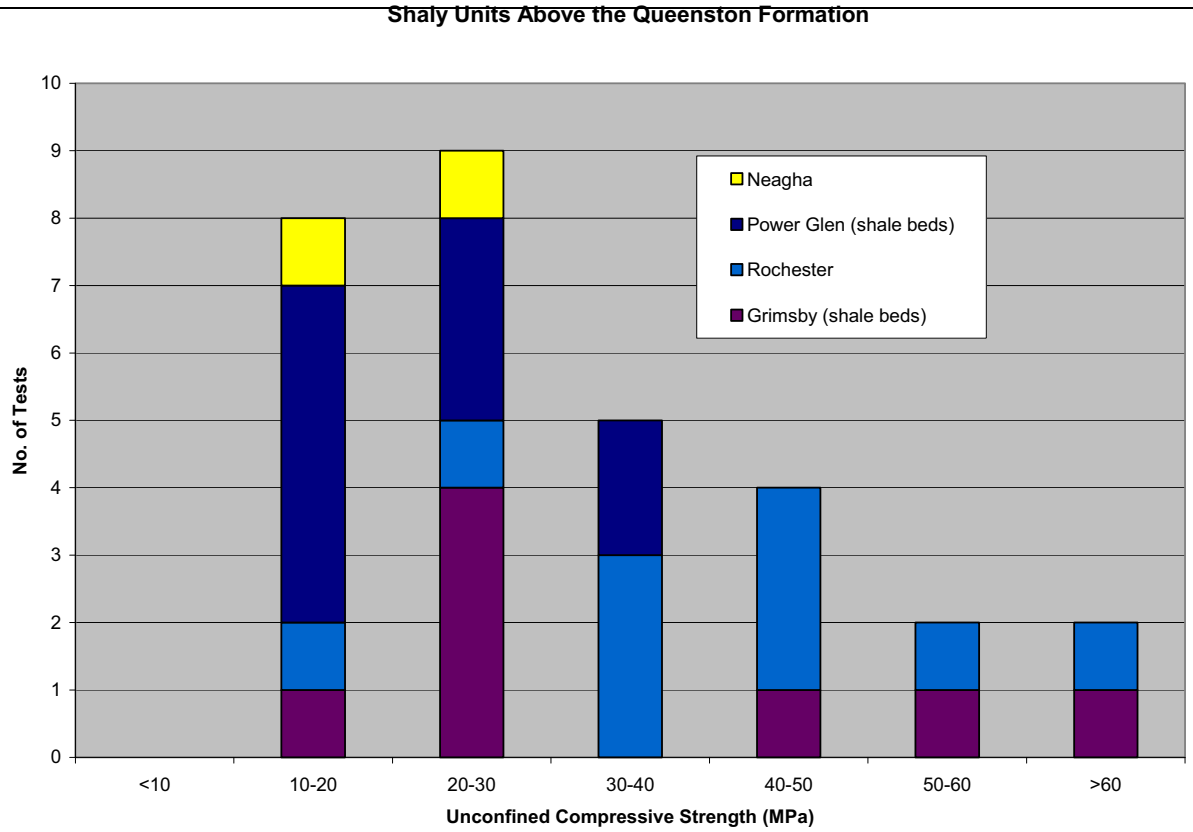
Figure 4.3

Ontario Power Generation

Niagara Tunnel Facility Project

Buried St. Davids Gorge - Baseline Elevations for Bottom of Gorge

Aug 11, 2005, 9:23pm Login name: Park110733
Drawing Name: R:\15981\Civil\St Davids Gorge\15981 Fig4.3.dwg



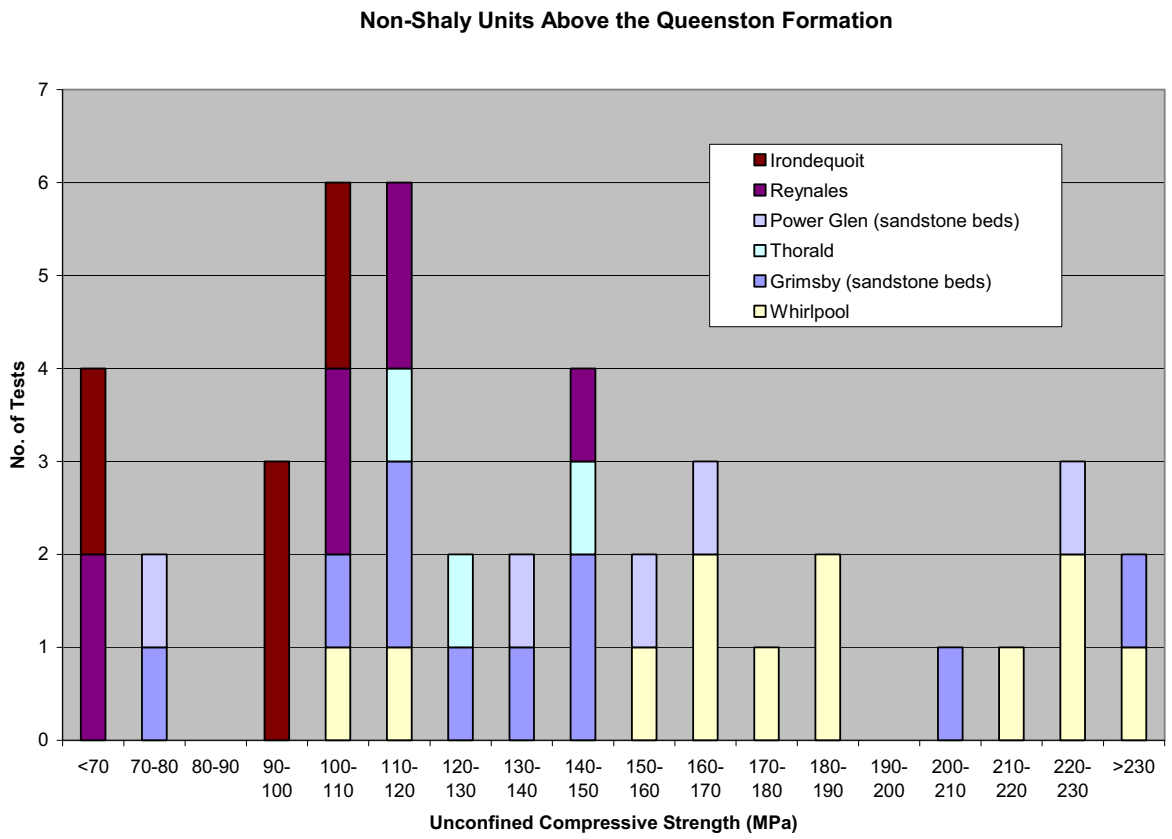
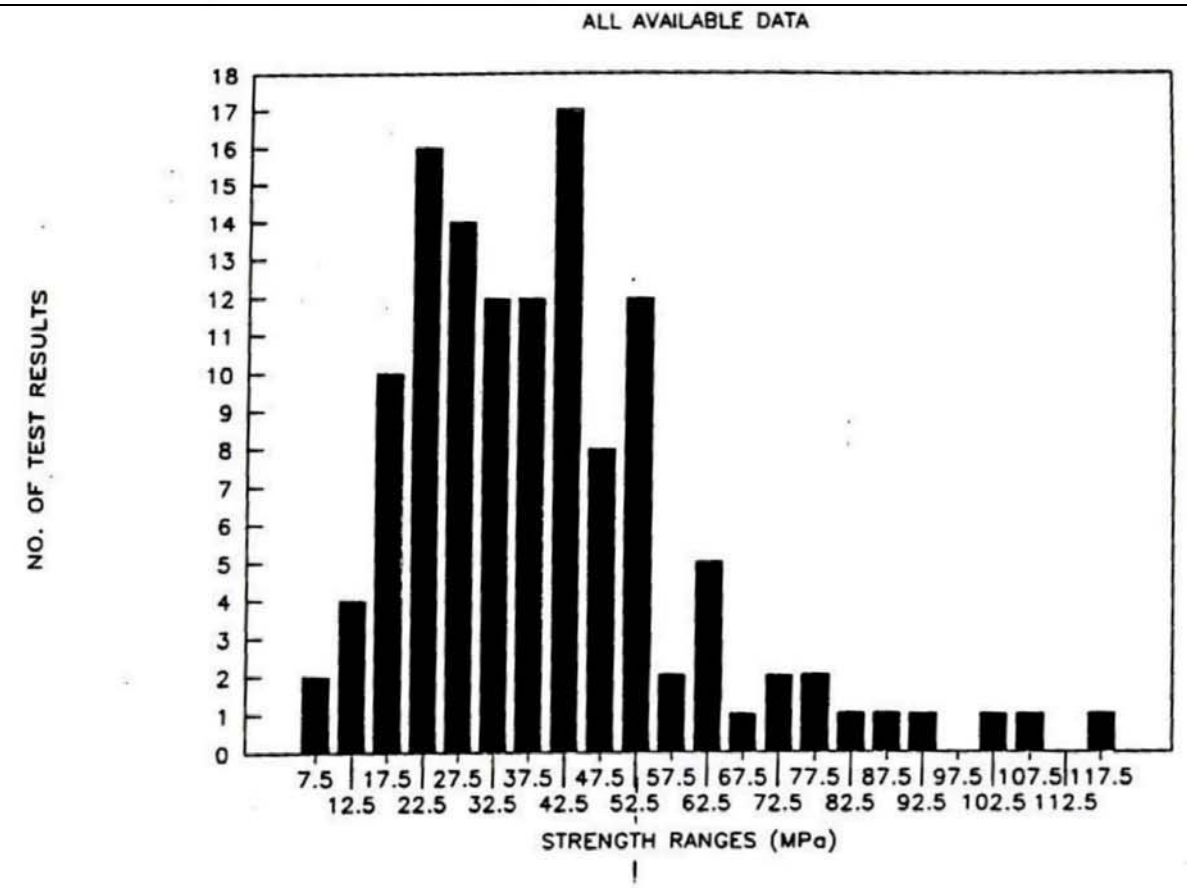


Figure 6.1

Ontario Power Generation

Niagara Tunnel Facility Project

Uniaxial Compressive Strengths of Rocks Above the Queenston



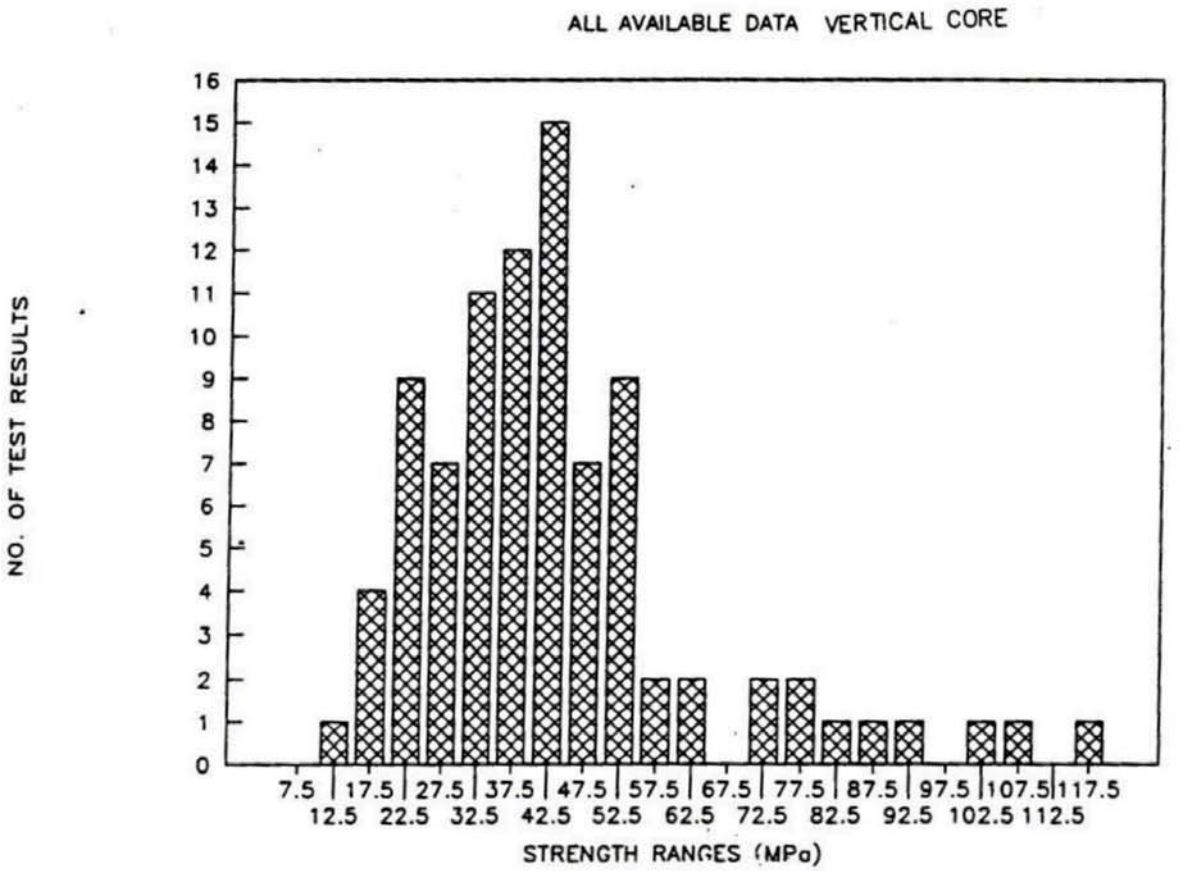
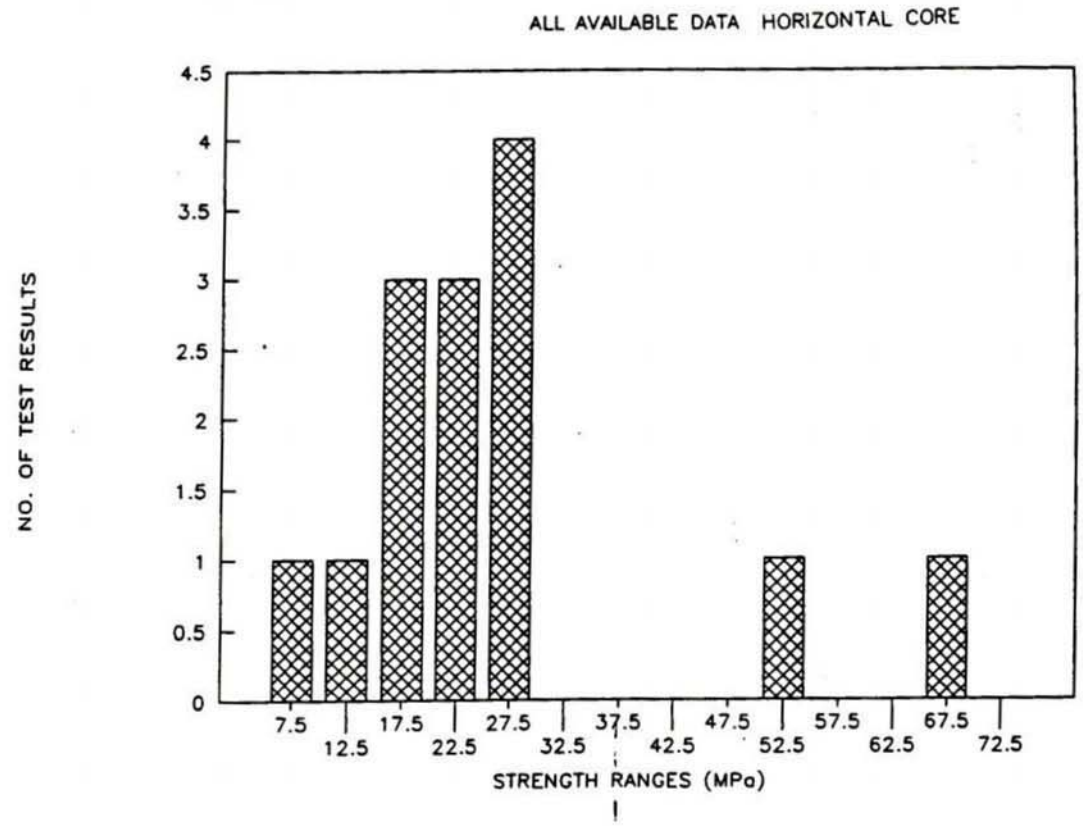


Figure 6.2

Ontario Power Generation

Niagara Tunnel Facility Project

Queenston Uniaxial Strength – All Data



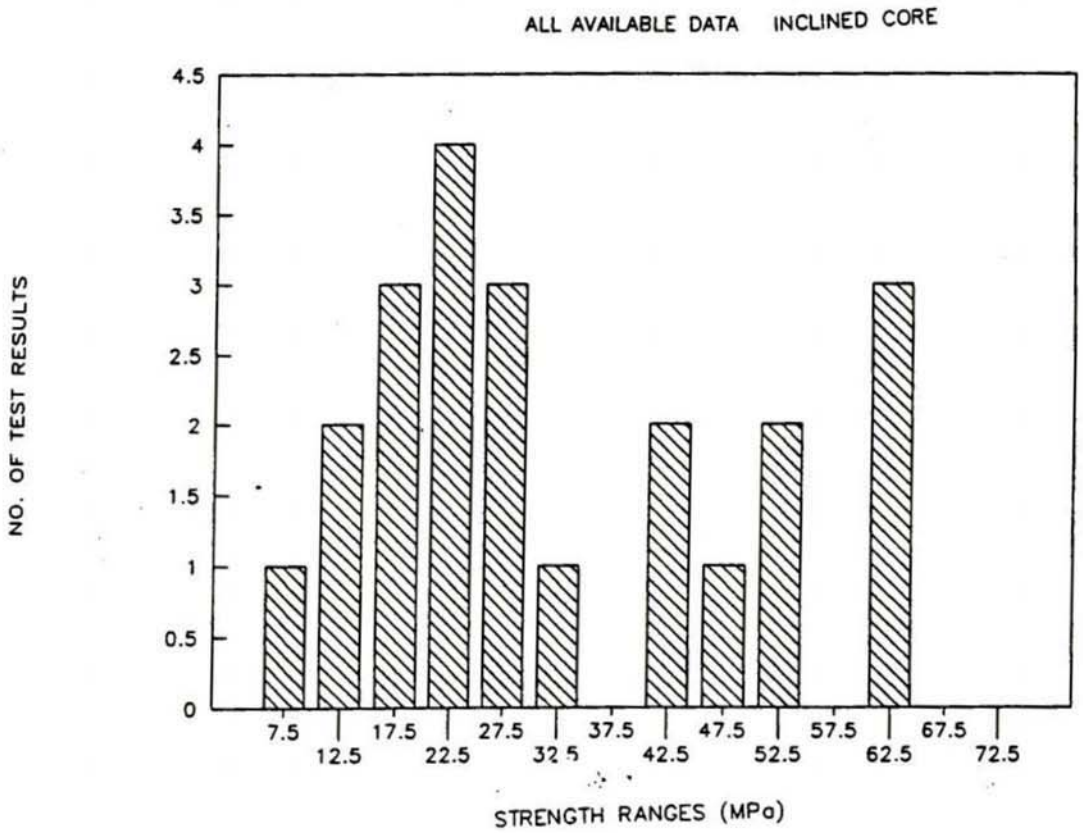
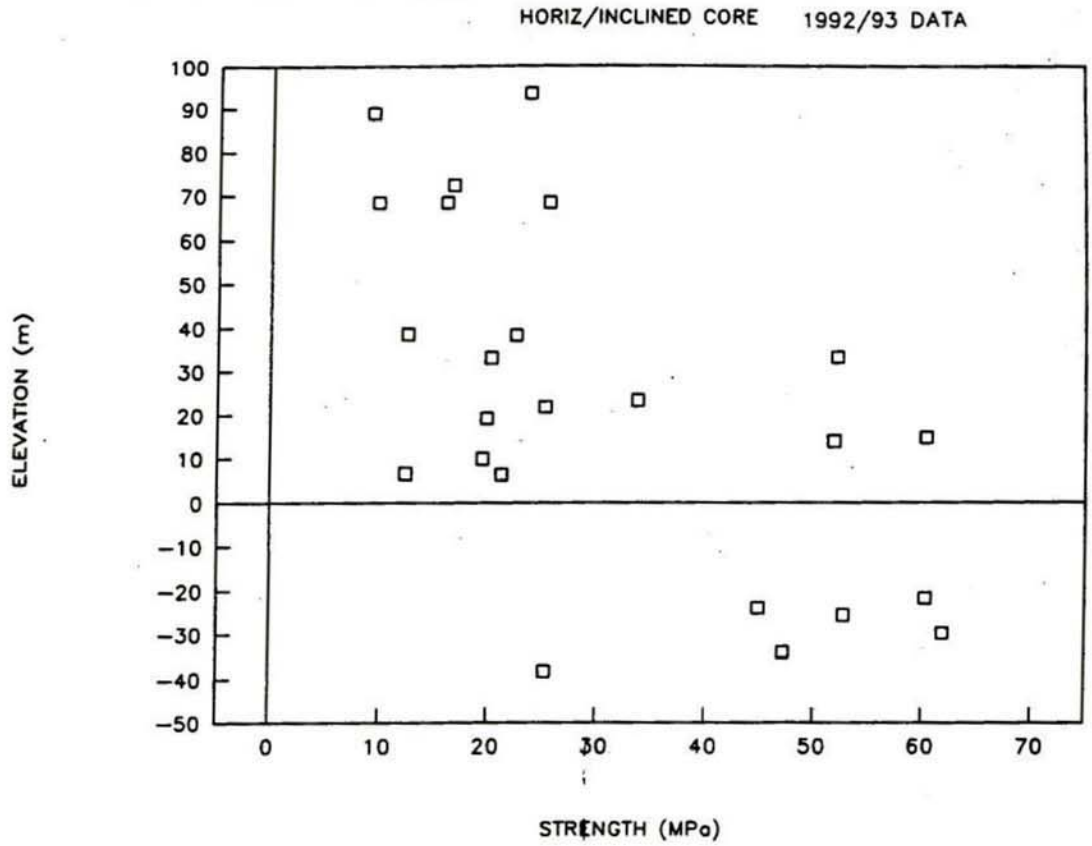


Figure 6.3

Ontario Power Generation

Niagara Tunnel Facility Project

Queenston Uniaxial Strength – All Data for Horizontal and Inclined Core



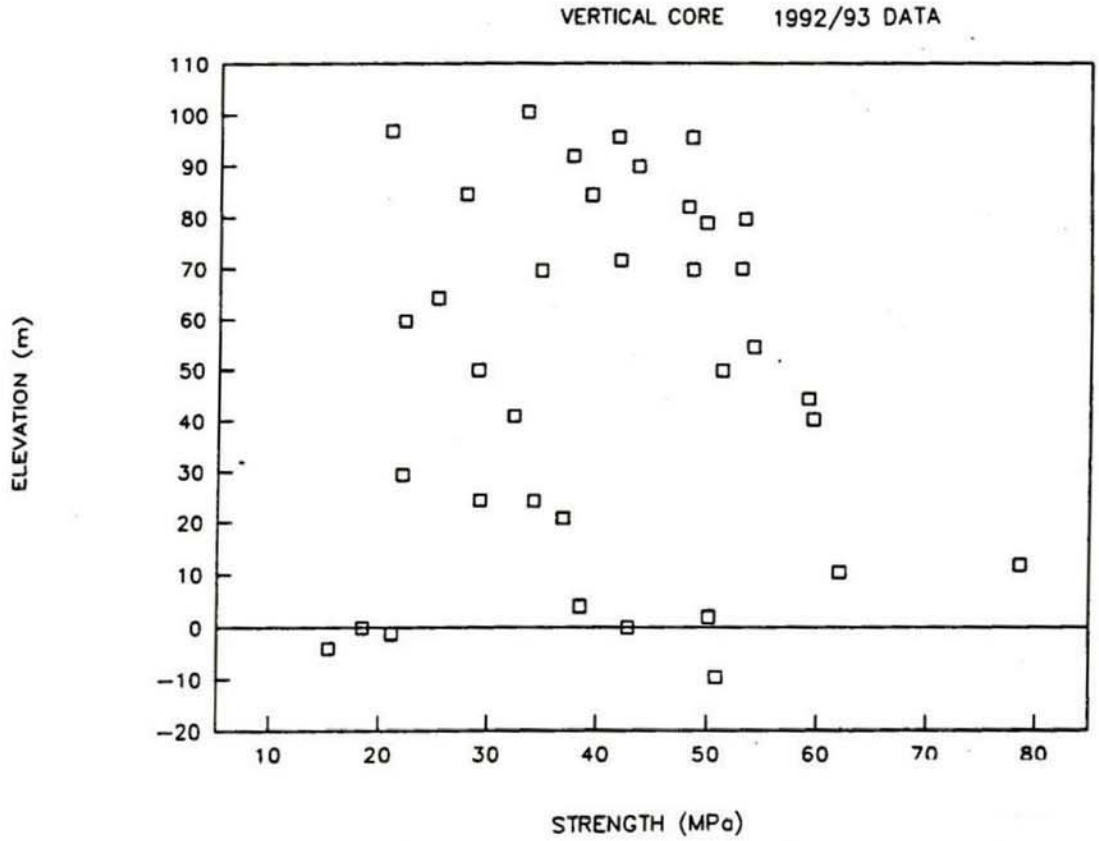
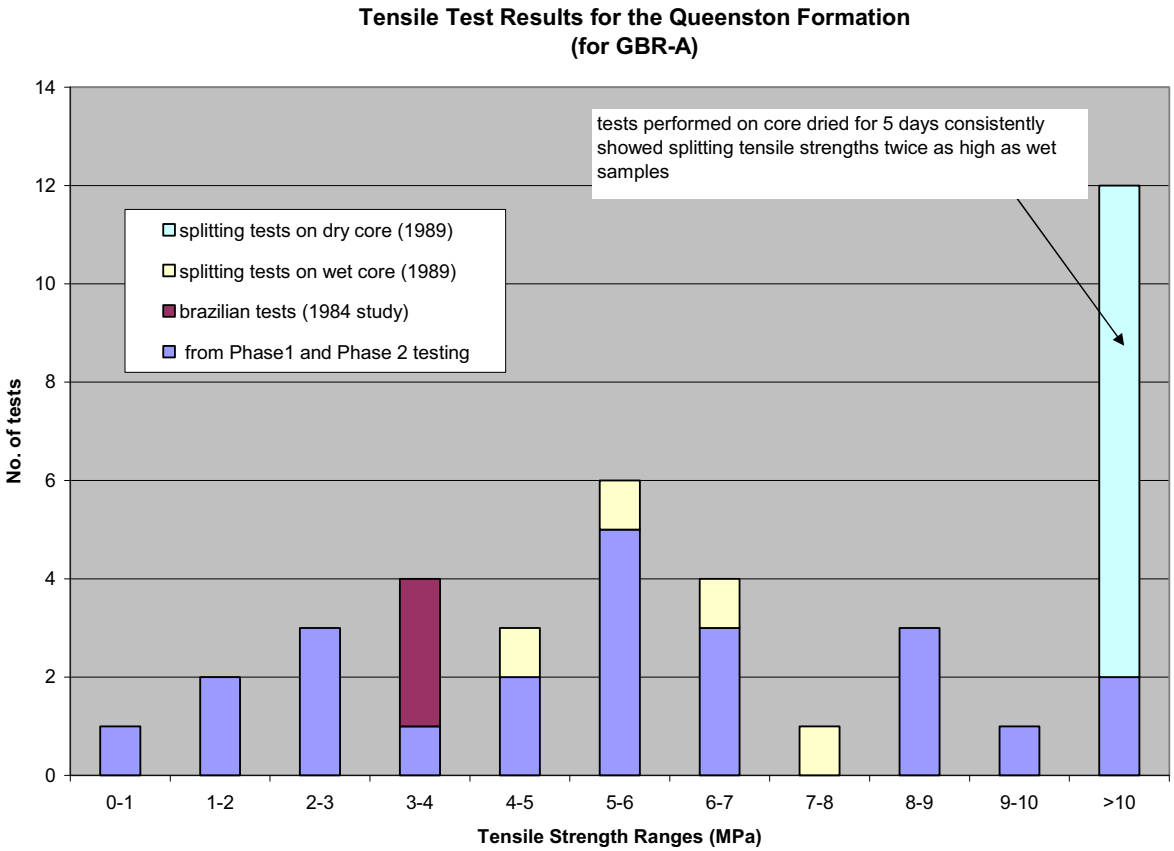


Figure 6.4

Ontario Power Generation

Niagara Tunnel Facility Project

Queenston Uniaxial Strength – by Core Orientation



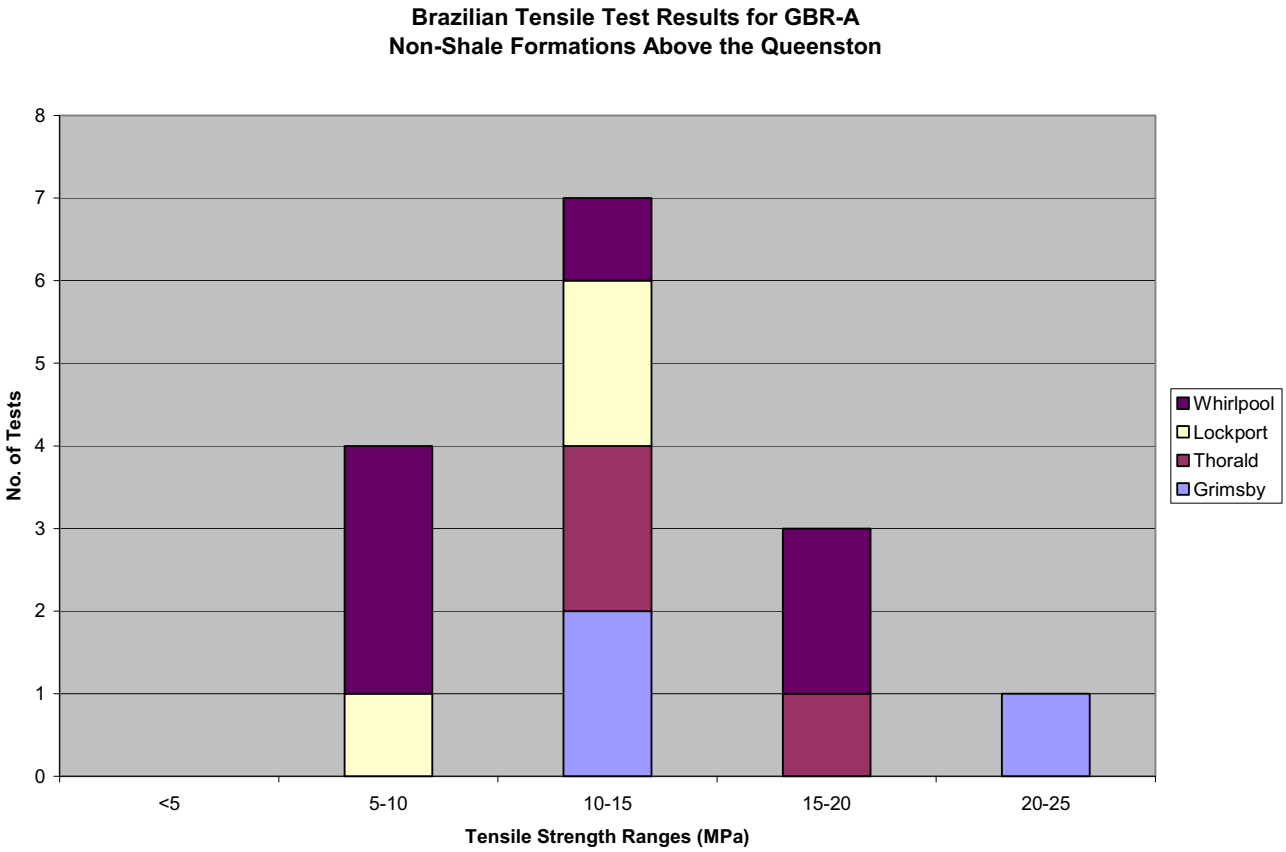
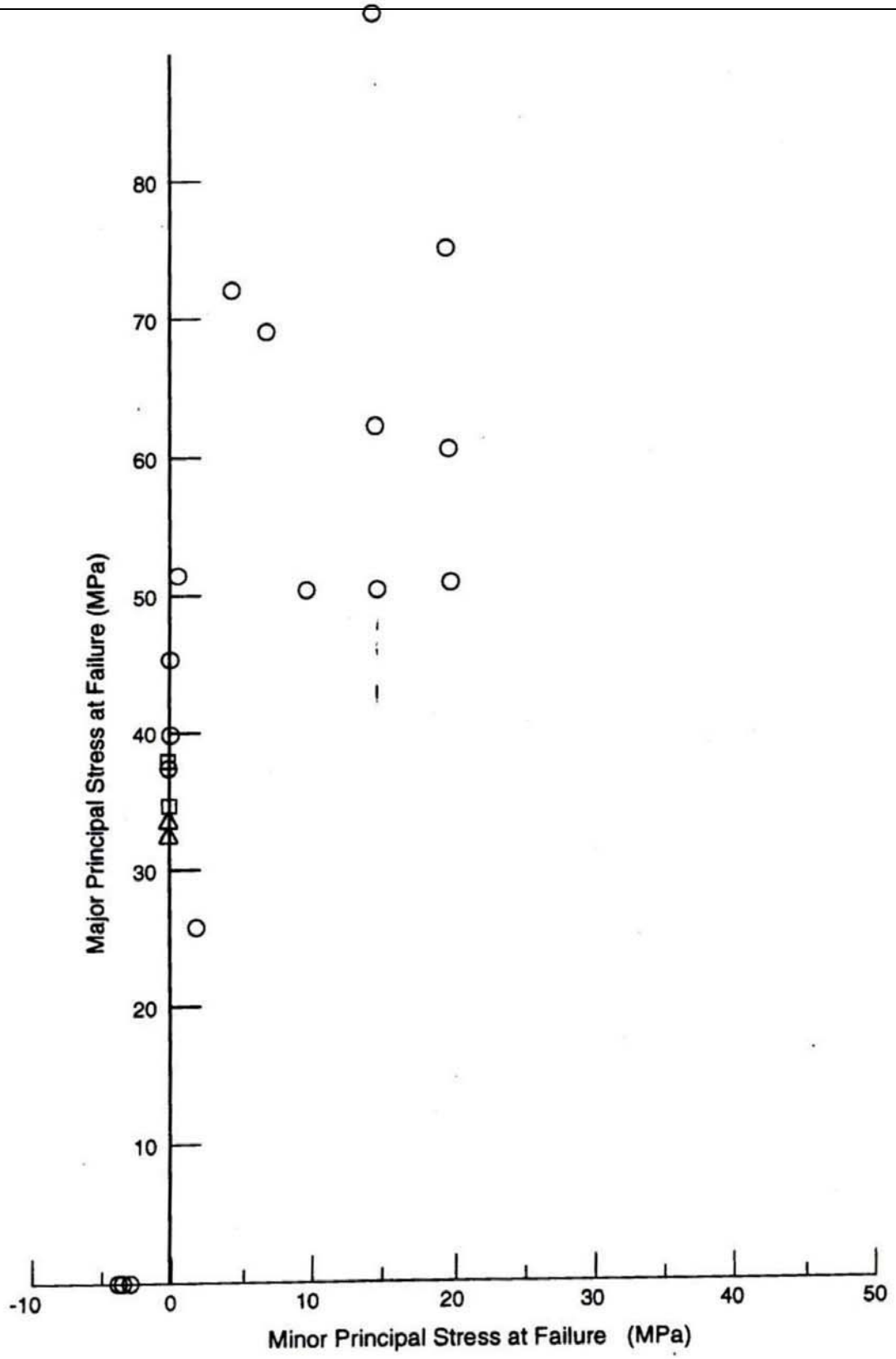


Figure 6.5

Ontario Power Generation

Niagara Tunnel Facility Project

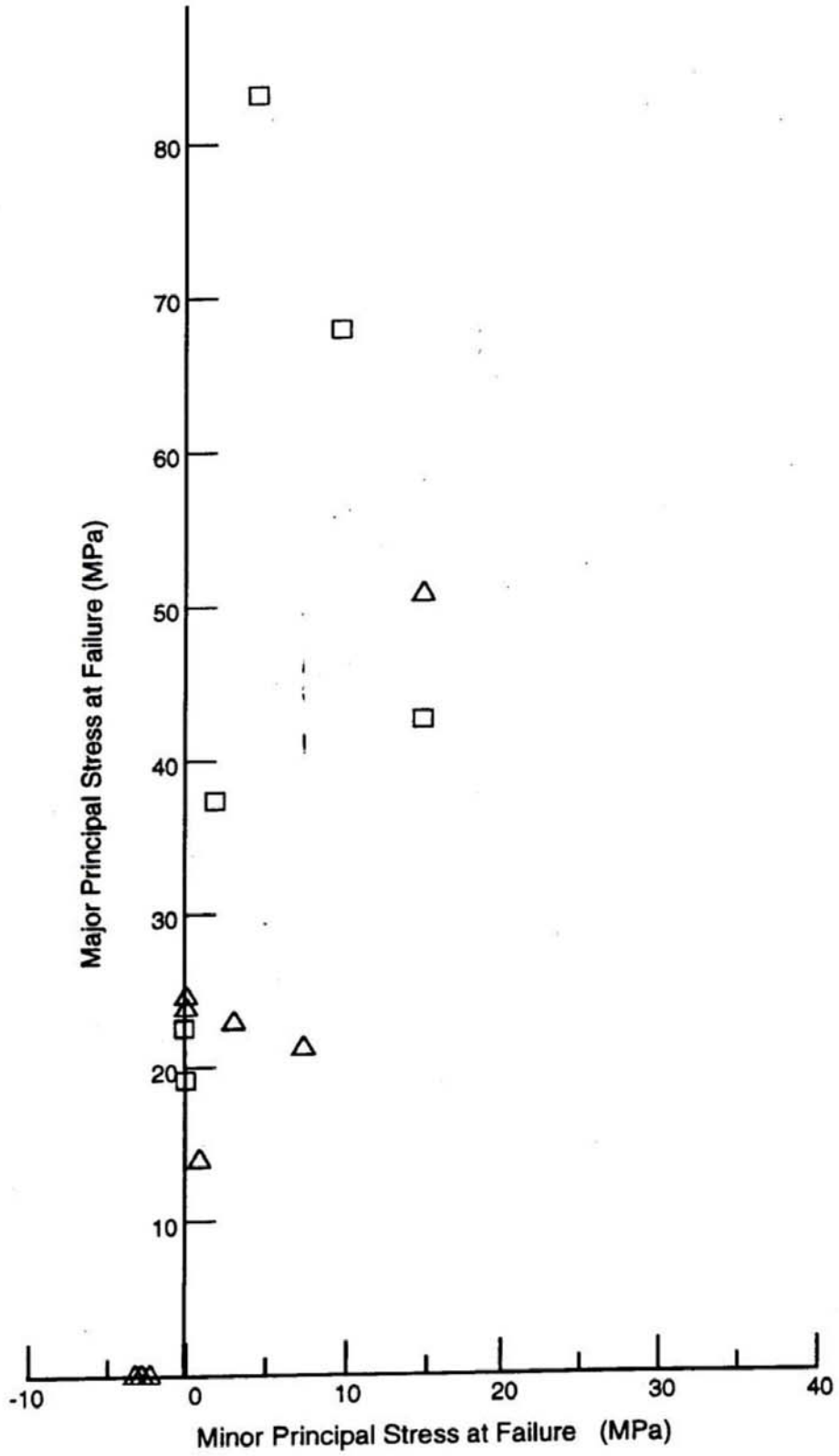
Tensile Strengths for GBR-A



○ NF-4A
△ NF-28
□ NF-32

Note:
Definition Phase I
Test Results only

Figure 6.6
Ontario Power Generation
Niagara Tunnel Facility Project
Compressive Strength of Queenston Shale – Diversion Tunnels



△ NF-37

□ NF-35
(Samples Partially
Dried Prior to Testing)

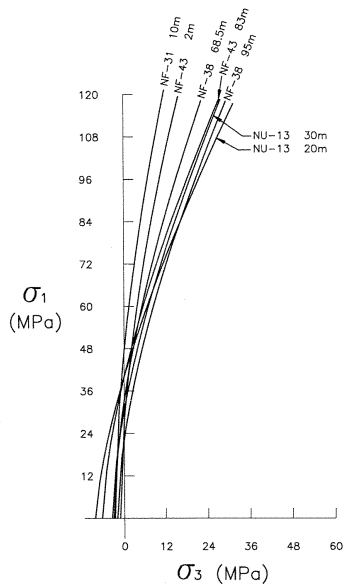
Note:
Definition Phase I
Test Results only

Figure 6.7

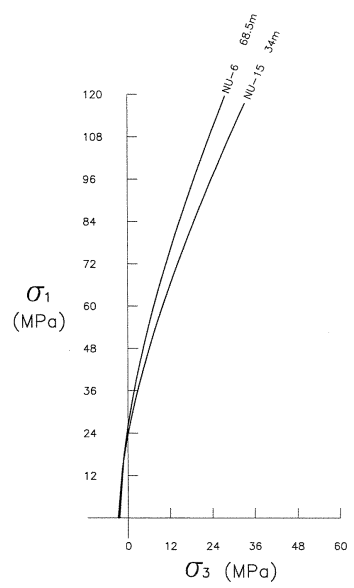
Ontario Power Generation

Niagara Tunnel Facility Project

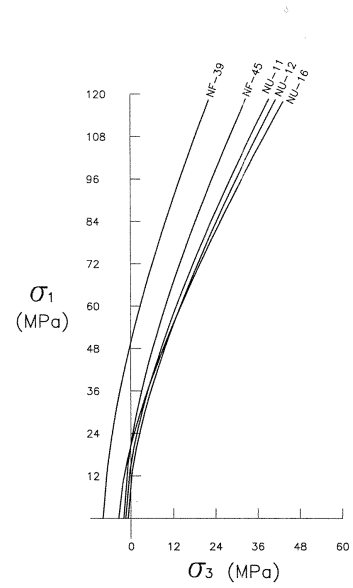
Compressive Strength of Queenston Shale – Powerhouse



VERTICAL SAMPLES



HORIZONTAL SAMPLES



INCLINED SAMPLES

BOREHOLE	ELEVATION	m*	σc (MPa)
NF-31	10m	17.63	47.22
NF-43	2m	23.60	27.15
NF-38	68.5m	11.00	33.23
NF-43	83m	6.21	39.87
NU-13	30m	8.67	30.47
NF-38	95m	11.31	22.37
NU-13	20m	4.64	39.95

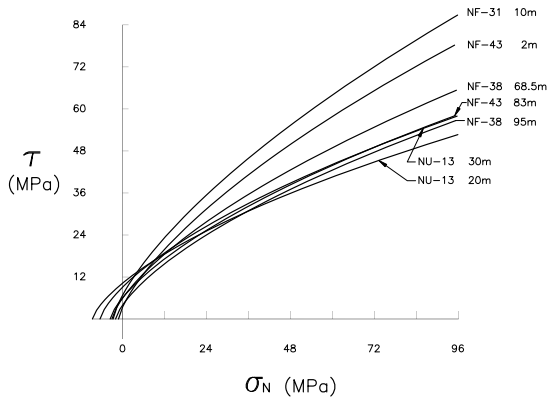
BOREHOLE	ELEVATION	m*	σc (MPa)
NU-6	68.5m	10.79	26.07
NU-15	34m	8.33	23.63

* HOEK-BROWN FAILURE CRITERION

BOREHOLE	ELEVATION	INCLINATION	m*	σc (MPa)
NF-39	-13m	53°	6.16	47.71
NF-45	-23m	53°	10.14	20.89
NU-11	92m	49°	10.08	15.27
NU-12	83m	17.5°	13.36	10.62
NU-16	38m	30°	5.76	20.53

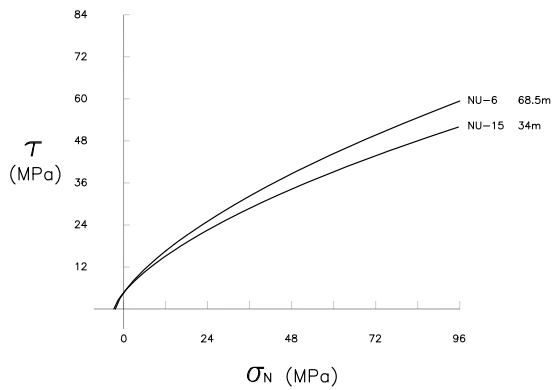
Figure 6.8
Ontario Power Generation
Niagara Tunnel Facility Project
Summary of Rock Strength Testing 1

\15981\Civil\V1GI6-8.DWG, Layout1, 12/08/2005 2:32:19 PM, Park110733, PostScript Level 2 [EPS].pc3, 1:1.34



VERTICAL SAMPLES

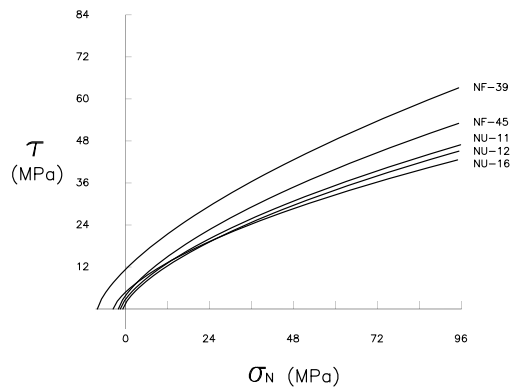
BOREHOLE	ELEVATION	m*	σc (MPa)
NF-31	10m	17.63	47.22
NF-43	2m	23.60	27.15
NF-38	68.5m	11.00	33.23
NF-43	83m	6.21	39.87
NU-13	30m	8.67	30.47
NF-38	95m	11.31	22.37
NU-13	20m	4.64	39.95



HORIZONTAL SAMPLES

BOREHOLE	ELEVATION	m*	σc (MPa)
NU-6	68.5m	10.79	26.07
NU-15	34m	8.33	23.63

* HOEK-BROWN FAILURE CRITERION



INCLINED SAMPLES

BOREHOLE	ELEVATION	INCLINATION	m*	σc (MPa)
NF-39	-13m	53°	6.16	47.71
NF-45	-23m	53°	10.14	20.89
NU-11	92m	49°	10.08	15.27
NU-12	83m	17.5°	13.36	10.62
NU-16	38m	30°	5.76	20.53

Figure 6.9
Ontario Power Generation
Niagara Tunnel Facility Project
Summary of Rock Strength Testing 2

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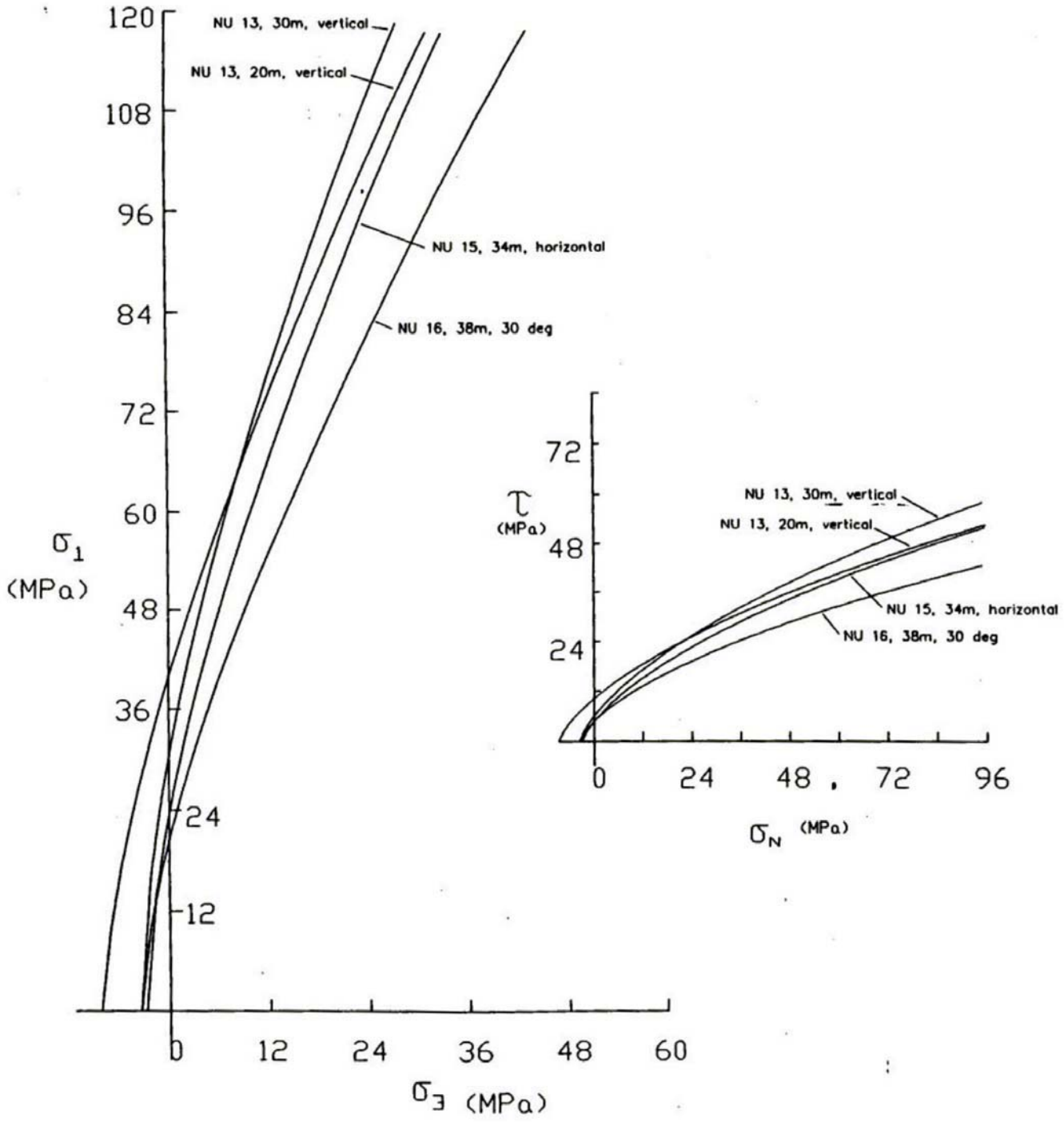


Figure 6.10
Ontario Power Generation
Niagara Tunnel Facility Project
Strength Envelopes – Trial Enlargement Area

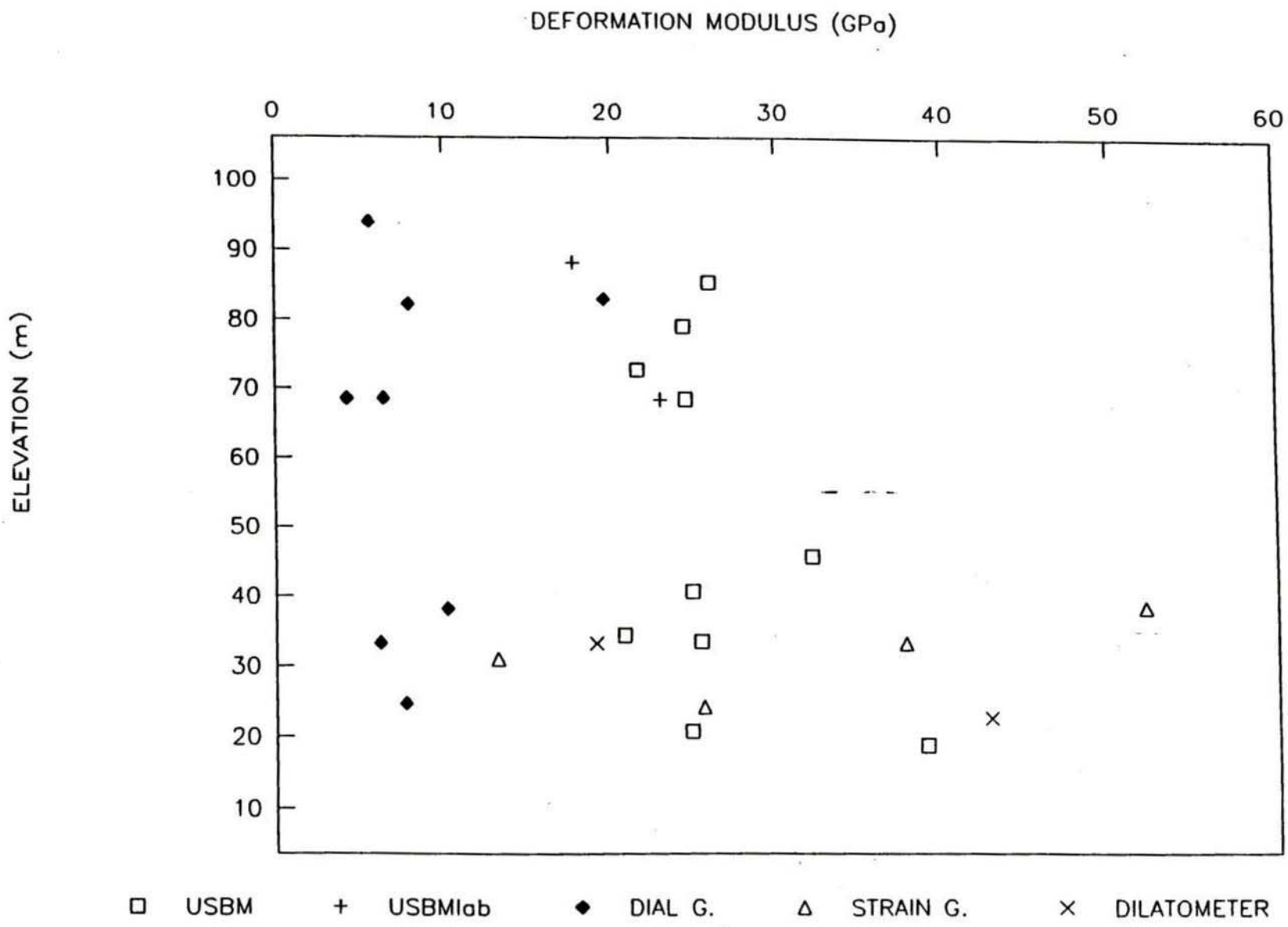


Figure 6.11
Ontario Power Generation
Niagara Tunnel Facility Project
Deformation Moduli Values – All Data

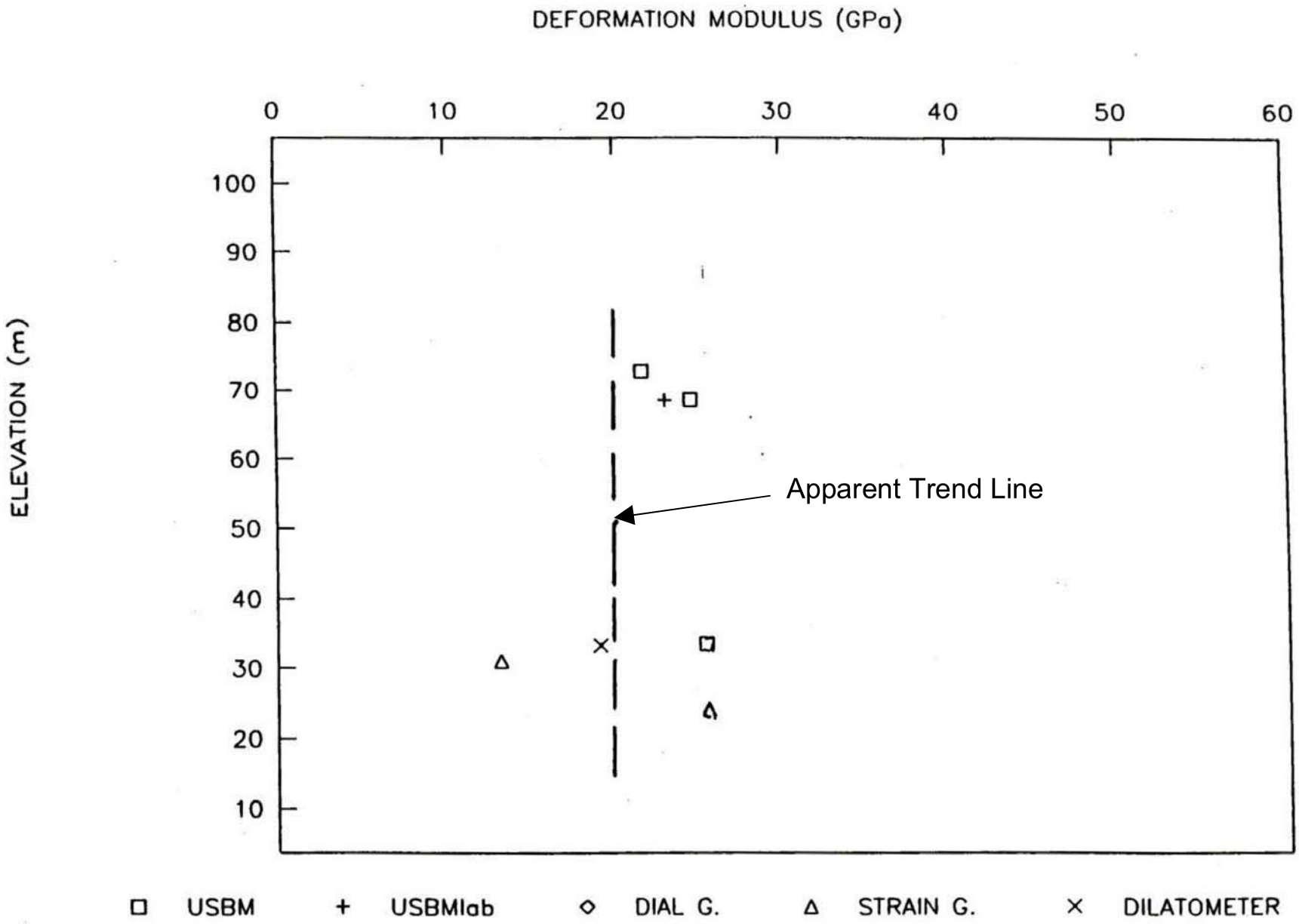


Figure 6.12
Ontario Power Generation
Niagara Tunnel Facility Project
Deformation Moduli Values – Vertical Plane

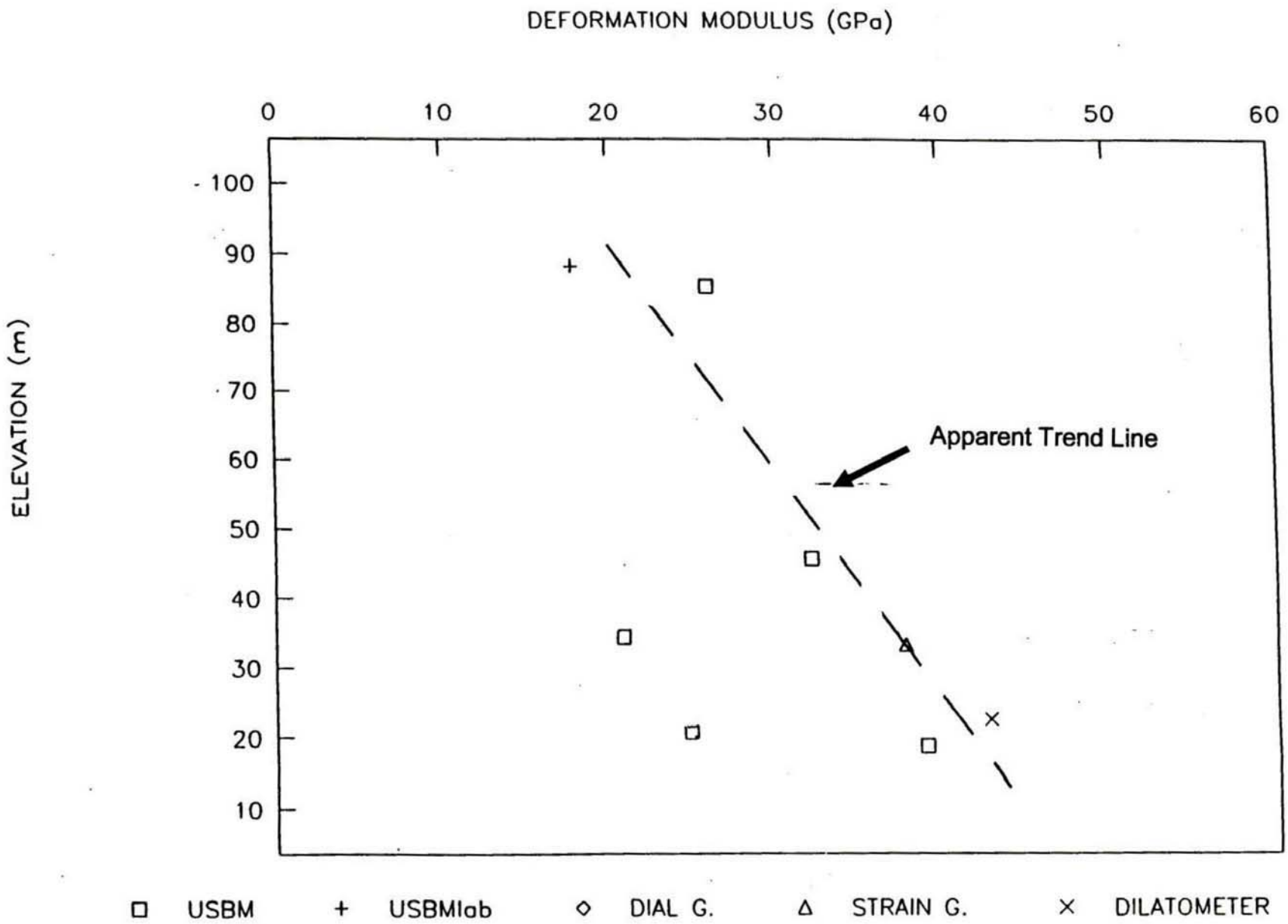


Figure 6.13
Ontario Power Generation
Niagara Tunnel Facility Project
Deformation Moduli Values – Horizontal Plane

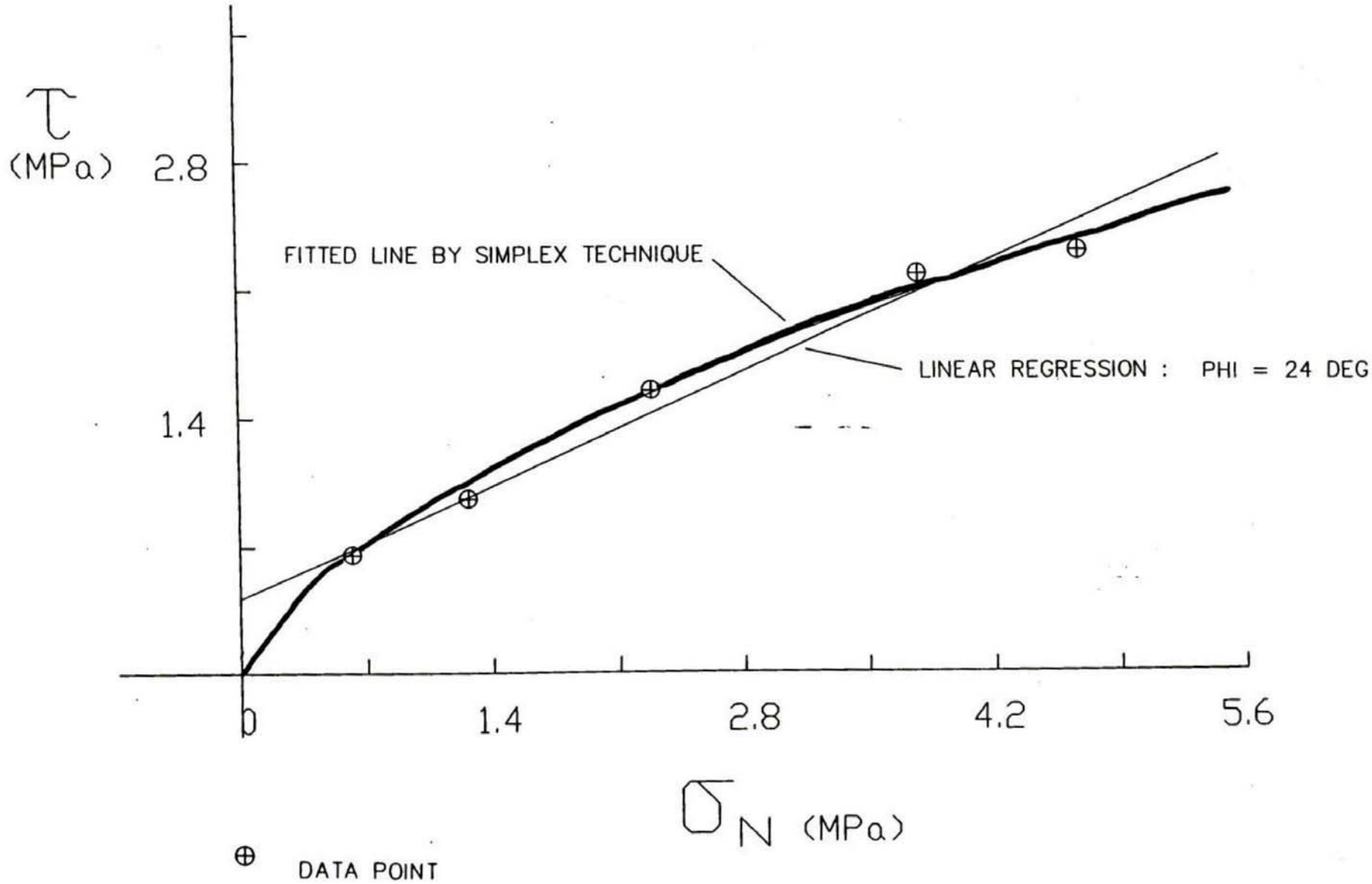


Figure 6.14
Ontario Power Generation
Niagara Tunnel Facility Project
Direct Shear – Bedding Plane BP8

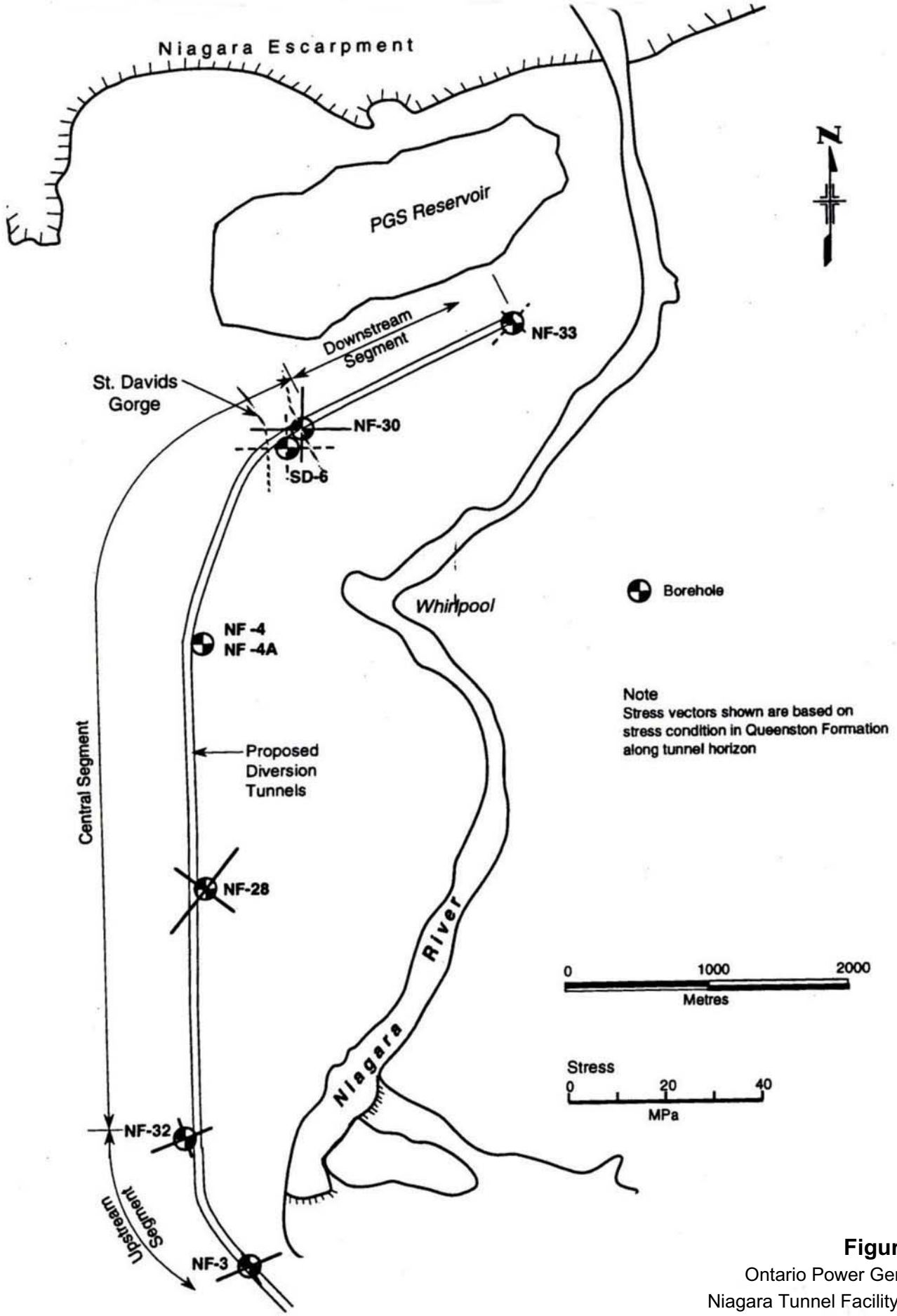
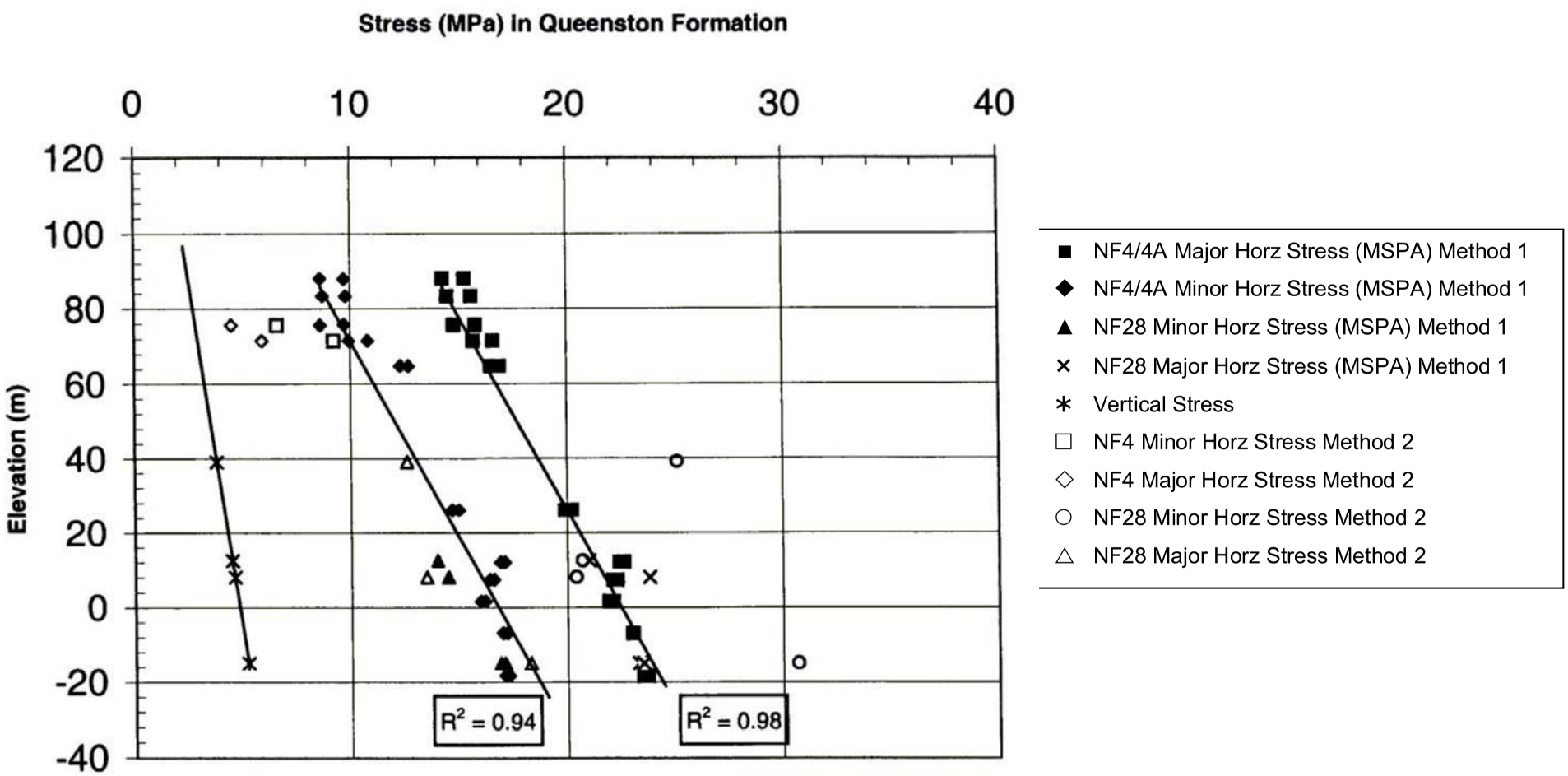


Figure 6.15
Ontario Power Generation
Niagara Tunnel Facility Project
Stress Orientations in Queenston Formation



Method of Analysis:

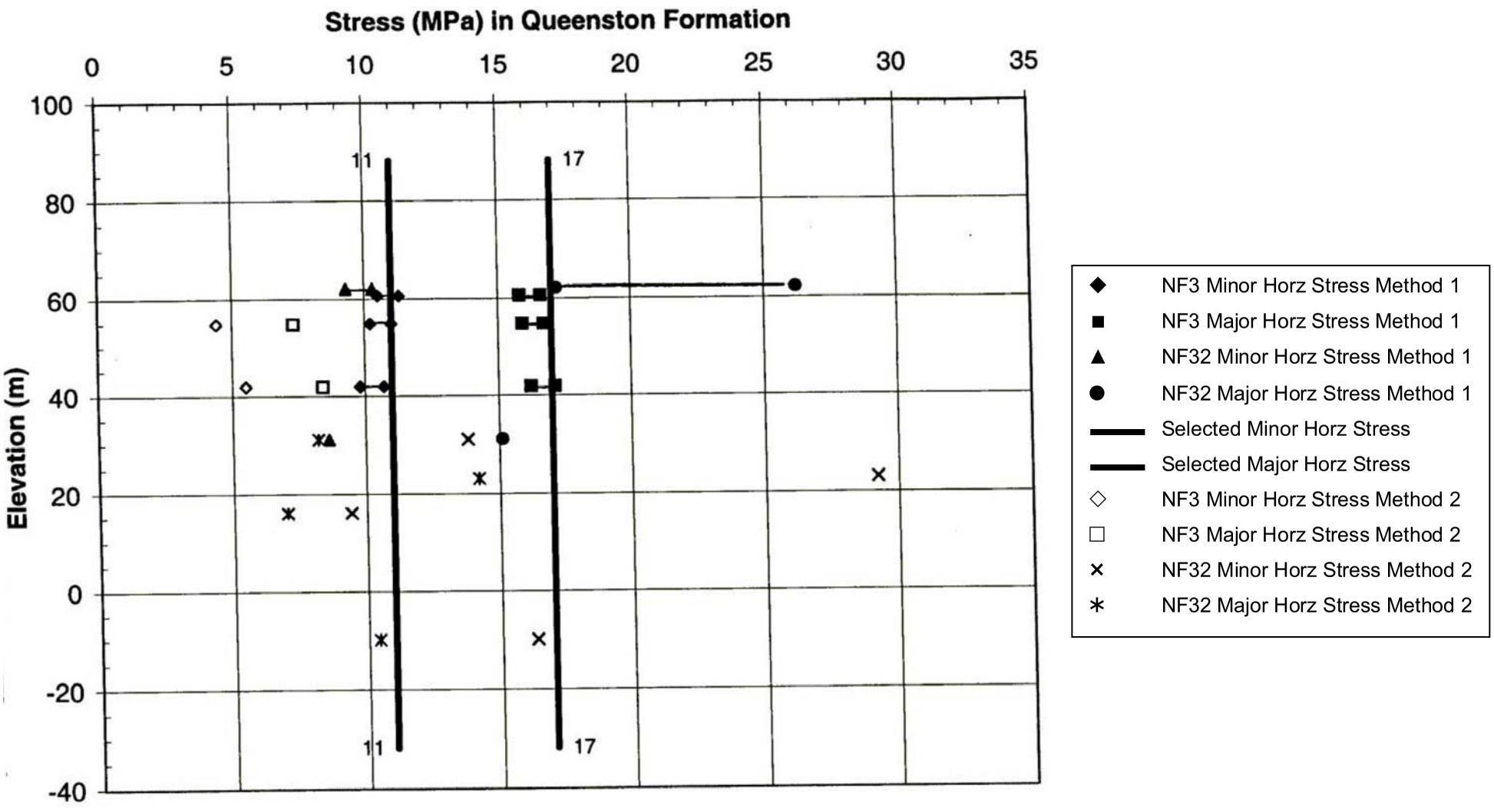
1. Modified Stress Path Analysis (MSPA) (Hefney and Lo, 1992)
2. Conventional stress analysis on vertical fractures only.

Figure 6.16

Ontario Power Generation

Niagara Tunnel Facility Project

Sta 2+000 to 7+600



Method of Analysis:

1. Modified Stress Path Analysis (MSPA) (Hefney and Lo, 1992)
2. Conventional stress analysis on vertical fractures only.

Figure 6.17

Ontario Power Generation

Niagara Tunnel Facility Project

Sta 7+600 to ~10+000

Appendix 5.7(a)

Appendix 5.7(a) - Dispute Notice

INTENT TO RESOLVE DISPUTE NOTICE

To: •

Contract: Design/build Agreement dated •, 2005 between Ontario Power Generation Inc. and Strabag AG (the "**Contractor**") (the "**Agreement**")

Dispute Notice No. •

Date: •

Defined terms used in this Notice have the same meanings given to those terms in the Agreement. In accordance with Section 5.7(a) of the Agreement, the undersigned hereby gives notice to the addressee that the undersigned wishes to have the Dispute related to the following matter resolved in accordance with Section 5.7 of the Agreement:

• ***[Describe disputed matter]***

■

By: _____

Name:

Title:

Appendix 6.2(b)

Appendix 6.2(b) - Excusable Delay Notice

EXCUSABLE DELAY NOTICE

To: •

Contract: Design/build Agreement dated •, 2005 between Ontario Power Generation Inc. and Strabag AG (the "**Contractor**") (the "**Agreement**")

Excusable Delay Notice No. •

Date: •

Defined terms used in this Notice have the same meanings given to those terms in the Agreement. Under Section 6.2(b) of the Agreement, the undersigned hereby gives notice to the addressee that the undersigned is seeking relief of certain of its obligations under the Agreement because of an excusable delay as described below:

Date of Event

Nature of Delay

Impact of Delay on Agreement

Anticipated Period of Delay

Anticipated Impact on Contract Price

Anticipated Impact on Contract Schedule

Expected Actions to be taken to mitigate impact

STRABAG AG

By: _____

Name:

Title:

Appendix 7.1

Appendix 7.1 - INTENTIONALLY DELETED

Appendix 7.2

Appendix 7.2 - Measurement for Payment Schedule

1. MEASUREMENT AND PAYMENT

1.1 Mobilization and Demobilization

1. Payment for mobilization and demobilization will be made at the price for 'Mobilization and Demobilization' as listed in the Schedule of Values.

2. This item will include all requirements for Mobilization including preparatory work within and outside the work areas, site preparation, supply, installation and maintenance of temporary facilities including project signs, site and roadway maintenance, water treatment facilities, erosion and sediment control; all costs related to establishing construction offices for the Contractor, its subcontractors and the Owner, communication, environmental protection, temporary utilities which may be required; temporary controls, site security and fencing as necessary; transportation to and from the site of construction equipment as required for the performance of the Work, and mandatory training under OPG's Work Protection Code and assuming the groundwater monitoring contract to be performed by Jagger Hims Limited, including contract administration. This item will also include groundwater monitoring per EA Conditions 4.1 and 4.2 for the duration of this Agreement.

   This item will also include all requirements for Demobilization from site.

1.1.1. Payment Terms

1. 80% for Mobilization. The first progress payment will be the lesser of 80% of the Contractor's submitted price for 'Mobilization and Demobilization' or $10,000,000.00, less holdbacks. Any net remaining payment for 80% of the Contractor's submitted price for 'Mobilization and Demobilization' will be made in equal monthly amounts over the duration of the contract up to the Final Completion Date.

2. 20% for Demobilization. Application for this may be made on or after the Final Completion Date.

1.2 Maintenance Bond

1. Payment for maintenance bond will be made at the price for "Maintenance Bond" as listed in the Schedule of Values.

1.3 Performance LC(s)

1. Payment for Performance LC(s) will be made at the price for "Performance LC(s)" as listed in the Schedule of Values.

1.4 [Intentionally deleted]

1.5 Design

1. All Work for Design including Design Basis, Design, Specifications and Drawings will be paid for according to the actual work performed based on values as listed in the Schedule of Values.

1.6 Accelerating Wall, Intake Channel and Approach Wall

1. All Work for the Accelerating Wall, Intake Channel and Approach Wall will be paid for according to the actual work performed each month based on values as listed in the Schedule of Values.

1.7 Diversion Outlet Canal

1. All Work for the Diversion Outlet Canal will be paid for according to the actual work performed each month based on values as listed in the Schedule of Values.

1.8 Dewatering System Shafts

1. All Work for the Dewatering System Shafts will be paid for according to the actual work performed each month based on values as listed in the Schedule of Values.

1.9 Intake Structure

1. All Work for the Intake Structure will be paid for according to the actual work performed each month based on values as listed in the Schedule of Values.

1.10 Intake Gates

1. All Work for the Intake Gates will be paid for according to the following payment terms based on values as listed in the Schedule of Values.

1.10.1. Payment Terms

1. 50% after delivery of Intake Gates to site
2. 20% after installation of Intake Gates
3. 20% after successful testing and commissioning
4. 10% after removal of gates to storage.

1.11 Outlet Structure

1. All Work for the Outlet Structure will be paid for according to the actual work performed each month based on values as shown in the Schedule of Values.

1.12 Outlet Structure Gate and Hoist

1. All Work for the Outlet Gate and Hoist will be paid for according to the following payment terms based on values as listed in the Schedule of Values.

1.12.1. Payment Terms

1. 50% after delivery of Outlet Gate and Hoist to site
2. 30% after installation of the Outlet Gate and Hoist
3. 20% after successful testing and commissioning.

1.13 Diversion Tunnel

1. All Work for the Tunnel will be paid for according to the actual length of tunnel completed each month based on values as listed in the Schedule of Values, subject to Section 7.6.

1.14 Tunnel Boring Machine

1. All Work for the Tunnel Boring Machine will be paid for by OPG according to the following payment terms based on values as listed in the Schedule of Values.

1.14.1. Payment Terms

1. 20% on the date on which the subcontract with the manufacturer of the TBM is executed by all Persons who are parties to such subcontract and a copy of such fully executed subcontract, unpriced, is delivered to OPG
2. 20% on the date on which the TBM is 50% completed (the "TBM Milestone") and OPG has confirmed that the TBM Milestone has been achieved. The 50% completion of the TBM is determined by the status of the main components of the TBM as described below:

    - Ring gear: forgoing received for machining
    - Cutterhead centre plate: fit and welded, stress relieved, ready for machining
    - Cutterhead sections: fit and welded, ready for stress relief
    - Main bearing and spare bearing: Purchase order in place
    - Motors: Puchase order in place
    - Main beam: main components welded
    - Gripper cylinders: raw material received by subcontractor
    - VFD modules received for assembly
    - Ring gear: forging received
    - Design and fabrication drawings complete

- Main seals ordered
- All major steel plate and components: ordered

3. 20% after the date on which the shop testing for the TBM has been completed, a factory test certificate for the TBM has been delivered to OPG and the Contractor and all documentation and other acts necessary to transfer the Contractor's right, title and interest in the TBM to OPG have been completed

4. 20% after delivery to Site of the TBM, all ancillary components of the TBM and all backup plant and equipment relating to the TBM

5. 20% after the TBM has successfully bored and lined 1 km of tunnel in accordance with the Design-Build Agreement and provision of an acceptance certificate signed by the Contractor and the TBM manufacturer stating that the TBM and backup plant and equipment have satisfied the performance requirements.

1.15 Flow Verification Test

1. All Work for the Flow Verification Test will be paid for after successful execution of the test based on values as shown in the Schedule of Values.

1.16 Demolition of Dewatering Structure (Optional)

1. All Work for demolition and disposal of the dewatering structure in the PGS canal and relocation of the existing waterline will be paid for according to the actual work performed each month based on values as listed in the Schedule of Values.

Appendix 7.3(a)

Appendix 7.3(a) - Approval Form for Applications for Payment

APPROVAL of APPLICATION for PAYMENT

To: **[Insert Contractor name and address]** Attn: ■ Fax: ■	Contract: Design/Build Agreement between Ontario Power Generation Inc. and Strabag AG (the "**Contractor**") dated ■, 2005 (the "**Agreement**") Application for Payment No.: ■ appended hereto as Appendix A Date: ■

Defined terms used in this Notice have the same meanings given to those terms in the Agreement.

Please be advised that the subject Application for Payment has been reviewed and is hereby:

(a) **Approved [ ]**

Please proceed to electronically deliver to OPG (at apmailroom@opg.com) a complete electronic copy of this Application for Payment in .PDF or .TIF format.

(b) **Rejected [ ]**

The subject Application for Payment is rejected for the following reason(s):

(a) ■

(b) ■

(c) ■

Please re-submit this Application for Payment when these deficiencies have been corrected.

ONTARIO POWER GENERATION INC.

By:_____
Name:
Title:

Appendix 7.3(b)

Appendix 7.3(b) - Retail Sales Tax Exemption

[See Attached]

Ministry of Finance

Retail Sales Tax Branch
PO Box 623
33 King Street West
Oshawa ON L1H 8H5
Tel: 905-433-6113
Toll Free: 1-888-285-7815
Fax: 905-433-5254

Ministère des Finances

Direction de la taxe de vente au détail
C.P. 623
33, rue King Ouest
Oshawa ON L1H 8H5
Tél: 905-433-6113
Sans-frais: 1-888-285-7815
Téléc: 905-433-5254

Ontario

(905) 436-4542

Ref#: 2005-0320

VP#: 5053-0739

May 27, 2005

Debbie Johnston
Manager - Taxation
Ontario Power Generation Inc.
700 University Avenue
Toronto ON M5G 1X6

Dear Ms Johnston:

Thank you for your letter dated April 1, 2005 regarding the application of Ontario retail sales tax (RST) to intake and outlet structures at the Sir Adam Beck (SAB) Complex.

This interpretation is based on the information provided and which is conveyed in the "Understanding of Facts" portion of this ruling. Please review the information for its completeness and accuracy. If it is determined that the information is incomplete or inaccurate, this interpretation will not be binding. In the event that our understanding of the facts is inaccurate or incomplete, please notify the undersigned, in writing, so that we may reconsider our opinion.

UNDERSTANDING OF FACTS

It is our understanding that the intake and outlet structures for the tunnel are constructed of reinforced concrete and are an extension to the segments that form the pipe that transports water to power the generating turbines. The structures are cast in-place and are equipped with steel gates that will be lowered to block the water passage to control the water flow into and out of the tunnel.

The tunnel intake structure will be located immediately upstream of the existing International Niagara Control Works and will be submerged about 17 metres below normal water level. The opening will be about 13 metres square and will be designed to provide a smooth transition from the underwater approach channel to the new concrete-lined tunnel, to avoid ice and air entrainment, and to minimize inefficiency due to the physical shape of the intake and roughness of the concrete.

The tunnel outlet structure will be located at the SAB generating station complex. The outlet structure will provide a smooth and efficient transition from the circular tunnel to a rectangular channel excavated in rock to complete the new diversion works.

.../2

Ontario Power Generation (OPG) believes that these components are part of the production machinery and are eligible for the exemption available to manufacturers.

You are requesting that our previous ruling (#2001-0315) to OPG dated August 14, 2001, be revised to reflect the exemption available pursuant to paragraph 7(1)68 of the Ontario *Retail Sales Tax Act* (Act).

LEGISLATION AND/OR ADMINISTRATIVE POLICY

Paragraph 7(1)68 of the Act exempts reinforced concrete, as defined by the Minister, used in the construction of a structure to be used by a manufacturer directly in the manufacture or production of tangible personal property, but only on such terms and conditions as the Minister may prescribe.

Section 14.4 of Regulation 1012 under the Act states that

(1) For the purposes of paragraph 7(1)68 of the Act, "reinforced concrete" means ready-mix concrete and includes any embedded or attached reinforcing material.

(2) For the purposes of this section, "exempt machinery" means machinery or equipment that is exempt from tax under paragraph 7(1)40 of the Act.

(3) For the purposes of paragraph 7(1)68 of the Act, reinforced concrete used in the construction of a structure to be used by a manufacturer directly in the manufacture or production of tangible personal property is exempt from tax if any of the following circumstances exist:

1. The structure is used directly and exclusively as an integral component of exempt machinery.

2. The structure is used directly and exclusively to detect, prevent, measure, treat, reduce or remove pollutants to water, soil or air, but only if the pollutants are attributable to the manufacture or production of tangible personal property.

3. The structure is used as a foundation or base that forms an integral part of exempt machinery, but only if the structure is required by engineering specifications for the purpose of vibration protection or elevation in order to permit gravity feeds during the manufacturing or production process.

4. The structure is used as an elevated access to exempt machinery for operational and maintenance purposes.

(4) Despite subsection (3), reinforced concrete is not exempt from tax if it is used in the construction of a floor or an environmental containment slab.

EE

ANALYSIS & CONCLUSION

Paragraph 7(1)68 of the Act came into force on June 18, 2002 and does not apply to transactions prior to that date. Our previous ruling remains in effect for transactions occurring prior to the legislative change.

From the facts provided, it appears that the intake and outlet structures are an integral component of the electricity generating equipment. We concur that if the structure is used directly and exclusively as an integral component of exempt machinery, then OPG may purchase the reinforced concrete exempt from RST by providing its supplier with its G permit number.

If a contractor is hired to supply and install the structures for OPG, then the contractor may also purchase the materials exempt from RST by providing the supplier with a properly completed PEC.

If you have any further questions, please contact our office.

Yours truly,

Noel Thompson
Tax Advisory Specialist
Tax Advisory
Retail Sales Tax Branch

cc: Husain Mirza
Audit Manager
North York RTO

9/0/47

Ministry of Finance

Retail Sales Tax Branch
PO Box 623
33 King Street West
Oshawa ON L1H 8H5
Tel: 905-433-5922
Toll Free: 1-888-285-7815
Fax: 905-433-5254

Ministère des Finances

Direction de la taxe de vente au détail
C.P. 623
33, rue King Ouest
Oshawa ON L1H 8H5
Tél: 905-433-5922
Sans-frais: 1-888-285-7815
Téléc: 905-433-5254

Ontario

(905) 436-4542

Ref#: 2005-0413

VP#: 5053-0739

July 7, 2005

Debbie Johnston
Manager - Taxation
Ontario Power Generation Inc.
700 University Avenue
Toronto ON M5G 1X6

Dear Ms Johnston:

We refer to your letter dated May 20, 2005 regarding the application of Ontario retail sales tax (RST) to cast in place concrete tunnel liners at the Sir Adam Beck (SAB) Complex and our telephone conversation with you and Emad Elsayed, Vice President, Special Projects on June 29, 2005.

This interpretation is based on the information provided and which is conveyed in the "Understanding of Facts" portion of this ruling. Please review the information for its completeness and accuracy. If it is determined that the information is incomplete or inaccurate, this interpretation will not be binding. In the event that our understanding of the facts is inaccurate or incomplete, please notify the undersigned, in writing, so that we may reconsider our opinion.

UNDERSTANDING OF FACTS

It is our understanding that Ontario Power Generation (OPG) is considering using cast-in-place concrete liners for the tunnels that convey water into the generating station, as opposed to precast liners that we ruled on in our letter (ref.#2001-0315) dated August 14, 2001.

You have provided the following facts regarding the construction of a cast-in-place concrete liner:

- after a tunnel is bored in the bedrock, rock dowels and steel sets are used to stabilize the rock;
- shotcrete is then used as the first layer of the cast-in place tunnel liner and provides the base on which the various layers are attached;
- a geotextile layer is then attached to the shotcrete and an impermeable membrane is then welded to the geotextile layer;
- an unreinforced layer of concrete is then cast and pressure grout is injected between the membrane and the shotcrete.

. . . /2

We understand that the grout acts in a way that makes all of the layers of the liner become one. The final layer of concrete layer is attached through pressure and withstands pressure by prestressing. The water pressure in the tunnel balances the pressure of the grout. The prestressing substitutes for the reinforcement within the concrete.

You are requesting confirmation that all of the materials needed to create the cast in place liner, with the exception of the rock dowels and steel sets can be acquired by the contractor on a tax-exempt basis.

LEGISLATION AND/OR ADMINISTRATIVE POLICY

Paragraph 7(1)40 of the Ontario *Retail Sales Tax Act* (Act) provides an exemption from RST on purchases of machinery, equipment or processing materials used primarily and directly by a manufacturer in the manufacture of tangible personal property or directly in and exclusively for research or development purposes. The equipment must be prescribed in Regulation 1012 subsection 14(1) and must not be excluded by Regulation 1012 subsection 14(1.1).

ANALYSIS & CONCLUSION

In the previous ruling letter noted above, we concluded that:

> "OPG is a manufacturer of electricity and qualifies for the exemptions available at paragraph 7(1)40 of the Act. The precast concrete liners qualify as production equipment purchased for the use of a manufacturer as they will be used primarily and directly in the manufacturing process, i.e., the conveyance of water to the SAB to spin the turbines to generate electricity. The liners may be purchased exempt from RST by the contractor under paragraph 7(1)40 of the Act."

Where the cast-in-place concrete liners described above are used in the same manner as precast liners, the materials required to create them, with the exception of the rock dowels and steel sets, will qualify for exemption from RST. OPG may purchase the materials exempt from RST by providing its supplier with its G permit number. If a contractor is hired to supply and install the structures for OPG, then the contractor may also purchase the materials exempt from RST by providing the supplier with a properly completed purchase exemption certificate .

If you have any further questions, please contact our office.

Yours truly,

Denise Miller
Senior Tax Specialist
Tax Advisory

c North York RTO (file copy)

9/0/47
9/0/23

Appendix 7.9(a)

Appendix 7.9(a) - Substantial Completion Form

NOTICE OF SUBSTANTIAL COMPLETION

To: Ontario Power Generation Inc. ("OPG")	Contract: Design/Build Agreement dated •, 2005 between Strabag AG (the "Contractor") and OPG (the "**Agreement**") Date: •

Defined terms used in this Notice have the same meanings given to those terms in the Agreement. In accordance with Section 7.9(a) of the Agreement, the Contractor hereby gives OPG notice that Substantial Completion has occurred as follows:

Date of "substantial performance" under the *Construction Lien Act (Ontario)*	•
Grounds for Requesting Substantial Completion	**• [Contractor to confirm that the requirements of the tests for Substantial Completion have been met]**
Costs to Finish the Work	$•
Delivery of Approvals	**• [Contractor to set out the dates on which Approvals were delivered and/or attach remaining Approvals]**
Commissioning and meeting all tests under Contractor's Proposal Documents and the Final Submittals	**• [Contractor to confirm that commissioning and tests were completed and met]**
Watering up of tunnel	**• [Contractor to confirm watering up for 24 consecutive hours]**
Delivery of Reports	**• [Contractor to set out on dates on which reports were delivered and/or attach remaining reports]**
Independent Professional Certificate	Attached as Appendix A.

STRABAG AG

By: _____

Name:

Title:

Appendix 7.9(a)(8)

Appendix 7.9(a)(8) - Affidavit of Design Professional

_____(NAME)

(sworn _____)

I, _____, of the City of_____, in the Municipality of _____, MAKE OATH AND SAY:

(a) I am an **[engineer/architect]** duly licensed in the Province of Ontario. I am a design Professional as defined under the Design/Build Agreement between Ontario Power Generation Inc. and Strabag AG (the "Contractor") dated •, 2005 (the "Design/Build Agreement"). I have been designated by the Contractor to provide Professional Services for the design **[of a portion]** of the Tunnel Facility Project as per the Design/Build Agreement. A copy of the Design/Build Agreement is attached as Exhibit A. Capitalized terms used in this affidavit, and not otherwise defined herein, have the meanings attributed to them in the Design/Build Agreement.

(b) I have prepared a design for use in the construction **[of the • portion]** of the Tunnel Facility Project (the "work"). A copy of my design is attached as Exhibit B. My design is in accordance with the requirements set out in the Design/Build Agreement.

(c) I have, on an ongoing and frequent basis, observed the Contractor's execution of my design in the construction of the Tunnel Facility Project. Specifically, my observations related to: _____

(d) I am satisfied that the work outlined in Paragraph b has been constructed in accordance with my design.

SWORN before me at the City of ■, in the County/Region of ■, this day of July, 2005.

_____ _____

A Commissioner for Taking Affidavits. Name

Appendix 7.9(b)

Appendix 7.9(b) - Substantial Completion Confirmation Form

CONFIRMATION OF SUBSTANTIAL COMPLETION

To: **STRABAG AG** (the "Contractor")	Contract: Design/Build Agreement (the "**Agreement**") dated •, 2005 between the Contractor and Ontario Power Generation Inc. ("OPG") Date: •

Defined terms used in this Notice have the same meanings given to those terms in the Agreement. OPG has determined that:

(a)	Substantial Completion has occurred effective •, 200•; or	■
(b)	Substantial Completion has not occurred for the reasons set out in Appendix A.	■

ONTARIO POWER GENERATION INC.

By: _____

Name:

Title:

Appendix 7.10

Appendix 7.10 - Final Completion Form

CONFIRMATION OF FINAL COMPLETION

To: STRABAG AG (the "Contractor")	Contract: Design/Build Agreement (the "**Agreement**") dated •, 2005 between the Contractor and Ontario Power Generation Inc. ("OPG") Date: •

Defined terms used in this Notice have the same meanings given to those terms in the Agreement. OPG has determined that:

(a)	Final Completion has occurred effective •, 200•; or	■
(b)	Final Completion has not occurred for the reasons set out on Appendix A.	■

ONTARIO POWER GENERATION INC.

By: _____

Name:

Title:

Appendix 7.11

Appendix 7.11 - Final Payment Related Documents

Certificate - Application for Final Payment

TO: Ontario Power Generation Inc. ("OPG")

RE: Design/Build Agreement (the "Agreement") between OPG and Strabag AG (the "Contractor"), dated as of [date], 2005 for the Niagara Tunnel Facility Project

I, **[name]**, am the **[title]** of the Contractor and am authorized to deliver this Certificate on behalf of the Contractor. I hereby certify, for and on behalf of the Contractor, as follows.

Set out in Appendix A to this Certificate are complete:

(a) as built drawings;

(b) maintenance and operating instructions;

(c) security documents;

(d) certificates of insurance;

(e) certificates of insurance;

(f) certificates of inspection;

(g) all documents required to be maintained at the Site in accordance with Section 2.15(a) of the Agreement; and

(h) all other documents required by the Agreement to be delivered to OPG on the entire finishing of the Tunnel Facility Project.

Set out in Appendix B to this Certificate is the required consent of any surety, if any, to the final payment made under Section 7.12 of the Agreement.

Set out in Appendix C to this Certificate is a certificate of good standing from the Workers' Safety and Insurance Board or successor organization.

Set out in Appendix D to this Certificate are releases in the form set out in Appendix 7.11 of the Agreement, from the Contractor and each Subcontractor who performed Work in respect of the Tunnel Facility Project, respecting all Liens and other claims filed or otherwise arising in respect of the Work or Tunnel Facility Project.

Set out in Appendix E to this Certificate are statutory declarations in the form set out in Appendix 7.11 of the Agreement, signed by a director or officer of the Contractor, and each Subcontractor who has performed Work at the Site, declaring that all payments due to Subcontractors, all wages and benefit payments due to any of the Contractor's Personnel, and all contributions, premiums, allowances and remittances due to any Governmental Authority,

pension fund, benefit plan, or union fund in accordance with a collective agreement, have been paid in a timely manner.

There are:

(a) no known outstanding claims under the Agreement, except for those claims which have already been communicated to OPG in a timely manner in the form of Notice required by the Agreement and which are listed in Appendix F to this Certificate, including an estimate of the value of each such claim; or

(b) there are outstanding claims which have not been communicated to OPG in the form of Notice required by this Agreement and each of these claims is described in the attached form of Notice required by this Agreement and is delivered to OPG in a timely manner, and there are no other known outstanding claims under the Agreement, except for those claims which have already been communicated to OPG in a timely manner in the form of Notice required by this Agreement and which are listed in Appendix F to this Certificate, including an estimate of the value of each such claim.

Defined terms used in this Certificate that are not defined in this Certificate have the meanings given to those terms in the Agreement.

DATED: **[date]**, 200**[●].**

STRABAG AG

By: _____

Name:

Title:

Release - Application for Final Payment

TO: Ontario Power Generation Inc. ("OPG")

RE: Design/Build Agreement (the "Agreement") between OPG and Strabag AG (the "Contractor"), dated as of [date], 2005 for the Niagara Tunnel Facility Project

For value received, including the final payment to the Contractor by OPG, the Contractor agrees as follows.

Release. Effective when OPG makes the payment under Section 7.12 of the Agreement, the Contractor irrevocably waives all entitlement to, and releases and forever discharges OPG and each member of the OPG Group from, any and all manner of claims, demands, suits, proceedings, actions and causes of action respecting any and all costs, damages, expenses, losses, liabilities, debts, sums of money, obligations, dues, accounts, interest and statutory rights or remedies, whether express, implied or otherwise, known or unknown, which the Contractor had, now has, can, will or may hereafter have respecting:

(a) any member of the OPG Group; or

(b) any act, cause, matter or thing whatsoever respecting the Project or the Agreement.

No Claims Against Certain Third Parties. The Contractor will not initiate any claim, demand, suit, proceeding or action against any Person respecting the Project or the Agreement if:

(a) that Person has claimed or demanded, in future claims or demands, or may reasonably be expected in future to claim or demand contribution or indemnity under the Negligence Act (Ontario) or otherwise from any member of the OPG Group; or

(b) that claim, demand, suit, proceeding or action may result (whether directly or indirectly against intermediate Parties by way of a third or subsequent party claim or an independent legal proceeding) in a claim, demand, suit, proceeding or action against any member of the OPG Group.

No Assignment. The Contractor represents and warrants to each member of the OPG Group that the Contractor has not assigned, either in whole or in part, to any Person, any right to initiate any claim, demand, suit, proceeding or action respecting the Project or the Design/Build Agreement.

General. The division of this Release into sections and the insertion of headings are for convenience of reference only and are not to affect the construction or interpretation of this Release. Unless otherwise specified, words importing the singular include the plural and vice versa and words importing gender include all genders. The term "**including**" means "**including without limitation**", and the terms "**include**", "**includes**" and "**included**" have similar meanings. Any reference in this Release to any agreement, is deemed to include a reference to that agreement, as amended, supplemented or restated from time to time. Defined terms used in this Release but not defined in this Release have the meanings given to those terms in the

Agreement. This Release is solely for the benefit of the Parties and, to the extent expressly and specifically made, beneficiaries of this Release. In particular, OPG holds the rights of each other member of the OPG Group under this Release in trust for the benefit of each such member.

The Contractor has duly executed this Release as of **[•]**, 200**[•]**.

STRABAG AG

By: _____

Name:

Title:

[Modify as required for signature by a Subcontractor]

Statutory Declaration - Application for Final Payment

CANADA	)	IN THE MATTER OF THE DESIGN/BUILD
	)	AGREEMENT BETWEEN ONTARIO POWER
	)	GENERATION INC. AND STRABAG AG
PROVINCE OF ONTARIO	)	DATED AS OF **[DATE],** 2005 FOR
	)	THE NIAGARA TUNNEL FACILITY
	)	PROJECT (the "Agreement")

I, **[•]**, of the **[City]** of **[•]**, Ontario, do solemnly declare that:

I am the **[title]** of Strabag AG and as such have personal knowledge of the facts set out in this solemn Declaration.

Defined terms used in this solemn Declaration but not defined in this solemn Declaration have the meanings given to those terms in the Agreement.

All

(a) payments due to Subcontractors;

(b) wages and benefit payments due to any of the Contractor's Personnel; and

(c) contributions, premiums, allowances and remittances due to any Governmental Authority, pension fund, benefit plan or union fund in accordance with a collective agreement or Applicable Laws,

have been paid in a timely manner on or before the date of the Application for Payment to which this solemn Declaration relates, subject to any withholdings or holdbacks required by Applicable Laws.

Title to the applicable part of the Project will pass to OPG in accordance with Section 7.4 of the Agreement no later than the date of OPG's payment to which this solemn Declaration relates.

(d) there are no known outstanding claims under the Agreement, except for those claims which have already been communicated to OPG in a timely manner in the form of Notice required by the Agreement and which are listed in the Appendix to this solemn Declaration, including an estimate of the value of each such claim; or

(e) there are outstanding claims which have not been communicated to OPG in the form of Notice required by this Agreement and each of these claims is described in the attached form of Notice required by this Agreement and is delivered to OPG in a timely manner, and there are no other known outstanding claims under the Agreement, except for those claims which have already been communicated to OPG in a timely manner in the form of Notice

required by this Agreement and which are listed in the Appendix to this solemn Declaration, including an estimate of the value of each such claim.

I make this solemn Declaration conscientiously believing it to be true and knowing it is of the same force as if made under oath.

DECLARED before me at the City of ■, in the County/Region of ■, this day of ■, 2005.	))))	
A Commissioner, etc.		Name

[Modify as required for signature by a Subcontractor]

Appendix 7.12

Appendix 7.12 - Final Payment Form

APPROVAL of APPLICATION for FINAL PAYMENT

To: **Strabag AG [Insert Contractor address]** Attn: ■ Fax: ■	Contract: Design/Build Agreement between Ontario Power Generation Inc. and Strabag AG dated ■, 2005 (the "**Agreement**") Application for Payment No.: ■ appended hereto as Appendix A Date: ■

Defined terms used in this Notice have the same meanings given to those terms in the Agreement.

Please be advised that the subject Application for Payment has been reviewed and is hereby:

(a) **Approved [ ]**, and subject to Sections 7.3(f) and 7.5(c) and 7.5(e) of the Agreement, OPG will make final payment within 60 days of the delivery of this Notice to the Contractor. Please proceed to electronically deliver to OPG (at apmailroom@opg.com) a complete electronic copy of this Application for Payment in .PDF or .TIF format.

(b) **Rejected [ ]**

The subject Application for Payment is rejected for the following reason(s):

(a) ■

(b) ■

(c) ■

Please re-submit this Application for Payment when these deficiencies have been corrected.

ONTARIO POWER GENERATION INC.

By:_____
Name:
Title:

Appendix 10.7

Appendix 10.7 - Breach Form

NOTICE OF BREACH BY ONTARIO POWER GENERATION INC.

To: Ontario Power Generation Inc. ("OPG")

Contract: Design/build Agreement (the "**Agreement**") dated •, 2005 between Strabag AG (the "**Contractor**") and OPG (the "**Agreement**")

Breach Notice No. •

Date: •

Defined terms used in this Notice have the same meanings given to those terms in the Agreement. In accordance with Section 10.7 of the Agreement, the Contractor hereby gives OPG notice as follows.

Date of breach of Agreement by OPG: _____, 200●.

Obligation that OPG breached and section in which OPG's obligation is set out in the Agreement:

Describe action or failure to act of OPG that constitutes the breach of OPG's obligation:

Describe precisely the anticipated remedy, if any, sought by the Contractor for OPG's breach of its obligation (including any changes to the Contract Price or the Contract Schedule):

STRABAG AG

By: _____

Name:

Title:

Appendix 11.1(a)

Appendix 11.1(a) - Dispute Review Board Agreement

1. Parties. The parties to this Dispute Review Board agreement ("DRB Agreement") are Ontario Power Generation Inc. ("OPG"), [the Contractor], (collectively, the "Parties"), and [name all three Dispute Review Board members] (collectively, the "Dispute Review Board").

2. Project. OPG has entered into an Agreement with the Contractor dated [*], to build the Tunnel Facility Project ("Project"), as defined in that Agreement (the "Agreement"). The Agreement between OPG and the Contractor provides for the implementation of a Dispute Review Board procedure.

3. Object. The object and purpose of the Dispute Review Board is to consider, fairly and impartially, all disputes referred to it (individually, a "Dispute"), and to provide written recommendations to OPG and the Contractor (individually, a "Recommendation"), which will either form the basis for settlement of the Dispute between the Parties or form part of the formal record in any subsequent dispute resolution procedure.

4. Proceedings of the Dispute Review Board. The proceedings of the Dispute Review Board will be conducted impartially, objectively and independently from the interests of any party.

    (a) **Recommendations.** The Dispute Review Board will provide fully reasoned, written Recommendations to the Parties to assist the resolution of Disputes. The fully reasoned, written Recommendations of the Dispute Review Board are not binding on any party, although it is expected that Parties will place considerable weight on the Recommendations and use them as a basis for settling Disputes.

    (b) **Condition Precedent to any further proceedings.** If the Recommendations relating to a Dispute are not satisfactory to a Party (the "**Dissatisfied Party**"), the Dissatisfied Party, not later than 10 Business Days after receipt of the written Recommendations, may deliver written Notice to the other Party of the Dissatisfied Party's intention to commence an action regarding the unresolved Dispute in a court of competent jurisdiction. All unresolved Disputes will be held in abeyance until the earlier of (i) Substantial Completion; and (ii) termination of the Agreement, except to the extent that holding such Dispute in abeyance could prejudice, by operation of the provisions of the *Limitations Act, 2002* (Ontario), the right of the Dissatisfied Party to commence an action regarding the unresolved Dispute. In the event that holding a Dispute in abeyance could prejudice, by operation of the *Limitations Act, 2002*, the right of the Dissatisfied Party to commence an action regarding the unresolved Dispute, the Dissatisfied Party may commence such action prior to the expiry of the applicable limitation period. It is a condition precedent to any court proceeding that the Recommendations of the Dispute Review Board be pleaded in, referred to and attached as a

schedule to the originating process. Either Party may plead or rely on the Agreement as evidence of the Parties' consent to an order staying any and all proceedings pending formal annexation of the applicable Recommendations. If neither Party delivers written Notice to the other Party within 10 Business Days after receipt of written Recommendations from the Dispute Review Board of the Party's intention to commence an action regarding the unresolved Dispute in a court of competent jurisdiction, the Parties will be deemed to have accepted the Recommendations of the Dispute Review Board, the Recommendations will be binding on the Parties, and the Parties will be estopped from commencing court proceedings regarding the unresolved Dispute.

5. **Constitution of the Dispute Review Board. The Dispute Review Board will consist of three individuals.**

(a) Members Qualifications. Only individuals experienced with the type of construction involved in respect of the Project, and with the interpretation of the Contract Documents, may be nominated to the Dispute Review Board. In selecting nominees for the Dispute Review Board, the Parties will only nominate individuals with a demonstrated ability to provide leadership for the Dispute Review Board's activities. The other mandatory criteria for selecting members of the Dispute Review Board are set out below. These are enduring criteria that apply at all times to all members and nominated members of the Dispute Review Board.

(i) **No Current Financial Interests**. No member may have a financial interest in either of the Parties or any Subcontractor on the Project, or otherwise have any financial interest in this Project or the Contract Documents.

(ii) **No Prior Financial Interest**. No member may remain a member, if, except for fee-based consulting services on other projects unrelated to the Project, such member was previously employed by, or had financial ties to either of the Parties or a Subcontractor.

(iii) **No Close Relationships**. No member may remain a member, who has a then current or recent, close, professional or personal, relationship with any key individual of OPG, the Contractor or any Subcontractor.

(iv) **No Previous Involvement in Services**. No member may remain a member, who has had a substantial, relevant prior involvement in the Project of a nature which could reasonably be expected to compromise the individual's or the member's, as the case may be, ability to participate impartially in the activities of the Dispute Review Board.

(v) **No Employment**. Neither Party will employ, or offer or commit to employ or otherwise engage, a Dispute Review Board member during the member's tenure. Similarly, no member of the Dispute Review Board may take employment, or offer any service to either of the Parties or a Subcontractor.

(b) Replacement Members. The Parties may agree to terminate the tenure of any member of the Dispute Review Board at any time in writing. Neither OPG nor the Contractor may unilaterally terminate the tenure of any Dispute Review Board member. Any member of the Dispute Review Board may resign, at any time, without stating a reason, so long as there is no outstanding Recommendation with respect to a hearing in which that member participated. This DRB Agreement survives the termination, resignation, death or incapacity of any member. If the tenure of any Dispute Review Board member is terminated or if any such member otherwise ceases to participate on the Dispute Review Board, the two remaining members of the Dispute Review Board will use the process set out in Section 11.2(b)(5) of the Agreement to select a new third member, and the new third member will be bound to enter into a new Dispute Review Board Agreement with the other two members and the Parties. If two or three members are terminated, the procedure in Sections 11.2(b) and 11.2(c) of the Agreement will apply until those positions are filled.

6. **Operation.**

(a) **Beginning and Completion:** The Dispute Review Board will remain empanelled and active throughout the duration of the Project, irrespective of the fact its actual composition may change from time to time.

(b) **Individual Communication:** No individual member of the Dispute Review Board will have any private communication with any party.

(c) **General Procedure**: Dispute Review Board operating procedures will be formulated by the Dispute Review Board as a task under this Dispute Review Board Agreement. It is anticipated that during its first meeting at the Site, the Dispute Review Board will establish procedures for the conduct of its routine meetings, Site visits, and hearings of Disputes. The Parties direct the Dispute Review Board to adapt such procedures as required, in its unfettered discretion, to best achieve the objects of the Dispute Review Board. The Parties acknowledge that the Dispute Review Board may initiate new procedures or modify existing procedures as it deems appropriate or necessary to best achieve the object of the Dispute Review Board. The Parties undertake and agree to comply with such procedures.

(d) **Contract Documents, Reports and Information**: The Parties will provide a conformed set of plans and specifications to each Dispute

Review Board member. The members will thereafter remain informed of construction activity and other developments by means of timely transmittal of relevant information prepared by OPG and the Contractor in the normal course of construction, including through periodic progress reports and minutes of progress meetings.

(e) **Progress Meetings**: In addition to its other duties, the Dispute Review Board will meet at regular intervals, no less frequently than quarterly, and at times of significant construction events. The frequency and scheduling of these meetings will be as agreed among the Parties and the Dispute Review Board, depending upon the progress of the Work. In the case of failure to agree, the Dispute Review Board will schedule the meetings. Each meeting will consist of an informal roundtable discussion followed by an optional field observation of the Project. The informal roundtable discussion will be attended by key personnel from OPG and the Contractor. The agenda for each meeting will include no fewer than the following items:

(i) approval of minutes of previous meeting (to be kept by OPG, and circulated for approval within seven days of each meeting, or less if necessary);

(ii) Work performed since the last meeting;

(iii) current status of the Project Schedule and schedule for future Work;

(iv) anticipated or potential problems and proposed solutions;

(v) perspectives on potential Disputes, claims and other controversies;

(vi) status of past Disputes, claims and other controversies;

(vii) new business; and

(viii) set date, time and place of next meeting and Site visit.

7. **Review of Disputes.**

(a) **General.** The Parties will cooperate to ensure that the Dispute Review Board is able to consider Disputes promptly.

(b) **Prerequisites to Review.** Provided that it has not been expressly excluded from referral in the Agreement, a Dispute (other than a Default Dispute, which dispute may be referred to the Dispute Review Board or arbitration in accordance with Section 11.5 of this Agreement) will be referred to the Dispute Review Board when:

(i) either Party believes that good faith bilateral negotiations have not and are not likely to succeed or have reached an impasse; or,

(ii) if the Contract Documents provide for a prior decision by OPG's Representative or a Professional, and such decision has been issued and is unacceptable to one or the other Party.

(c) **Disputes.** Provided that it has not been expressly excluded from referral in the Agreement, either party may refer a Dispute to the Dispute Review Board. Requests for Dispute Review Board resolution must be submitted in writing to the chairperson of the Dispute Review Board and must state the Dispute, with particularity, arising in respect of the Agreement, including a sworn statement that negotiations have been attempted and exhausted or otherwise failed (the "**Dispute Request**"). The Party referring the Dispute to the Dispute Review Board will simultaneously submit a copy of the Dispute Request in compliance with this Section 7 to the other Party. After conferring with both parties, the Dispute Review Board will establish a hearing procedure that is as summary, efficient, and inexpensive as possible in the circumstances and in accordance with the principles set out above.

(d) **Substantial and Complex Disputes.** If and only if the Dispute cannot be resolved summarily by exercise of the Dispute Review Board's inquisitorial powers, and (i) the Dispute Review Board considers it to be necessary, or (ii) the Parties make a joint request, the Dispute will be heard as follows:

(i) Concise written statements will be prepared by both Parties, together with a binder of relevant supporting documents, indexed, paginated in one continuous sequence throughout the binder, each document separated from each other document by sequentially numbered index tabs corresponding to the index.

(ii) The Party initiating the Dispute will serve its statement (the "**Applicant's Statement**") on the other Party and file three copies with the chairperson of the Dispute Review Board within the time set by the Dispute Review Board. The Applicant will set out a proposed method and schedule for the hearing in its Applicant's Statement.

(iii) The respondent's statement (the "**Respondent's Statement**"), prepared in identical form, will be similarly served and filed within the time set by the Dispute Review Board. The respondent will set out a proposed method and schedule for the hearing in the Respondent's Statement.

(iv) The Dispute Review Board may, by written notice to the Parties, require either or both of the Parties to support their respective statements with documents, affidavits, declarations, tests, samples, photographs, videos, reports or other material, in the Dispute Review Board's sole and absolute discretion, and at any time and from time to time.

(e) The Dispute Review Board will acknowledge in writing to the Parties that the Dispute is perfected in accordance with this section when all of (i), (ii), (iii), and (iv) above are complied with and shall, at the same time, advise the Parties as to the method and schedule for the hearing having regard to the Parties' positions as recorded in their statements.

(f) **Board to Visit Site.** In the case of a Dispute referred to the Dispute Review Board, either party to the Dispute or the Dispute Review Board itself may request that a Site visit be undertaken before, or as part of, any hearing.

(g) **Hearing.** The place of the hearing will be at the Site at a time and on a date stipulated by the Dispute Review Board in consultation with the Parties. If circumstances require, the Dispute Review Board may, with the prior consent of the Parties, adjourn all or a portion of the hearing of the Dispute to any other location or time.

(i) **Proceedings in Confidence.** The proceedings of the Dispute Review Board hearing will be conducted and maintained as far as possible in absolute privacy, privilege and confidence.

(ii) **Representation.** Each party has the right, but not the obligation, to be represented by counsel at any hearing or any portion of any hearing, at its own expense.

(iii) **No Transcripts Required.** No transcript is required to be kept of any testimony before the Dispute Review Board, but, if such testimony is transcribed, a copy must be provided to the other Party once received.

(iv) **Hearing Procedure.** The order of proof, the fact and extent of oral evidence (whether under oath or not), examinations and cross-examinations (whether under oath or not), the quality of proof, the burden of proof, argument both written and oral, and all matters of form, procedure, and process relating to the hearing before the Dispute Review Board are within the sole and absolute discretion of the Dispute Review Board.

(h) **Inquiry by Board.** The Dispute Review Board is expressly authorised by the Parties to take all accounts, make all inquiries, give all directions and do all things necessary to reach their Recommendations. The Parties agree

to satisfy, in good faith, and as soon as practicably possible, any inquiries made by the Dispute Review Board, including where appropriate, the production of any documents, affidavits, declarations, tests, samples, photographs, videos, reports or other material, which inquires are made in their sole and absolute discretion, at any time and from time to time.

(i) **Deliberations.** The chairperson of the Dispute Review Board will declare the hearing closed at the close of argument and thereafter the Dispute Review Board will have, in aggregate, no more than two weeks for deliberation and delivery of its Recommendations.

(j) **Recommendations.** The Dispute Review Board's Recommendation for the resolution of the Dispute will be transmitted to both Parties simultaneously at the end of the period of deliberation. In a difficult or complex case, this time period may be extended at any time and from time to time by agreement of the parties. The Dispute Review Board will use best efforts to reach a unanimous Recommendation on every Dispute, however, if unanimity is not reached, individual Recommendations are permissible.

(k) **Clarification and Reconsideration**. If either party feels that the Recommendations require clarification or reconsideration, that party may so request, in writing, specifying with all possible particularity that party's reasons, and the Dispute Review Board may or may not, in its sole and absolute discretion, elect to clarify, re-deliberate or re-open the hearing for the purpose set out in the party's request, and if the hearing is re-opened, the requirements set out in this section apply once again.

(l) **Funding.** All expenses of the Dispute Review Board shall be shared equally, and billed monthly, in arrears, with OPG paying 50% and the Contractor paying 50%. The Dispute Review Board will render its invoices to OPG, who will pay these and recover the Contractor's portion as a consensual set-off against monies otherwise earned and payable.

(m) **Termination.** Notwithstanding any term in this DRB Agreement, OPG and the Contractor may terminate this DRB Agreement at any time by a document in writing. Upon termination, the Dispute Review Board will promptly render any outstanding Recommendations and a final account for its services. The Chair of the Dispute Review Board will make the final payments from the Dispute Review Board bank account and will render a final account within 30 days of termination and will disburse any balance remaining in the Dispute Review Board bank account equally to OPG and to the Contractor.

(n) **Legal Relations.** Each Party and each member of the Dispute Review Board expressly acknowledge that each member of the Dispute Review Board is acting as an individual and not in his/her professional capacity, if

any, nor in the capacity of employee or agent of any of the parties or any other person, including any employer of any such individual. The Parties each expressly acknowledge that each member of the Dispute Review Board is acting in a capacity intended to facilitate resolution of the Disputes and accordingly it is agreed and acknowledged that to the fullest extent permitted by the law, each member of the Dispute Review Board will be accorded quasi-judicial immunity for any good faith decisions or actions taken by such member in any way associated with the performance of such member's services as a member of the Dispute Review Board. Each member of the Dispute Review Board will be indemnified and held harmless, by OPG and the Contractor, of and from any claim of any nature or kind whatsoever that may be brought arising out of or related in any way whatsoever to such member's conduct (save for failure to act in good faith or willful misconduct) as a member of the Dispute Review Board.

ONTARIO POWER GENERATION INC.

By: _____

Name:

Title:

STRABAG AG

By: _____

Name:

Title:

[DRB MEMBER #1]

By: _____

Name:

Title:

[DRB MEMBER #2]

By: _____

Name:

Title:

[DRB MEMBER #3]

By: _____

Name:

Title:

Appendix 7.13(b) - EPSCA and BACU Wage Rates

[See attached]

Electrical Workers CUSW

PRINCIPAL AGREEMENT

between

ONTARIO POWER GENERATION INC.

(hereinafter called "OPGI" or "The Employer")

and

THE CANADIAN UNION OF SKILLED WORKERS,

(hereinafter called the "CUSW" or the "Union")

August 11, 2000 – April 30, 2004

OPGI/CUSW GENERATION PROJECTS COLLECTIVE AGREEMENT

GENERAL NOTE

This Collective Agreement distinguishes between two broad categories of work; namely, work that is covered by the *"modified provisions"* of this construction agreement and work that is not. *"Modified provisions"* apply to <u>most</u> work on existing generating sites. Following is a more detailed explanation:

The *"Modified Provisions"* of this Construction Agreement will apply to:

all work on existing generating sites <u>except</u> the construction of:

- **a new facility which provides a new function**
- **a new (ie. additional) generating unit**

Appendix A contains the *"Modified Provisions of this Construction Agreement"*. All terms of this collective agreement shall apply to work covered by Appendix A, with the exception of Section 11 - Hours of Work and Section 22 - Travel and Room and Board Allowance. The above Sections 11 and 22 do not apply when working under the terms and conditions of the *"modified provisions"*, as these Sections are replaced by Articles 1 and 2 of Appendix A.

When work does not fall within the scope of Appendix A, all terms of this agreement, with the exception of Appendix A, apply.

A chart to illustrate the above applications follows:

Generating - Existing Sites <u>Excluding</u> construction of new facility (new function) &/or new (additional) generating unit(s)	Generating – Existing Sites <u>Involving</u> construction of new facility (new function) and/or new (additional) generating unit(s)	Generating - New Sites (ie. Greenfield Work)
Use Appendix - Modified Provisions for Hours of Work, and Travel & Room & Board Allowance.	Use all the provisions of the collective agreement, *except* Appendix A.	Use all the provisions of the collective agreement, *except* Appendix A.

OPGI/CUSW GENERATION PROJECTS COLLECTIVE AGREEMENT

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Section 1

PREAMBLE

1.1 WHEREAS the Employer is engaged in construction industry work in the electrical power systems sector on Ontario Power Generation Inc. ('OPGI') property and may enter into collective agreements covering those of its employees in the bargaining unit as hereinafter defined; and

1.2 WHEREAS the Union, as defined in the covering page of this Collective Agreement, has in its membership competent, skilled and qualified journeymen and apprentices to perform work coming within the trade and craft jurisdiction; and

1.3 WHEREAS the Employer and the Union desire to encourage closer co-operation and understanding between the Employer and the Union to the end that a satisfactory, continuous and harmonious relationship will exist between the parties to this Agreement.

Section 2

SCOPE OF AGREEMENT

2.1 The Employer recognizes the Union as the exclusive bargaining agency for a bargaining unit made up of OPGI employees whose classifications are defined in Subsection 2.4 engaged in all construction industry work on the Employer's property in the Province of Ontario.

2.2 This work shall be performed in the Province of Ontario on OPGI property for generating facilities. This work includes the building of generating stations, hydraulic works, heavy water facilities, microwave and repeater stations and Miscellaneous Hydraulic Projects but excludes the building of commercial-type office facilities at urban locations remote from operating facilities.

2.3 The work encompasses:

(i) construction of new facilities
(ii) additions to existing facilities
(iii) modifications
(iv) rehabilitation
(v) reconstruction of existing facilities

2.4 The bargaining unit under this Agreement shall comprise the following classifications

Electrician Journeyman including Foreman and Subforeman
Electrician Welder
Electrician Apprentice
Communications Electrician

2.5 If additional classifications are required, they will be negotiated as appropriate for electrical construction work in the electrical power systems sector.

2.6 The term "employee" shall include all employees of the Employer in the classifications as set out in Subsection 2.4 above.

2.7 A subforeman is an individual who exercises supervisory responsibility and may use the tools of the trade.

2.8 The classifications referred to in Subsection 2.4 do not establish craft jurisdiction. Such jurisdiction is established in accordance with Section 4 of this Collective Agreement.

2.9 The Employer and the Union agree that the use of nomenclature is meant to refer to both genders.

Section 3

DURATION OF AGREEMENT

3.1 This Agreement shall become effective on August 11, 2000 and will expire on April 30, 2004.

3.2 Either party to this Agreement may give notice in writing to the other party not more than 90 days prior to the expiry date and not less than 30 days prior to the expiry date of this Agreement and negotiations should begin within 15 days of the giving of notice. If there is no notice given of change or termination of this Agreement, as mentioned in this Section, this Agreement shall remain in effect from term to term thereafter.

3.3 This Agreement shall be subject to amendment at any time by mutual consent of the parties hereto. Any such amendment agreed upon shall be reduced to writing, signed by the parties hereto.

Section 4

WORK ASSIGNMENT

4.1 **Advance Notice**

The Employer will advise the Union as far in advance as possible of new construction work coming under the scope of this Agreement.

At the request of the Union, the Employer will convene a prejob conference before this work commences to discuss the preliminary details of the proposed work to be performed and to establish conditions in accordance with this Agreement for the work site.

4.2 **Work Assignment**

(a) The Employer recognizes the work jurisdiction of the union and when assigning work to its employees, agrees to assign all work traditionally performed by employees in the classifications under this agreement in accordance with established practice.

Regular mark-up meetings will be conducted for new construction work at times appropriate for the work in progress subject to the following:

The purpose of these mark-up meetings is to indicate to the Union the work that is about to be carried out by the Employer in order to minimize the potential for jurisdictional disputes.

The Union will attend these mark-up meetings, and every effort will be made to settle questions of jurisdiction before the dates that the Employer indicates the work is expected to commence. The Employer will provide written notice to the Union as far in advance as possible of mark-up meetings.

(b) When work is to be performed on a project site* and it meets the following criteria: same work, same project site, the mark-up process will not be required. This procedure shall not preclude the Union's right to contest previously disputed work.

When a mark-up is required and the Employer has work that is less than three (3) weeks in duration and there are ten (10) or fewer employees employed on this specific work, the Union will be notified of the scope of work and the Employer's proposed work assignments.

The Union will have one (1) week from the date of notification to submit jurisdictional claims and supporting evidence to the Employer for consideration. The Employer will notify the Union of the final work assignments prior to the commencement of the work.

(c) The parties recognize that circumstances may arise, particularly with discovery and emergency work, where the process set out above may not be practical or possible.

4.3 **Jurisdictional Disputes**

(a) In the event that a jurisdictional dispute arises over a work assignment, such assignments will remain in effect until the dispute is resolved, if necessary, by the Ontario Labour Relations Board, and will not interfere in any way with the progress of the work.

(b) In the event the Union elects to pursue or respond to the Jurisdictional Dispute Board pursuant to the Act is not authorized to award damages in respect of a mis-assignment of work only in circumstances where the other union(s) involved in the proceedings is (are) equally restricted in their ability to claim for damages. However, this paragraph shall not apply when the Jurisdictional Dispute and the mis-assignment of work results from a bad faith assignment on the same work that was previously the subject of a Jurisdictional Dispute before the OLRB.

* *For the purposes of this Section, Bruce Nuclear Power Development (BNPD) will be considered a single project site.*

(c) The employer shall have direct recourse to the Ontario Labour Relations Board when the Board has under its consideration a dispute involving the assignment of work being done by employees covered by this agreement.

Section 5

UNION RIGHTS AND REPRESENTATIVES

5.1 The Union will designate Accredited Union Representatives to handle the day-to-day administration of this Agreement on the basis of not more than two representatives from the Union for each Project. The Union will notify the authorized representative of the Employer in writing of the names of such Union representatives, or alternates in the event of illness or unavailability, so that they may be issued identification cards to permit entry to the site. Upon entering the job site, such representatives after identifying themselves to the authorized representative of the Employer will be free to observe the progress and conduct of the work and to conduct normal union business associated with the administration of this Collective Agreement. The Union undertakes that these representatives will not unduly interfere in any way with said work.

5.2 The Accredited Union Representative reserves the right to appoint or remove a steward or stewards on any job where workmen are employed under the terms of this Agreement.

5.3 The Employer shall be notified in writing when a steward is appointed and when such stewards cease to act as stewards.

5.4 Stewards will be responsible for their regularly assigned work on behalf of the Employer.

5.5 Such stewards shall be allowed sufficient time to see that the provisions of this Agreement are observed.

5.6 No steward shall be discriminated against by the Employer because of the performance of his duties as a steward.

5.7 The Chief Steward shall be notified in advance, when reasonably possible, of all overtime. The Chief Steward shall provide the name of the steward who will work the overtime. If no steward is available to work the overtime then the Employer will have no further obligation under this Section.

5.8 Where appropriate and where more than one steward is required, one steward shall be appointed Chief Steward.

5.9 Where the Employer has only one steward appointed for a job, such steward will receive the same consideration given a Chief Steward.

5.10 The Chief Steward shall be the last to be laid off as long as he is capable of performing the remaining work.

5.11 The Employer shall receive the approval of the Accredited Union Representative prior to transferring a Chief Steward to another Project.

5.12 As the parties recognize the responsibilities of the Health and Safety Representative/Joint Health & Safety Committee member, this individual will be among the last five (5) employees kept on a project, providing he is capable of performing the remaining work.

5.13 If management feels that the Health and Safety representative/Joint Health & Safety Committee member is not discharging his health and safety duties in a manner that follows the intent and spirit of the legislation, the Employer may refer the issue to the grievance procedure.

Section 6

UNION SECURITY

6.1 All employees covered by this Agreement will be members or will apply for membership in CUSW within fifteen (15) calendar days, and will maintain such membership in good standing as a condition of employment.

6.2 A checkoff system of Union dues will be made operative for the lifetime of this Agreement. The Employer will supply full checkoff lists of employees subject to checkoff at regular intervals and agrees to collect monthly, or weekly as the case may be, for the Union dues payable to the Union. The Employer will transmit the monies so collected to the designated officials of the Union. The Union will indemnify the Employer for any liability arising form the deduction of dues as requested by the Union.

6.3 Any change in dues will be referred to the Employer through the Accredited Union Representative of the Union before any change is put into effect. Notification of any such change will be given to the Employer at least three (3) weeks prior to the effective date of implementation.

6.4 The Union is required to make arrangements with new employees to join CUSW as provided for in Subsection 6.1 of this Section.

Section 7

EMPLOYEE DESIGNATION

7.1 It is understood that foremen and sub-foremen hold responsible positions in the relationship between the Employer and the Union. Both parties agree that every effort should be made to recruit and retain foremen and sub-foremen who have a high degree of efficiency in the performance of their jobs and in the handling of their men. Recognizing the responsibilities involved in being a supervisor and a member of the Union, the Employer and the Union will make every effort to minimize problems that may arise which concern the relationship between the foremen and sub-foremen, the Employer and the Union.

7.2 The parties recognize the responsibilities of foremen and sub-foremen to discharge their managerial duties. If the Union feels that the foreman or sub-foreman is not discharging his managerial duties in a manner that is fair and equitable, or if the Employer feels that the Union is interfering with the foreman or sub-foreman in the performance of his managerial duties the grievance procedure may be invoked by either party.

7.3 The selection and retention of foremen and sub-foremen will be the responsibility of the Employer. When making appointments to the foreman and sub-foreman level, the Employer will give consideration to those journeymen they presently employ, however, this consideration does not create an obligation to make an appointment from these employees.

7.4 Such foremen and sub-foremen shall be members of the Union and shall register at the union office and shall be issued with clearance cards.

7.5 In the interest of efficiency and productivity, the Employer shall have the right to move foremen and sub-foremen from construction site to construction site.

7.6 The foremen's differential shall be eleven percent (11%) of the Journeyman's Base Hourly Rate. The sub-foremen's differential shall be six percent (6%) of the Journeyman's Base Hourly Rate. The rates of pay for all foremen and sub-foremen covered by this Agreement will be set forth in the current wage schedule(s). The Employer shall provide the Union with current wage schedule(s).

7.7 Where the crew size is five (5) or less, including the foreman, the foreman may be required to work with the tools of the trade. The foreman if not already eligible to work during scheduled hours of work, will not be used to replace a journeyman on overtime.

Section 8

EMPLOYMENT PRACTICES/HIRING

8.0 General

An office may be established by the employer for each Project. A purpose of this office will be to coordinate employment as specified in this Section.

The employer and the union will exchange the names of their representatives in each Project who will be responsible for co-operating in the referral and employment of reliable and competent union members.

Where practical the employer will notify the union of future manpower requirements for all employees coming within the scope of this agreement.

8.1 Hiring

The employment and layoff of tradesmen and apprentices, shall be carried out on the following basis and sequence:

(i) The employer agrees to hire and employ only members of the Canadian Union of Skilled Workers on work assigned to the Union in accordance with Section 4 (Work Assignment).

The employer shall submit requests to the Union for certified tradesmen and apprentices as required (see attached Letter of Understanding No.4 on Work Request Process). All requests shall include a description of the work, the number of tradesmen and apprentices required and the prerequisite skills, training and qualifications that these individuals must hold.

The Employer will either hire such persons or substantiate their reasons in writing for not doing so. No one will be employed unless they are in possession of a clearance card from CUSW.

(ii) If the Union is unable to furnish certified members or travel card holders to the Employer within three (3) working days of the time the Union office receives the request for tradesmen (excepting Saturdays, Sundays and Holidays), the Employer shall be afforded the right to employ certified tradesmen (travel card members or permit holders) as are available. The union will issue clearance cards to tradesmen hired in these circumstances.

(iii) All persons referred to the site, shall register with the employer prior to commencing work. Permit holders may be replaced by union members after three (3) working days notice to the employer, but in no case until a tradesperson has worked a minimum one week.

Notwithstanding the above, re-employment as required by the Workplace Safety and Insurance Board shall not be a violation of this Collective Agreement. The union agrees to issue a clearance slip to employees hired in these circumstances.

8.2 **Nuclear Sites**

Members being referred to Nuclear generating facilities will sign a Security Clearance Identification Report (SCIR) in order to commence the security clearance process prior to being referred for employment. Within three (3) working days the completed and signed SCIR shall be returned to the requesting Nuclear generating facility.

Union members who fail the Security Clearance process are not eligible for employment at a Nuclear generating facility.

The union agrees not to refer for employment members who fail the Security Clearance process.

If the Union is unable to furnish the employer the completed and signed SCIR's within the prescribed time limit, that is, within three working days from when the union receives the Help Requisition (excluding Saturdays, Sundays and Holidays) the employer shall be afforded the right to employ certified tradesmen (permit holders) as are available. The union will issue clearance cards to tradesmen hired in these circumstances.

Section 9

TRANSFER OF EMPLOYEES

9.1 The Employer reserves the right to transfer employees to meet its needs, having regard for the special requirements of thermal, nuclear or hydraulic generation construction.

9.2 The Employer shall provide transportation or pay the equivalent of the cost of public transportation or mileage, whichever is deemed appropriate by the Management, for the initial trip to the new work location from the employee's most recent work location.

9.3 The Employer shall also pay travelling time at the appropriate straight time rate up to a maximum of eight (8) hours per day.

Section 10

REDUCTION OF STAFF

10.1 When a reduction of staff is to take place at a project site, the Employer shall layoff the employees in the following sequence:

(i) permit holders;
(ii) travel card members;
(iii union members hired by the employer after May 26, 1996
(iv) Union members continuously employed by the Employer since May 26, 1996.

10.2 For those employees identified in 10.1(iv) above, the following procedure shall be utilized for staff reductions:

(i) For the purposes of this procedure, there shall be two (2) classifications of employee:

Electrician Journeymen (excluding Foremen)
Electrician Apprentice

(ii) The Employer shall decide which of the classifications listed above will be affected. Layoffs will be based on employee seniority on the project site, subject to the remaining employee(s) having the necessary skills and abilities to satisfactorily perform the remaining work.

10.3 Seniority is based on the Established Commencement Date (ECD) and shall be maintained if an employee is transferred to another project site.

10.4 When possible, the Employer shall notify the Union three (3) days prior to layoff but no later than by the day of the layoff. Failure of the Employer to notify the Union by the day of the layoff will entitle the Employee to an additional one (1) hour's pay.

Section 11

HOURS OF WORK

***Section 11* is applicable to work which is *not* covered by *Appendix A - Modified Provisions of this Construction Agreement*. Please refer to the *GENERAL NOTE* preceding the Index Page of this Agreement**

11.1 The normal weekly hours of work for all employees covered by this Agreement shall be thirty-eight (38) except as described in Subsection 11.4 below.

11.2 The weekly hours shall be worked in four (4) eight (8) hour days, Monday to Thursday inclusive, with the remaining six (6) hours to be worked on Friday.

11.3 The normal hours of work for employees working the third shift shall be thirty-two and one-half (32-1/2) made up of five (5) days of six and one-half (6-1/2) hours each.

11.4 The hours of work on Miscellaneous Projects (excluding Lakeview and R.L. Hearn Generating Stations) shall be forty (40) hours per week made up of five (5) days of eight (8) hours each, Monday to Friday inclusive.

11.5 A Miscellaneous Project is any work undertaken by OPGI which will require less than one year to complete and comprise a total work force of not more than one hundred employees at one time.

11.6 The normal starting time for day work hours shall be 8:00 a.m. By mutual agreement between the Employer and the Union, the starting time may be varied by one-half (1/2) hour either way. This variance will be established at the prejob conference or while the job is in progress.

11.7 No employee shall be required to work more than one shift in any twenty-four (24) hour period unless the overtime rate is paid.

Section 12

REST PERIODS

12.1 For employees working regularly scheduled hours, a fifteen (15) minute rest period will be allotted, at the time directed by the Employer, for each half shift worked. Where a half shift is less than four (4) hours, there shall be no rest period excluding the third shift.

12.2 For employees required to work overtime, a ten (10) minute rest period will be allotted prior to the end of the normal shift before commencing overtime work.

12.3 For employees working overtime, a fifteen (15) minute rest period will be allotted, at the time directed by the Employer, after each two hours of overtime worked.

Section 13

REPORTING PAY

13.1 An employee who reports for work, unless directed not to report the previous day by the Employer, shall receive a minimum of three (3) hours' pay plus his appropriate daily travel or board allowance at the applicable rate when he reports for work but is unable to commence or continue to work because of circumstances beyond his control. An employee will not receive this allowance if he is unable to complete his shift as a result of inclement weather.

13.2 Notwithstanding Subsection 13.1, when the Employer considers it necessary to shut down a job to avoid the possible loss of human life, because of an emergency situation that could endanger the life and safety of an employee, in such cases, employees will be compensated only for the actual time worked.

Section 14

INCLEMENT WEATHER PAY

14.1 An employee who reports for work at the beginning of a shift and is unable to commence work due to inclement weather will receive three (3) hours' pay. To qualify, the employee must remain at a protected place or area as designated by the Employer for three (3) hours unless excused by an authorized representative of the Employer.

14.2 An employee who reports for and commences work but is unable to continue work due to inclement weather shall receive three (3) hours pay at the applicable rate of pay or pay for the actual time worked for that shift, whichever is the greater.

14.3 An employee in receipt of inclement weather pay shall also receive travel or board allowance if applicable.

Section 15

VACATION AND RECOGNIZED HOLIDAYS

15.1 The holidays recognized under this Agreement are:

New Year's Day	Civic Holiday
Good Friday	Labour Day
Easter Monday	Thanksgiving Day
Victoria Day	Christmas Day
Canada Day	Boxing Day

15.2 The Employer agrees to recognize Heritage Day when proclaimed by legislation.

15.3 Recognized holidays falling on a Saturday or Sunday shall be observed on the following Monday. When Christmas Day falls on a Saturday or Sunday, it shall be observed on the following Monday and Boxing Day on the following Tuesday. When New Year's Day falls on a Saturday or Sunday, it shall be observed either on the preceding Friday or following Monday.

15.4 The Employer reserves the right to change the day of observation of a recognized holiday when such holiday falls on a Tuesday or Thursday.

15.5 The Employer agrees to pay vacation and recognized holiday pay on a weekly basis. The vacation pay rate shall be four percent (4%) of the base hourly rate earnings and the recognized holiday pay rate shall be six percent (6%) of the base hourly rate earnings.

Section 16

CALL-IN PAY

16.1 When an employee is called in to work outside of his regularly scheduled hours of work, he shall receive a minimum of two (2) hours' pay at double the straight time hourly rate plus travel allowance where applicable.

16.2 If the employee's normal hours of work commences within this two (2) hour period, the employee will be paid double the straight time hourly rate for the actual hours worked and revert to his normal rate at the commencement of his regularly scheduled hours of work.

16.3 The parties agree that Call-In Pay is not meant to replace nor be considered to be extension overtime.

Section 17

OVERTIME

17.1 When working on an eight (8) hour day and five (5) day per week work schedule (Monday to Friday inclusive), overtime work shall be paid at one and one-half (1 1/2) times the straight time hourly rate for all hours worked beyond the normal daily scheduled number of hours up to a maximum of two (2) hours per day. All hours in excess of 10 hours per day shall be paid at two (2) times the straight time hourly rate.

17.2 When working on a ten (10) hour day and four (4) day per week work schedule (Monday to Friday inclusive), overtime work shall be paid at one and one-half (1 1/2) times the straight time hourly rate for all hours worked beyond the normal daily scheduled number of hours up to a maximum of two (2) hours per day. All hours in excess of 12 hours per day shall be paid at two (2) times the straight time hourly rate.

17.3 Overtime work performed on Saturday, Sunday, Recognized Holidays and non-shift days shall be paid at two (2) times the straight time hourly rate.

17.4 Extension overtime may be worked either prior to or after the regularly scheduled hours of work.

Section 18

MEALS ON OVERTIME

18.1 **Scheduled Eight (8) Hour Shifts**

18.1.1 When an employee has not been notified the previous day that he will be required to work for more than two (2) hours beyond the normal quitting time of the first or second shifts or for more than three and one half (3 ½) hours beyond the normal quitting time of the third shift, he shall be provided with a meal and be allowed thirty (30) minutes to consume same and the employee shall be paid at the Base Hourly Rate of pay. This meal break will be taken following the first two (2) hours of overtime worked. After each additional four (4) hours is worked and when work is required beyond that four (4) hour period, the employee shall be allowed thirty (30) minutes to eat and be paid at the Base Hourly Rate of pay and he shall be provided with a meal. The Employer will supply a hot meal when possible. Where an employee has been notified the previous day, no meal will be provided after the first two (2) hours of overtime worked, but the employee will be allowed thirty (30) minutes to eat and be paid at the Base Hourly Rate of pay. After each additional four (4) hours is worked and when work is required beyond that four (4) hour period, the employee shall be allowed thirty (30) minutes to eat and be paid at the Base Hourly Rate of pay and he shall be provided with a meal.

18.1.2 When a paid meal period overlaps a rest period, the paid meal period will supplant the rest period.

18.1.3 The above-noted is not applicable to the first eight (8) hours worked on Saturdays, Sundays or Recognized Holidays for employees who normally work the first or second shifts.

18.1.4 The above-noted is not applicable to the first six and one-half (6 ½) hours worked on Saturdays, Sundays or Recognized Holidays for employees who normally work the third shift.

18.2 **Scheduled Ten (10) Hour Shifts**

18.2.1 When an employee has not been notified the previous day that he will be required to work beyond his normal quitting time, prior to commencing the overtime work, he shall be provided with a meal and be allowed thirty (30) minutes to consume same and the employee shall be paid at the Base Hourly Rate of pay. After each additional four (4) hours is worked and when work is required beyond that four (4) hour period, the employee shall be allowed thirty (30) minutes to eat and be paid at the Base Hourly Rate of pay and he shall be provided with a meal. The Employer will supply a hot meal when possible. Where an employee has been notified the previous day, no meal will be provided prior to the commencement of overtime work, but the employee will be allowed thirty (30) minutes to eat and be paid at the base hourly rate of pay. After each additional four (4) hours is worked and when work is required beyond that four (4) hour period, the employee shall be allowed thirty (30) minutes to eat and be paid at the Base Hourly Rate of pay and he shall be provided with a meal.

18.2.2 The above-noted is not applicable to the first ten (10) hours worked on Saturdays, Sundays, or Recognized Holidays for employee who normally work the first or second shifts.

18.2.3 When a paid meal period overlaps a rest period, the paid meal period will supplant the rest period.

Section 19

STANDOFF

19.1 An employee may be subject to standoff for up to six (6) weeks time accumulated in any one calendar year (January 1st to December 31st).

19.2 An employee may be subject to further standoff within the calendar year upon mutual consent of the Union and the Employer.

Section 20

WAGES AND PAY PROCEDURE

20.1 The rates of pay for employees in the classifications listed in Subsection 2.3 of this Agreement and working on the Employer's property shall be as set forth in the wage schedule(s) attached hereto.

20.2 The Normal pay procedure shall be as follows:

(i) Employees shall be paid weekly and payment for any given week will be made not later than the sixth working day after the close of the payroll period, but in any event not later than Thursday of the following week.

(ii) Wages shall be paid by the Employer on the job site, before quitting time by cheque payable at par in the locality of the job site. Accompanying each payment of wages shall be a statement, in writing, which can be retained by the employee, setting forth:

(a) the period of time or the work for which the wages are being paid;
(b) the rate of wages to which the employee is entitled;
(c) the amount of wages to which each employee is entitled;
(d) the amount of each deduction from wages of the employee and the purpose for which each deduction is made;
(e) any allowance or other payment to which the employee is entitled;
(f) the amount of vacation pay and holiday pay for which the employee is being credited;
(g) the net amount of money being paid to the employee.

(iii) In cases of inclement weather being declared on pay day, employees will receive their pay before leaving the site provided it is available on the site.

20.3 On termination, an employee will have his final pay and termination documents mailed to his last known address by registered mail within five (5) working days of the date of termination.

Once the mailing period has expired and an employee has yet to receive his final pay and termination documents, the employee shall have ten (10) days in which to notify the Employer in writing, of non-compliance with Section 20. Once the Employer has been notified of non-compliance, the employee will be entitled to two (2) hours of pay at the straight time rate for each normal work day of non-compliance.

Section 21

UNION AND BENEFIT FUNDS

21.1 The Employer agrees to pay into operative welfare, pension and/or other such plans, the amounts specified by the Union and identified in the wage schedule(s) attached hereto. Payment to the above-noted funds shall be based on each hour paid unless otherwise noted.

21.2 The Employer agrees to deduct from wages and remit to the Union, Union Funds. The amounts to be deducted and remitted will be as set out in the wage schedule(s) attached hereto.

21.3 The Union agrees to supply the Employer with administrative material and information regarding the Funds identified in this Section.

21.4 The trustees of the employee benefit plans referred to in this collective agreement shall promptly notify the Union of the failure of the Employer to pay any employee benefit contributions required to be made under this collective agreement and which are owed under the said plans in order that the program administrator of the Employee Wage Protection Plan may deem that there has been an assignment of compensation under the said program in compliance with the regulation to the Employment Standards Amendment Act, 1991 in relation to the Employee Wage Protection Program.

Section 22

TRAVEL AND ROOM AND BOARD ALLOWANCE

***Section 22* is applicable to work which is *not* covered by *Appendix A - Modified Provisions of this Construction Agreement*. Please refer to the *GENERAL NOTE* preceding the Index Page of this Agreement**

22.1 **Travel Allowance**

22.1.1 The daily travel allowance will be paid by the Employer to the employees who are not receiving room and board allowance as referred to in Subsection 22.2, on the following basis:

(i) If an employee lives within twenty (20) radius kilometers* of the project, no travel allowance will be paid.

(ii) If an employee lives within 20 to 40 radius kilometers of the project, he shall receive $ 15.60 per day ($16.10 effective May 1, 2001, $16.60 effective May 1, 2002, $17.10 effective May 1, 2003) travel allowance for each day worked or reported for.

(iii) If an employee lives within 40 to 56 radius kilometers of the project, he shall receive $ 18.85 per day ($19.35 effective May 1, 2001, $19.85 effective May 1, 2002, $20.35 effective May 1, 2003) travel allowance for each day worked or reported for.

(iv) If an employee lives within 56 to 80 radius kilometers of the project, he shall receive $ 22.10 per day ($22.60 effective May 1, 2001, $23.10 effective May 1, 2002, $23.60 effective May 1, 2003) travel allowance for each day worked or reported for.

(v) If an employee lives within 80 to 97 radius kilometers of the project, he shall receive $ 25.60 per day ($26.10 effective May 1, 2001, $26.60 effective May 1, 2002, $27.10 effective May 1, 2003) travel allowance for each day worked or reported for.

(vi) If an employee lives greater than 97 radius kilometers from the project and does not qualify for subsistence allowance under Subsection 22.2 below, he shall receive $ 29.85 per day ($30.35 effective May 1, 2001, $30.85 effective May 1, 2002, $31.35 effective May 1, 2003) travel allowance for each day worked or reported for provided he continues to travel greater than 97 radius kilometers daily.

22.1.2 When an employee is directed to report to a location that involves travelling around a natural barrier, the distance around the natural barrier shall be the shortest distance measured by a series of straight lines. The sum of the distances of these straight lines shall be applied to the ring concept to establish the employee's travel allowance entitlement, board allowance entitlement and initial and return allowance entitlement.

22.1.3 A natural barrier is defined as any obstruction or impediment which creates an unreasonable relationship between radius kilometers and actual kilometers travelled.

22.1.4 Upon application, payment of Room and Board/Travel Allowance will be issued for the first two pay periods. Failure to provide satisfactory proof of eligibility during this period, will result in cessation of payments and the recovery in two equal amounts. In the event of termination for any reason before full recovery, any balance owing will be deducted from the final pay.

* *For the purpose of this Section, "radius kilometers" shall be measured from the centre of the turbine hall on each project.*

Note: **Bruce G.S. "A", Bruce G.S. "B" and the Bruce Heavy Water Plants will be combined to form the Bruce Complex. Travel allowance for the Bruce Complex will be calculated from the midpoint of a straight line joining the centres of the Bruce G.S. "A' and Bruce G.S. "B" turbine halls.**

22.2 **Room and Board Allowance**

22.2.1 The following conditions will apply for employees whose regular residence* is more than 97 radius kilometers from the project:

(i) An Employer may supply either:

(a) free room and board in camp or a good standard of board and lodging within a reasonable distance of a project; or
(b) a subsistence allowance; or
(c) a travel allowance.

22.2.2 An employee may exercise his option not to stay in a camp or accept free room and board. An employee who exercises this option shall receive a room and board allowance as follows:

(i) When an employee's regular residence is more than 97 radius kilometers from a Project located North of the French River and the employee maintains temporary accommodation at or near the Project, the employee shall be paid a subsistence allowance of $70.00 per day ($72.00 effective May 1, 2001, $74.00 effective May 1, 2002, $76.00 effective May 1, 2003) for each day worked or reported for.

(ii) When an employee's regular residence is more than 97 radius kilometers from a Project located South of the French River and the employee maintains temporary accommodation at or near the project, the employee shall be paid a subsistence allowance of $57.00 per day ($59.00 effective May 1, 2001, $61.00 effective May 1, 2002, $63.00 effective May 1, 2003) for each day worked or reported for, subject to Subsection 22.2.2 (iii) below.

(iii) When an employee's regular residence is more than 97 radius kilometers from the Project and the employee commutes to work on a daily basis, the employee shall receive $30.10 per day ($30.60 effective May 1, 2001, $31.10 effective May 1, 2002, $31.60 effective May 1, 2003) for each day worked or reported for.

* *An Employee's "Regular Residence" is:*

The place where the employee maintains a self-contained, domestic establishment (a dwelling house, apartment or similar place of residence where a person generally eats and sleeps and for which he can show proof of financial commitment). This is in contrast to a boarding house facility which is not self-contained; and

The employee normally resides in the residence except for those periods of time when, because of the location of the work, the employee obtains temporary accommodation for that work location.

(iv) At the Pickering and Darlington Projects, employees who live beyond 97 radius kilometers from the Project, shall be paid a subsistence allowance of $45.00 per day ($48.00 effective May 1, 2001, $51.00 effective May 1, 2002, $54.00 effective May 1, 2003) for each day worked or reported for.

22.2.3 An employee shall not qualify for daily travel allowance or room and board allowance when such employee reports for work but does not remain at work for his scheduled daily hours unless excused by an authorized representative of the Employer. Such permission shall not be unreasonably denied.

22.2.4 The Union recognizes the Employer's right to charge for board and other existing services. The Employer fixes the charge for board and other existing services in camps at $25.00 per day. This will be applied on the following basis:

(i) An employee who remains in camp on a normally scheduled work day on which he does not work will be charged $25.00 per day unless he is excused from work for a legitimate reason by an authorized representative of the Employer.

(ii) An employee who is absent from work on Friday without approval and who remains in camp and who is still absent from work on the following Monday without approval will be charged for room and board for Friday, Saturday, Sunday and Monday.

(iii) An employee who remains in camp and who is absent from work without approval on Friday but who works the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

(iv) An employee who remains in camp and who works the Friday and is absent from work without approval on the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

Section 23

INITIAL AND RETURN TRAVEL AND TRANSPORTATION

23.1 On recruitment of tradesmen who live between 97 and 161 radius kilometers* from the project, the Employer shall pay $21.00 ($22.00 effective May 1, 2001, $23.00 effective May 1, 2002, $24.00 effective May 1, 2003) for the initial trip to the project.

23.2 On recruitment of tradesmen who live beyond 161 radius kilometers from the project, the Employer shall pay thirty-four cents ($0.34) per radius kilometer (thirty-five cents ($0.35) effective May 1, 2001, thirty-six cents ($0.36) effective May 1, 2002, thirty-seven cents ($0.37) effective May 1, 2003) plus travel time based on one hour's pay at the Base Hourly Rate for each 80 radius kilometers of travel, or part thereof, to a maximum of 8 hours' pay at the Base Hourly Rate for the initial trip to the project from where the tradesman lives or the Union Referral Hall for the project, whichever is closer to the project.

* *For the purpose of this Section, "radius kilometers" shall be measured from the centre of the turbine hall on each project.*

23.3 To qualify for payment in Subsections 23.1 or 23.2, the employee must remain at the project for a minimum of fifteen (15) working days or the duration of the job, whichever is lesser.

23.4 On termination of employment due to a reduction of staff, an employee entitled to payment under Subsections 23.1 or 23.2 shall be entitled to return expenses calculated in the same manner as in Subsections 23.1 or 23.2 above for the return trip from the project to where the tradesman lives or place of recruitment, whichever is closer to the project. An employee whose employment terminates for any reason other than reduction of staff shall not be eligible for return payment.

23.5 On the Thunder Bay Project and Atikokan Project, an employee shall qualify for a return trip from the Project to his regular residence for each thirty (30) days worked on the Project providing his regular residence is more than four hundred (400) radius kilometers from the Project.

23.6 For each entitlement, the Employer shall pay travel expenses on the basis of the equivalent cost of public transportation plus travel time based on one (1) hour's pay for each eighty (80) radius kilometers of travel, or part thereof, to a maximum of eight (8) hours' pay at the Base Hourly Rate.

Section 24

USE OF PERSONAL VEHICLE

24.1 An employee who is requested or receives approval from an authorized representative of the Employer to use his personal vehicle for the convenience of the Employer shall be reimbursed thirty-seven cents ($0.37) effective May 1, 2001, thirty-eight cents ($0.38) effective May 1, 2002, thirty-nine cents ($0.39) effective May 1, 2003) per kilometer travelled for such use of his vehicle.

Section 25

TOOLS AND CLOTHING

25.1 Employees shall be required to provide themselves with the ordinary hand tools of the trade as specified in the attached tool list. The Employer will provide insofar as is practical, separate facilities for storing the tools, but shall not be held responsible for losses, except as noted hereunder:

25.2 When personal tools valued in excess of $15.00 are lost due to fire, the Employer will consider replacement or payment value to a maximum of $500.00 based on the merit of each case. This will include only personal tools that a tradesman is required to have to perform the normal duties with the Employer.

25.3 The Employer agrees to compensate employees for tools lost by theft, as supported by claims submitted in writing with substantiating evidence to establish theft resulting from forcible entry to a locked storage provided by the Employer to a maximum of $500.00.

25.4 In the event of a loss by fire at a work location, replacement or payment of the full estimated value in excess of $15.00 but not exceeding $500.00 for the loss of personal clothing will be made.

25.5 In the event of a loss by fire at an Employer operated camp, replacement or payment of the full estimated value in excess of $15.00 but not exceeding $750.00 for the loss of personal clothing will be made.

25.6 Employees who have obtained tools from the Employer's tool crib shall be allowed sufficient time, in the opinion of Management, to return such tools to the tool crib during working hours. Employees receiving tools from such tool crib shall be held responsible for the return of such tools in good condition, subject to normal wear and tear. On layoff, employees will be allowed reasonable time to return tools to the tool crib.

25.7 Gang tools are tools which are issued to a foreman and are used by one or more members of the crew. Such tools are not identified on trade tool lists, nor are they the tools and equipment identified in this Section. Such tools shall be the responsibility of the Employer.

25.8 Employees eligible for payment under Subsections 25.2, 25.3, 25.4 or 25.5 above, shall be reimbursed within 60 days after the date of submitting a claim. The Employer shall provide tools for the employee to use during the replacement period.

25.9 Employees are required to wear protective clothing and use protective equipment appropriate for the work being done. The Employer shall supply employees working in close proximity to obvious fire hazards (i.e. open flame) with fire retardant coveralls.

25.10 On abnormally dirty and/or corrosive work, in which the employee's clothing may be excessively or permanently damaged, the Employer will supply protective clothing and equipment (including gloves and coveralls where appropriate) at no cost to the employee.

25.11 Employees shall supply themselves with, and wear at all times on the job, approved safety shoes.

25.12 When an Employer wishes an employee to wear a specifically identified safety helmet, the Employer shall provide it on loan, complete with a new liner.

25.13 Protective clothing and equipment (including gloves, coveralls and fire retardant coveralls) and rainwear that is provided by the Employer will be charged out to an employee and the employee shall be responsible for the return of such protective clothing and equipment (including gloves, coveralls and fire retardant coveralls) and rainwear upon completion of the work involved.

Section 26

GRIEVANCES AND ARBITRATIONS

26.1 Grievances within the meaning of the grievance and arbitration procedure shall consist only of disputes about the interpretation or application of particular clauses of this Agreement and about alleged violations of this Agreement. In the event of any dispute

concerning the meaning or application of any provision of this Agreement or a dispute concerning an alleged violation of this Agreement, there shall be no suspension or disruption of work, but such dispute shall be treated as a grievance and shall be settled, if possible, by the Employer and the Union. In the interests of expediting the procedure, the parties shall process grievances in the following manner.

26.2 **Preliminary Discussion**

26.2.1 Disputes arising out of the interpretation or alleged violation of this Agreement shall, if possible, be settled by discussion between the employee and/or his steward and the employee's supervisor.

26.3 **First Step**

26.3.1 If a dispute cannot be resolved by this method, the Chief Steward for the Union may file a formal grievance on the prescribed form with the Employer. Such grievance shall be filed within fifteen (15) working days of the alleged grievous act.

26.3.2 Within ten (10) working days of the filing of the grievance, the Employer shall investigate the grievance and convene a meeting to attempt to resolve it. The Employer shall give his reply on the prescribed form to the Chief Steward within five (5) working days from the date of the First Step meeting.

26.4 **Second Step**

26.4.1 If a dispute has not been resolved at the First Step of the grievance procedure, the Chief Steward may refer the grievance on the prescribed form to the Employer's Grievance Officer. Such grievances shall be referred within ten (10) working days after the disposition has been issued under the First Step of this procedure.

26.4.2 The Employer's Grievance Officer shall investigate the grievance and convene a meeting to attempt to resolve the matter within five (5) working days from the receipt of the grievance form which was completed at First Step.

26.5 **Employer or Policy Grievances**

26.5.1 The processing of Employer grievances shall begin at the Second Step. The Employer may submit either policy or specific grievances. The Union may also institute policy grievances at this Step. Such policy or specific grievances shall be submitted within thirty (30) days of the alleged grievous act.

26.6 **Time Limits**

26.6.1 The time limits as to both documents and procedure set out in the above Subsections shall be complied with by the parties to this Agreement provided, however, that the parties may mutually agree in writing in respect to an extension or waiver of any of the time limits imposed. Where no answer is given within the time limits specified in the grievance procedure, the employee concerned, the Union or The Employer shall be entitled to submit the grievance to the next step of the grievance procedure. Any grievance not processed within the time limits specified in the grievance procedure shall be deemed to have been withdrawn and ineligible for arbitration.

26.7 Alleged unjustified termination, discharge, suspension or disciplinary action may be grieved beginning at First Step.

26.8 Disputes about the interpretation or application of particular clauses of this Agreement and about alleged violations of this Agreement shall not be processed under Section 133 of the Labour Relations Act of Ontario by either party until the provisions set forth in this Section for the resolution of such disputes have been fully exhausted.

26.9 The Employer shall provide the necessary facilities for all grievance meetings.

26.10 If any dispute about the interpretation or application of particular clauses of this Agreement or about an alleged violation of this Agreement cannot be settled through the grievance procedure outlined in this Section, the matter may be submitted within thirty (30) days of its failure of settlement by grievance procedure by either the Employer or the Union to a Board of Arbitration for adjudication. The party desiring to submit the dispute to arbitration shall notify the other party in writing of its desire and the notice shall contain the name of the first party's nominee to an arbitration board. The recipient of the notice shall, within five (5) working days, inform the other party of the name of its nominee to the arbitration board. The two nominees so selected shall, within ten (10) working days of the appointment of the second of them, appoint a third person who shall be the Chairman. If the recipient of the notice fails to appoint a nominee, or if the nominees fail to agree upon a Chairman, the appointment shall be made by the Minister of Labour for Ontario upon the request of either party. The arbitration board, when selected or appointed, will proceed as soon as practicable to hear and determine the dispute and it shall issue a decision which is final and binding upon the parties and upon their respective members. The decision of a majority is the decision of the arbitration board, but if there is no majority, the decision of the Chairman governs.

26.11 The arbitration board shall have no power to add to or subtract from or modify any of the terms of this Agreement. The arbitration board shall not substitute its discretion for that of the parties except where the board determines that an employee has been discharged or otherwise disciplined for cause when this Agreement does not contain a specific penalty for the infraction that is the subject matter of the arbitration. In such cases, the arbitration board may substitute such other penalty for the discharge or discipline as to the arbitration board seems just and reasonable in all circumstances. The arbitration board shall not exercise any responsibility or function of the parties. The arbitration board shall not deal with any matter not contained in the original statement of grievance filed by the party referring the matter to arbitration.

26.12 In arbitration proceedings, each party shall pay the fees and expenses of its nominee, whether appointed by the party or by the Minister of Labour for Ontario, and the fees and expenses of the Chairman shall be shared equally by the parties.

26.13 The time limits as to both documents and procedure set out in this section shall be observed by the parties to this Agreement provided, however, that the parties may mutually agree in writing in respect to an extension or waiver of any of the time limits imposed.

26.14 There shall be no strikes or lockouts so long as this Agreement continues to operate.

Section 27

COMMITTEES AND APPRENTICESHIP

27.1 **Joint Committee**

The parties agree that a Joint Committee will be established consisting of Employer representatives and the Executive of CUSW which shall meet on a semi-annual basis to address issues of mutual concern.

27.2 **Apprenticeship**

27.2.1 The Employer recognizes that the Canadian Union of Skilled Workers has an Apprenticeship Council established for the purpose of training apprentices in the electrical industry.

27.2.2 The employer agrees to participate in the operation of the Apprenticeship Council. This Council will be a Joint Apprenticeship Council for purposes of the Apprenticeship and Tradesman's Qualification Act (or any successor Act)

27.2.3 The Apprenticeship Council shall be responsible for the establishment and maintenance of an apprenticeship training program, as well as adopting operating rules and conditions with respect thereto which are complementary to and in keeping with the intent of the Apprenticeship and Tradesman's Qualification Act (or any successor Act).

27.2.4 All apprentices shall be governed by the Ontario Apprenticeship and Tradesman's Qualification Act and Regulations. The staffing ratio will be one apprentice to six employees in all other classifications.

27.2.5 In order to expedite the Apprentice's entrance into Journeyman status, the following policy shall apply:

(i) The Apprentice must apply to the Apprenticeship Branch to write his examination as soon as possible after he has reached his total hours, less 300.

(ii) The Apprentice will give the Employee two weeks notice that he is going to write his examination.

(iii) After writing the examination, the Apprentice will check his Hours in his Progress Record Book.

(iv) The Employer will commence paying the Journeyman's rate of pay the day after the Apprentice completes his hours and providing the following conditions have been met:

(a) The Employer is satisfied that the Apprentice has completed his hours. If there is a question concerning the completion of hours , confirmation will be supplied by the employee and;

(b) The Employer is shown written proof of Certification from the Apprenticeship Branch and;

(c) The Apprentice has passed his examination for his Certification of Qualification (C of Q).

27.2.6 In the event that an Apprentice fails his examination for his C of Q, he will be paid the journeyman rate of pay from the day he passes any future examinations.

Section 28

LUNCHROOM FACILITIES

28.1 Adequately heated accommodation separate from changerooms and washrooms shall be provided by the Employer on each project when necessary and where such accommodation can be reasonably provided for.

28.2 Such accommodation shall be weatherproof and shall be kept reasonably clean.

28.3 A table and sufficient benches or seats for the employees on the job shall be provided in the accommodation. Trailerized or portable accommodation shall include tables, benches, light, heat maintained at a minimum sixty-eight (68) degrees Fahrenheit, proper access and egress, and shall not be used for material storage.

28.4 The Employer will provide, where practical, clean, heated, lighted and ventilated facilities containing flush toilets and hand basins.

Section 29

RADIATION WORK

29.1 The Employer will, upon request, make available to the Union the OPGI Radiation Protection Procedures.

29.2 Each employee will have access to his personal radiation exposure record.

29.3 Long-term employees who reach their exposure limit will be given alternate employment until they can resume radiation work.

29.4 Short-term employees will be given a guaranteed period of employment at their time of hire.

29.5 Employees working in a radiation area, in plastic suits or replacement material of the fully enveloping type with an independent air supply, will receive $8.00 per day. A day for the purpose of this item shall be defined as any period up to twelve (12) hours.

Section 30

ABORIGINAL CONTENT COMMITMENT

30.1 Where an aboriginal commitment has been established on a project, the Union will cooperate in meeting the content commitments.

30.2 For projects, or jobs within a project, that are less than $100,000 field labour, and have aboriginal content commitments, the terms of the collective agreement will not apply to these aboriginal commitments.

Dated at Toronto, this 7th day of October, 2001.

For:

ONTARIO POWER GENERATION INC

Max Jackson

CANADIAN UNION OF SKILLED WORKERS

Joe Mulhall

Harry Tomsett

TOOL LIST

All journeymen electricians are required to have the following tools:

1 Centre Punch
1 1/2" Cold Chisel
1 Half-round File
1 Ball Peen Hammer
1 Adjustable Hacksaw Frame
1 Knife
1 Medium Level
5 Prs. of Pliers -
8" Sidecutters, Diagonal, Longnose and 2 pairs of Channelock
6 Screwdrivers, Robertson and Standard types
1 6" Square or Combination Square
1 Steel Tape, 10 or 12-foot
1 Small Tap Wrench
1 Tool box
1 Tool Pouch and belt for hand tools

LETTER OF UNDERSTANDING NO.1

Between

ONTARIO POWER GENERATION INC.

And The

CANADIAN UNION OF SKILLED WORKERS

Security Clearance Expense Allowance

A member who successfully passes the required security clearance and hires on shall receive, on the first pay cheque, fifty dollars ($50) in consideration of the time and cost associated with the procedure for completing the authorizing forms and submitting to the security clearance check.

The Union will refer only members who have successfully passed the required security clearance.

Dated at Toronto this 14th day of July, 2000.

Max Jackson

For OPGI

Joe Mulhall

Harry Tomsett

For CUSW

LETTER OF UNDERSTANDING NO.2

Between

ONTARIO POWER GENERATION INC.

And The

CANADIAN UNION OF SKILLED WORKERS

The Parties recognize that the continued existence of CUSW is directly related to providing employment opportunities to CUSW members.

The parties agree as follows:

(a) Effective July 14, 2000, OPG will not contract out work at Nuclear facilities involving the use of tradespersons as identified in 2.4 unless at least one hundred (100) "direct hire" employees are employed by OPGI.

(b) Effective July 1, 2001, the number of "direct hire" employees associated with the above provision will be reduced to fifty (50).

(c) The provision outlined in (b) above expires December 31, 2001

(d) When OPG transfers operation of Bruce Nuclear to another company, the number of "direct hire" employees contemplated by (a) above will be reduced to sixty (60).

This new company will not be bound in any way by this Agreement.

Dated at Toronto this 14th day of July, 2000:

Max Jackson

For OPGI

Joe Mulhall

Harry Tomsett

For CUSW

LETTER OF UNDERSTANDING NO.3

Between

ONTARIO POWER GENERATION INC.

And The

CANADIAN UNION OF SKILLED WORKERS

When Ontario Power Generation Inc. contracts out work that may involve the use of tradespersons in the following classifications:

Electrician Journeyman (including foreman and subforeman)
Electrician Welder
Electrician Apprentice
Communications Electrician

(a) Contractors with contractual relations with the IBEW will have the work performed under the terms and conditions of the EPSCA/IBEW Collective Agreement using IBEW members

(b) All other contractors will have the work performed under the terms and conditions of the OPGI/CUSW Collective Agreement

The Labour Requirements process will be changed to reflect the above.

Dated at Toronto this 14th day of July, 2000.

Joe Mulhall

Harry Tomsett

For CUSW

Max Jackson

For OPG

LETTER OF UNDERSTANDING NO. 4

Between

ONTARIO POWER GENERATION INC.

And The

CANADIAN UNION OF SKILLED WORKERS

WORK REQUEST PROCEDURE

1. This procedure shall become effective July 14, 2000.

2. The parties agree the Employer may request twenty-five percent (25%) of the certified tradespeople hired. The number of tradespeople requested shall not exceed twenty-five percent (25%) of the total.

3. The option to request individual certified tradespersons will apply to each request and will not carry forward to future requests.

4. Reductions of staff will ensure that the individual certified tradespersons are laid off in the same manner in which the hiring occurred.

5. A spreadsheet shall be set up on a depersonalized basis to track the hiring and layoff procedure. The following can be used as guiding principles:

	HIRING	LAYOFF
	Employers Option:	**Employers Option:**
1 Person	N or U	N or U
2 Persons	N+U or two U	N+U or two U
3 Persons	N+U or three U	N+U or three U
4 Persons	N+3U	N+3U
5 Persons	2N+3U	N+4U
6 Persons	2N+4U	N+5U
7 Persons	2N+5U	N+6U
8 Persons	2N+6U	2N+6U
9 Persons	2N+6U	2N+7U
10 Persons	3N+7U	2N+8U
11 Persons	3N+8U	2N+9U
12 Persons	3N+9U	3N+9U
	N = Name Request	***U = Union Referral***

Dated at Toronto this 14th day of July, 2000.

Max Jackson

For OPG

Joe Mulhall
Harry Tomsett

For CUSW

APPENDIX A

MODIFIED PROVISIONS

OF THIS CONSTRUCTION AGREEMENT

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Article 1

HOURS OF WORK

1.1 A shift will be deemed to be established providing at least four (4) consecutive days of a shift are to be worked, excluding Saturdays, Sundays and Recognized Holidays. If an employee is removed from their scheduled shift prior to completing four (4) consecutive shifts, the employee will be paid shift differential for the balance of the four (4) consecutive shifts that would have been worked had the employee not been reassigned to another shift.

1.2 It may be necessary from time to time to vary the hours of work established in this Section. Any amendments to the hours of work will be established by mutual agreement between the Employer and the Union.

1.3 **One (1) or Two (2) Shift Operation**

1.3.1 The weekly hours of work shall consist of forty (40) hours for all employees of the Employer covered by this agreement and working on a one (1) or two (2) shift operation.

1.3.2 The weekly hours of work (Monday to Friday inclusive) may be arrived at by having the employees work four (4) consecutive ten-hour shifts or by having the employees work five (5) consecutive eight-hour shifts.

1.3.3 Weekly hours of work will be established for a minimum period of thirty (30) days.

1.3.4 If a project site intends to change the weekly hours of work, a minimum of two (2) weeks written notice shall be sent to the Union.

1.3.5 The start time for the day shift shall be 8:00 a.m. with a possible one (1) hour variance either way. The start time for the afternoon shift shall be immediately following the day shift or within one-half (1/2) hour either way to coincide with the end of the day shift.

1.3.6 The shift differential for those employees working the afternoon shift when a two shift operation has been established by the Employer will be one-seventh (1/7) of the Base Hourly Rate for scheduled hours worked on that shift.

1.4 **Three (3) Shift Operation**

1.4.1 When a three (3) shift operation is established by the Employer, the following conditions will apply:

1.4.2 Those employees working on the day shift shall work eight (8) hours at the straight time rate.

1.4.3 Those employees working on the afternoon shift shall work seven and one-half (7 1/2) hours per shift. A shift differential of one-seventh (1/7) of the Base Hourly Rate shall be paid for all normal scheduled shift hours worked.

1.4.4 Those employees working on the night shift shall work seven (7) hours per shift. A shift differential of one-fifth (1/5) of the Base Hourly Rate shall be paid for all normal scheduled shift hours worked.

1.5 **All Shifts – One, Two or Three Shift Operations**

1.5.1 The rate for the shift will be based on the day in which the shift begins.

1.5.2 An unpaid lunch period of one-half hour shall be allowed to be taken no later than five hours after the commencement of a shift.

1.5.3 It may be necessary, from time to time, to vary the shift starting times, with a possible variance of one (1) hour either way. When this occurs, a revised shift arrangement will be established.

1.6 **Seven (7) Day Operation**

1.6.1 When working under the provisions of this 7-day shift schedule all conditions listed below will supercede those contained in the other Sections of this collective agreement. Where this shift schedule is silent, the appropriate Section in the collective agreement applies.

1.6.2 This shift schedule is intended for work greater than four (4) weeks in duration, however, it is recognized that unforeseen circumstances may require the cancellation of this shift schedule.

1.6.3 If in the transition onto or off this 7-day shift schedule an employee would receive less than 40 paid hours in a pay period, the employee shall receive the difference between the total paid hours for that pay period and 40 hours pay. This does not apply to those employees who are laid off during or at the end of the schedule.

1.6.4 The employee(s) shift schedule consists of four consecutive ten (10) hour shifts (day, afternoon, or night) followed by four scheduled days off. Shift overlap may be required.

1.6.5 Shift work may be established by the employer to provide seven days per week work coverage, on a one, two, or three shift per day basis. When this occurs, a specific shift arrangement will be established by the employer detailing the shift schedule to be worked. The employer will provide the Union with at least 48 hours notice prior to the implementation of these shift provisions.

1.6.6 **First Shift**

Regularly scheduled hours of work Monday to Friday inclusive shall be paid at straight time hourly rates.

1.6.7 **Second Shift**

Regularly scheduled hours of work Monday to Friday inclusive shall be paid at straight time hourly rates plus a shift differential of one-seventh (1/7) of the Base Hourly Rate.

1.6.8 **Third Shift**

Regularly scheduled hours of work Monday to Friday inclusive shall be paid at straight time hourly rates plus a shift differential of one-fifth (1/5) of the Base Hourly Rate.

1.7 **All Shifts – 7 Day Operation**

1.7.1 Regularly scheduled hours of work on Saturday, Sunday, Statutory and Recognized Holidays shall be paid at two times the straight time hourly rate. Recognized Holidays will be observed on the actual day on which the holiday occurs or as declared by legislation.

Article 2

TRAVEL AND ROOM AND BOARD ALLOWANCE

2.1 **Travel Allowance**

2.1.1 Upon application, payment of Travel Allowance will be issued for the first two pay periods. Failure to provide satisfactory proof of eligibility during this period, will result in cessation of payments and the recovery in two equal amounts. In the event of termination for any reason before full recovery, any balance owing will be deducted from the final pay.

2.1.2 The daily travel allowance will be paid by the Employer to the employees who are not receiving room and board allowance as referred to in Subarticle 2.2, on the following basis:

(i) If an employee lives within forty (40) radius kilometers* of the project, no travel allowance will be paid.

(ii) If an employee lives within 40 to 56 radius kilometers of the project, he shall receive $18.85 per day ($19.35 effective May 1, 2001, $19.85 effective May 1, 2002, $20.35 effective May 1, 2003) travel allowance for each day worked or reported for.

(iii) If an employee lives within 56 to 80 radius kilometers of the project, he shall receive $22.10 per day ($22.60 effective May 1, 2001, $23.10 effective May 1, 2002, $23.60 effective May 1, 2003) travel allowance for each day worked or reported for.

(iv) If an employee lives within 80 to 97 radius kilometers of the project, he shall receive $25.60 per day ($26.10 effective May 1, 2001, $26.60 effective May 1, 2002, $27.10 effective May 1, 2003) travel allowance for each day worked or reported for.

* *For the purpose of this Article, "radius kilometers" shall be measured from the centre of the turbine hall on each project.*

(v) If an employee lives greater than 97 radius kilometers from the project and does not qualify for subsistence allowance under Subarticle 2.2 below, he shall receive $ 29.85 per day ($30.35 effective May 1, 2001, $30.85 effective May 1, 2002, $31.35 effective May 1, 2003) travel allowance for each day worked or reported for provided he continues to travel greater than 97 radius kilometers daily.

2.1.3 When an employee is directed to report to a location that involves travelling around a natural barrier, the distance around the natural barrier shall be the shortest distance measured by a series of straight lines. The sum of the distances of these straight lines shall be applied to the ring concept to establish the employee's travel allowance entitlement, board allowance entitlement and initial and return allowance entitlement.

2.1.4 A natural barrier is defined as any obstruction or impediment which creates an unreasonable relationship between radius kilometers and actual kilometers travelled.

Note: Bruce G.S. "A", Bruce G.S. "B" and the Bruce Heavy Water Plants will be combined to form the Bruce Complex. Travel allowance for the Bruce Complex will be calculated from the midpoint of a straight line joining the centres of the Bruce G.S. "A' and Bruce G.S. "B" turbine halls.

2.2 Room and Board Allowance

2.2.1 Upon application, payment of Room and Board will be issued for the first two pay periods. Failure to provide satisfactory proof of eligibility during this period, will result in cessation of payments and the recovery in two equal amounts. In the event of termination for any reason before full recovery, any balance owing will be deducted from the final pay.

2.2.2 The following conditions will apply for employees whose regular residence* is more than 97 radius kilometers from the project:

(i) An Employer may supply either:

(a) free room and board in camp or a good standard of board and lodging within a reasonable distance of a project; or
(b) a subsistence allowance; or
(c) a travel allowance.

** An Employee's "Regular Residence" is:*

1. *The place where the employee maintains a self-contained, domestic establishment (a dwelling house, apartment or similar place of residence where a person generally eats and sleeps and for which he can show proof of financial commitment). This is in contrast to a boarding house facility which is not self-contained; and*

2. *The employee normally resides in the residence except for those periods of time when, because of the location of the work, the employee obtains temporary accommodation for that work location.*

2.2.3 An employee may exercise his option not to stay in a camp or accept free room and board. An employee who exercises this option shall receive a room and board allowance as follows:

(i) When an employee's regular residence is more than 97 radius kilometers from a Project located North of the French River and the employee maintains temporary accommodation at or near the Project, the employee shall be paid a subsistence allowance of $70.00 per day ($72.00 effective May 1, 2001, $74.00 effective May 1, 2002, $76.00 effective May 1, 2003) for each day worked or reported for.

(ii) When an employee's regular residence is more than 97 radius kilometers from a Project located South of the French River and the employee maintains temporary accommodation at or near the project, the employee shall be paid a subsistence allowance of $57.00 per day ($59.00 effective May 1, 2001, $61.00 effective May 1, 2002, $63.00 effective May 1, 2003) for each day worked or reported for, subject to 2.2.3 (iv) below .

(iii) When an employee's regular residence is more than 97 radius kilometers from the Project and the employee commutes to work on a daily basis, the employee shall receive $30.10 per day ($30.60 effective May 1, 2001, $31.10 effective May 1, 2002, $31.60 effective May 1, 2003) for each day worked or reported for.

(iv) At the Pickering and Darlington Projects, employees who live beyond 97 radius kilometers from the Project, shall receive $45.00 per day ($48.00 effective May 1, 2001, $51.00 effective May 1, 2002, $54.00 effective May 1, 2003) for each day worked or reported for.

2.2.4 An employee shall not qualify for daily travel allowance or room and board allowance when such employee reports for work but does not remain at work for his scheduled daily hours unless excused by an authorized representative of the Employer. Such permission shall not be unreasonably denied.

2.2.5 The Union recognizes the Employer's right to charge for board and other existing services. The Employer fixes the charge for board and other existing services in camps at $25.00 per day. This will be applied on the following basis:

(i) An employee who remains in camp on a normally scheduled work day on which he does not work will be charged $25.00 per day unless he is excused from work for a legitimate reason by an authorized representative of the Employer.

(ii) An employee who is absent from work on Friday without approval and who remains in camp and who is still absent from work on the following Monday without approval will be charged for room and board for Friday, Saturday, Sunday and Monday.

(iii) An employee who remains in camp and who is absent from work without approval on Friday but who works the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

(iv) An employee who remains in camp and who works the Friday and is absent from work without approval on the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

Electrical Workers IBEW

PRINCIPAL AGREEMENT

for

Generation Projects Construction

in the

Electrical Power Systems Sector

made and entered into

between

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION
(hereinafter called "EPSCA")

and

THE IBEW
ELECTRICAL POWER COUNCIL OF ONTARIO
representing the following affiliated Local Unions
105, 115, 120, 303, 353, 402, 530, 586,
773, 804, 894, 1687, 1739
(hereinafter called the "Union")

May 1, 2000 - April 30, 2004

EPSCA/IBEW EPCO GENERATION PROJECTS COLLECTIVE AGREEMENT

GENERAL NOTE

This Collective Agreement distinguishes between two broad categories of work; namely, work that is covered by the *"modified provisions"* of this construction agreement and work that is not. *"Modified provisions"* apply to most work on existing generating sites. Following is a more detailed explanation:

The *"Modified Provisions"* of this Construction Agreement will apply to:

all work on existing generating sites except the construction of:

- **a new facility which provides a new function**
- **a new (ie. additional) generating unit**

Appendix A contains the *"Modified Provisions of this Construction Agreement"*. All terms of this collective agreement shall apply to work covered by Appendix A, with the exception of Section 8 - Hours of Work and Section 11 - Travel and Room and Board Allowance. The above Sections 8 and 11 do not apply when working under the terms and conditions of the *"modified provisions"*, as these Sections are replaced by Articles 1 and 2 of Appendix A.

When work does not fall within the scope of Appendix A, all terms of this agreement, with the exception of Appendix A, apply.

A chart to illustrate the above applications follows:

Generating - Existing Sites Excluding construction of new facility (new function) &/or new (additional) generating unit(s)	Generating - Existing Sites Involving construction of new facility (new function) & /or new (additional) generating unit(s)	Generating - New Sites (ie. Greenfield Work)
Use Appendix A - Modified Provisions for Hours of Work, and Travel & Room & Board Allowance.	Use all the provisions of the collective agreement, *except* Appendix A.	Use all the provisions of the collective agreement, *except* Appendix A.

EPSCA/IBEW EPCO GENERATION PROJECTS COLLECTIVE AGREEMENT

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SECTION 1 — PREAMBLE

100
Witnesseth

A. WHEREAS EPSCA is an Association formed to represent Employers engaged in construction industry work in the electrical power systems sector in collective bargaining and on their behalf enter into collective agreements covering those of their employees in the bargaining unit as hereinafter defined; and

WHEREAS the Union, as defined in the covering page of this Collective Agreement, has in its membership competent, skilled and qualified journeymen and apprentices to perform work coming within the trade and craft jurisdiction; and

WHEREAS EPSCA and the Union desire to mutually establish and stabilize wages, hours and working conditions for journeymen and apprentices employed by Employers within the electrical power systems sector of the construction industry, and further, to encourage closer co-operation and understanding between EPSCA and the Union to the end that a satisfactory, continuous and harmonious relationship will exist between the parties to this Agreement.

NOW THEREFORE, EPSCA and the Union mutually agree that the working conditions as set out below shall be applicable throughout the Province of Ontario.

SECTION 2 — SCOPE OF AGREEMENT

200
Recognition

A. (i) EPSCA recognizes the Union as the exclusive collective bargaining agency for a bargaining unit as defined in Section 200 A (ii) engaged in construction industry work performed on Ontario Power Generation Inc. (OPGI) facilities.

(ii) The bargaining unit shall comprise the classifications of electrician journeyman (including foreman and subforeman), electrician welder, electrician apprentice and communications electrician. If additional classifications are required, they will be negotiated as appropriate for work on Ontario Power Generations Inc. (OPGI) property.

(iii) Ontario Power Generations Inc. (OPGI) generating facilities shall mean generating stations, hydraulic works, heavy water facilities, microwave and repeater stations and Miscellaneous Hydraulic Projects located on Ontario Power Generation Inc. (OPGI) property but excludes the building of commercial-type office facilities at locations remote from operating facilities.

B. The terms and conditions of this Agreement will apply when contracts are awarded by Ontario Power Generation Inc. (OPGI) to Employers in contractual relations with the IBEW, or otherwise required to apply the terms of this Agreement.

C. The Union recognizes EPSCA as the sole and exclusive collective bargaining agency for all of the Employers covered by this Agreement, and in all matters pertaining to the administration of this Collective Agreement.

D. The term "employee" shall include all employees of the Employers in the classifications as set out in Item A (ii) above.

E. A subforeman is an individual who exercises supervisory responsibility and may use the tools of the trade.

F. The term "Employers" shall include individual members of EPSCA and any company, partnership, sole proprietorship, joint venture, contractor, subcontractor or any person that agrees to be bound by the terms and conditions of this Agreement.

G. Notwithstanding the provisions contained in this Subsection, this Agreement does not alter existing agreements and practices operative between individual Employers and the Union with respect to General Foremen.

H. The classifications referred to in Item A (ii) do not establish craft jurisdiction. Such jurisdiction is established in accordance with Section 4 of this Collective Agreement.

I. EPSCA and the Union agree that the use of nomenclature is meant to refer to both genders.

201
Form of
Agreement

A. This Agreement shall consist of a master portion of general application to the construction field forces represented by the Union together with the following Appendices and/or wage schedules of particular application to employees represented by the Union at Projects or in areas as noted in Subsection 202 below, and shall also be deemed to include any additional Appendix and/or wage schedule added, as the said Appendices and/or wage schedules may be revised by EPSCA and the Union from time to time.

202
Geographic
Jurisdiction

A.

Local	Geographic Jurisdiction	Project
Hamilton (105)	Brant, Haldimand-Norfolk Region, Hamilton-Wentworth Region and that portion of Halton Region west of Trafalgar Road and South of the 401 in the Province of Ontario except the portion of Haldimand-Norfolk Region east of the road running south from Caistorville to Lake Erie.	Nanticoke
Quinte-St. Lawrence (Kingston) (115)	Counties of Prince Edward, Hastings, Lennox and Addington, Frontenac, Leeds, Grenville, Dundas, Stormont and Glengarry.	
London (120)	Counties of Elgin, Huron, Middlesex and that portion of the Restructured County of Oxford north of a straight east to west line connecting the Town Line Road and Newell Road in the Town of Tillsonburg in the Province of Ontario	
Niagara Peninsula (St. Catharines) (303)	The Niagara Region and the portion of Haldimand-Norfolk Region east of the road running south of Caistorville to Lake Erie.	

Local	Geographic Jurisdiction	Project
Toronto (353)	The Regional Municipalities of York and Peel and that portion Dufferin County east of Highway #10 and south of Highway #9 and is part of the Town of Orangeville. That portion of Regional Municipality of Halton east of the Eighth Concession Line and south of 401 to Lake Ontario and the Municipality of Metro Toronto.	Lakeview R.L. Hearn
Thunder Bay (402)	Districts of Thunder Bay, Rainy River and that portion of the District of Kenora bounded on the West by the Manitoba border and on the East by the 87° Meridian, in the Province of Ontario.	Thunder Bay Atikokan
Sarnia (530)	Lambton County.	
Ottawa (586)	Counties of Lanark, Regional municipality of Ottawa-Carleton Renfrew, Prescott and Russell in the Province of Ontario, and the entire Province of Quebec.	
Windsor (773)	Essex and County and the. municipality of Chatham-Kent.	J.C. Keith
Central Ontario (Kitchener) (804)	The Region of Waterloo, the Counties of Wellington, Perth, Bruce, Grey and Dufferin except that portion of Dufferin County laying east of Hwy #10 and south of Hwy #9 and in that portion of Halton Region north of Hwy 401 in the Province of Ontario.	Bruce

Local	Geographic Jurisdiction	Project
Oshawa-Port Hope (894)	Durham Region, Northumberland Victoria, Peterborough and Haliburton Counties in the Province of Ontario, and that portion of Simcoe County east of Lake Simcoe and Lake Couchiching.	Pickering Darlington Wesleyville
Sudbury (1687)	Districts of Algoma, Cochrane, Nipissing Sudbury, Timiskaming, Manitoulin Island the District of Parry Sound, and the Sudbury Region save and except the Townships of Humphrey, Conger, Christie, Foley, Cowper, McKellar, McDougall and Hagerman; that portion of the District of Kenora bounded on the West by the 87° Meridian and on the East by the Quebec border in the Province of Ontario.	
Georgian Bay (1739)	Barrie and Orillia, all of Simcoe County and the District Municipality of Muskoka and the Townships of Humphrey, Conger, Christie, Foley, Cowper, McKellar, McDougall and Hagerman in the County of Parry Sound, except the portion of Simcoe County east of Lake Simcoe and Lake Couchiching.	

SECTION 3 **DURATION OF AGREEMENT**

300 Duration **REV**

A. This Agreement shall become effective May 1, 2000 and will expire on April 30, 2004.

301 Notice

A. Either party to this Agreement may give notice in writing to the other party not more than 90 days prior to the expiry date and not less than 30 days prior to the expiry date of this Agreement and negotiations must begin within 15 days of the giving of notice. If there is no notice given of change or termination of this Agreement, as mentioned in this Section, this Agreement shall remain in effect from term to term thereafter.

302
Amendments

A. This Agreement shall be subject to amendment at any time by mutual consent of the parties hereto. Any such amendment agreed upon shall be reduced to writing, signed by the parties hereto and approved by the International Office of the Union, the same as this Agreement.

SECTION 4 **WORK ASSIGNMENT**

400
Advance
Notice

A. EPSCA will advise the Union of all new construction work coming under the scope of this Agreement for the construction field forces of the Employers.

EPSCA will convene a prejob conference before work commences to discuss the preliminary details of the proposed work to be performed and to establish conditions in accordance with this Agreement for the Project.

B. Subsequent prejob conferences will be convened by EPSCA before specific portions of work commence to discuss the final details of the work and to establish conditions in accordance with this Agreement for that work.

C. Upon the request of the Union a prejob conference will be convened by EPSCA.

D. EPSCA will provide written notice to the Union as far in advance as possible of new work and prejob conferences as noted in Item A and Item B above.

401
Work
Assignment

A. The Employer who has the responsibility for the work shall make a proposed assignment of the work involved. The Employer shall be responsible for providing copies of proposed assignments to the Union (International Office and Local Union Office). The Employer will specify a time limit for the Union to submit evidence supporting its claims. The Employer will evaluate all evidence submitted and make a final assignment of the work involved. This final assignment will be in accordance with the procedural rules established by the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry. The Employer will advise the Union of the final assignments prior to the work commencing.

When a jurisdictional dispute exists between unions and upon request by the IBEW, the Employer shall furnish the IBEW International Office a signed letter from a duly authorized official of the company on employer stationery, stating whether or not the Union was employed on specific types of work on a given project. The Employer agrees to consider evidence of established practices within the construction industry generally when making jurisdictional assignments.

B. A markup process will be utilized when an Employer intends to perform work on a project site*. The purpose of the markup process is to indicate to the Union the work which is planned to be carried out by the Employer in order to minimize the potential for jurisdictional disputes.

REV When work is to be performed on a project site and it meets the following criteria; same employer, same work, same project site, the markup process will not be required. This procedure shall not preclude the Union's right to contest previously disputed work. In the Electricity Production Zones when work falls within this criteria the EPSCA Office will send out a "Notification of Work" along with a copy of the original minutes of mark-up meeting(s) to the Local Unions prior to work commencing. This procedure shall not preclude the Unions' right to contest previously assigned work, if the work is in a Local Union jurisdiction other than the one it was marked up in.

When an Employer has work that is less than a three (3) week duration and there are ten (10) or fewer employees covered by EPSCA Collective Agreements employed on this specific work, the Union will be notified of the scope of work and the Employer's proposed work assignments. The Union will have two (2) weeks from the date of notification to submit jurisdictional claims and supporting evidence to the Employer for consideration. The Employer will notify the Union of the final work assignments prior to the commencement of the work.

All work that does not meet the criteria set out in paragraphs 2 and 3 above, will be reviewed and assigned at a markup meeting.

EPSCA will provide written notice to the Union (International Office and Local Union Office) as far in advance as possible of markup meetings. The Union may attend these markup meetings and every effort will be made to settle questions of jurisdiction before the work is expected to commence.

REV *** For the purposes of this Section, Nanticoke, Lambton, Bruce Nuclear Power Development (BNPD), Darlington, Pickering, Lakeview/Hearn and the five (5) Electricity Production Zones are each considered one project site.**

The EPSCA representative will record the proposed assignments and jurisdictional claims and forward a copy of them within fifteen (15) working days to the Union (International Office and Local Union Office).

The parties recognize that circumstances may arise, particularly with discovery and emergency work, where the mark-up process may not be practical or possible. However, reasonable effort will be made by the Employer to adhere to the jurisdiction of the IBEW.

402 Jurisdictional Disputes

A. The jurisdiction of the Union shall be that jurisdiction established by agreements between International Unions claiming the work or decisions of record recognized by the AFL-CIO for the various classifications and the character of work performed.

B. In the event that a jurisdictional dispute arises over a work assignment, the Employer will make an assignment for the work to be done. If any Union or Unions disagree with such a work assignment, the parties will settle such jurisdictional dispute in accordance with procedure as outlined by the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry, or any successor thereto.

C. In the event that a jurisdictional dispute cannot be settled on a local basis by the Unions involved, it shall be submitted to the International Unions involved for settlement without permitting it to interfere in any way with the progress of the work at any time. In the event the dispute is not settled by the International Unions involved, it shall then be submitted to the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry for resolution. The International Representative of the Union will advise EPSCA in writing of his intent to submit a jurisdictional dispute to the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry and will identify in detail the work in question. The decision of the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry will be final and binding to the parties to this Agreement.

D. EPSCA shall have direct recourse to the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry when the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry has under its consideration a dispute involving the assignment of work being done by employees who are covered by this Agreement.

SECTION 5 UNION RIGHTS AND REPRESENTATIVES

500 Accredited Union Representatives

A. The Union will designate local Union representatives as Accredited Union Representatives to handle the day-to-day administration of this Agreement on the basis of not more than two representatives from the Union for each Project. The Union will notify the General Manager of EPSCA in writing of the names of such Union representatives, or alternates in the event of illness or unavailability, so that they may be issued identification cards to permit entry to the site. Upon entering the job site, such representatives after identifying themselves to the EPSCA Representative and the authorized representative of the Employer, will be free to observe the progress and conduct of the work and to conduct normal union business associated with the administration of this Collective Agreement. The Union undertakes that these representatives will not unduly interfere in any way with said work.

501 Union Stewards

A. The Accredited Union Representative reserves the right to appoint or remove a steward or stewards on any job where workmen are employed under the terms of this Agreement.

B. The EPSCA Representative and the Employer shall be notified in writing when a steward is appointed and when such stewards cease to act as stewards.

C. The steward will be responsible for his regularly assigned work on behalf of his Employer.

D. Such stewards shall be allowed sufficient time to see that the provisions of this Agreement are observed.

E. No steward shall be discriminated against by the Employer because of the performance of his duties as a steward.

F. Provided he is qualified to perform the work, the steward shall have the opportunity to work on all overtime. The steward shall be notified in advance of all overtime.

G. Where appropriate and where more than one steward is required, one steward shall be appointed Chief Steward.

H. The Chief Steward shall not have his employment terminated without the consent of the Accredited Union Representative until as near as possible to the completion of the job, unless with just cause. Where an Employer has only one steward appointed for a job, such steward will receive the same consideration given a Chief Steward as noted above.

I. The Employer shall receive the approval of the Accredited Union Representative prior to transferring a steward to another Project.

502 Health & Safety Representatives

A. As the parties recognize the responsibilities of the Health and Safety Representative/Joint Health & Safety Committee member, this individual will be among the last five (5) employees kept on a project, providing s/he is capable of performing the remaining work.

B. If management feels that the Health and Safety representative/Joint Health & Safety Committee member is not discharging his/her health and safety duties in a manner that follows the intent and spirit of the legislation , the Employer may refer the issue to the Executive Committee for resolution. If the matter cannot be resolved by the Executive Committee, the grievance procedure may be invoked.

SECTION 6 **EMPLOYEE DESIGNATION**

600 Foremen and Subforemen

A. It is understood that foremen and subforemen hold responsible positions in the relationship between the Employers and the Union. Both parties agree that every effort should be made to recruit and retain foremen and subforemen who have a high degree of efficiency in the performance of their jobs and in the handling of their men. Recognizing the responsibilities involved in being a supervisor and a member of the Union, the Employers and the Union will make every effort to minimize problems that may arise which concern the relationship between the foremen and subforemen, the Employers and the Union.

B. The parties recognize the responsibilities of foremen and subforemen to discharge their managerial duties. If the Union feels that the foreman or subforeman is not discharging his managerial duties in a manner that is fair and equitable, or if an Employer feels that the Union is interfering with the foreman or subforeman in the performance of his managerial duties, the Employer or the Union may refer the problem to the Executive Committee referred to in Section 14 - Committees, Subsection 1400 - Executive Committee, for resolution. If the matter cannot be resolved by the Executive Committee, the grievance procedure may be invoked by either party.

C. The selection and retention of foremen and subforemen will be the responsibility of the Employers. When making appointments to the foreman and subforeman level, the Employers will give consideration to those journeymen they presently employ, however this consideration does not create an obligation to make an appointment from these employees.

D. Such foremen and subforemen shall be members of the IBEW and shall register at the local union office and shall be issued with clearance cards.

E. In the interest of efficiency and productivity, the Employer shall have the right to move foremen and subforemen from construction site to construction site.

REV

F. The foremen's differential shall be the greater of $3.00 or the established percentage above the journeyman rate differential as set out in the existing wage schedules. The subforeman's differential shall be the greater of $2.00 or the established percentage differential above the journeyman rate as set out in the existing wage schedules. The rates of pay for all foremen and subforemen covered by this Agreement will be set forth in the current wage schedules. EPSCA will provide the Union with current wage schedules.

G. For conditions applying to General Foremen, refer to Subsection 200, Item G.

H. Where the crew size is five (5) or less, including the foreman, the foreman may be required to work with the tools of the trade.

SECTION 7

EMPLOYMENT PRACTICES/HIRING

700
Employment
Practices

A. For purposes of this Section, a geographic area will be established for each Project in accordance with the geographic jurisdiction established in Section 2, Subsection 202, of this Agreement.

B. An office will be established by EPSCA, or by the Employer with the approval of EPSCA, for each Project. A purpose of this office will be to coordinate employment as specified in this Section.

C. EPSCA, or the Employer with the approval of EPSCA, and the Union will exchange the names of their representatives in each of the areas described in Item A who will be responsible for co-operating in the referral and employment of reliable and competent Union members.

D. EPSCA will notify the Union of future manpower requirements for all employees coming within the scope of this Agreement.

E. The Union recognizes that where key tradesmen are required, the number will be jointly determined at a prejob conference provided for in Section 4, Subsection 400, of this Agreement.

701 Hiring

A. The employment and layoff of tradesmen and apprentices, excluding key key tradesmen, shall be carried out on the following basis and sequence:

(i) The Employer agrees to hire and employ only members of the International Brotherhood of Electrical Workers on all electrical work. The EPSCA office, or the Employer's office will request the appropriate Local Union office for certified tradesmen and apprentices required and no one will be employed unless they are in possession of a clearance card from the Local Union office.

REV

(ii) If the Local Union is unable to furnish certified Local Union members to the Employer within three (3) working days of the time the Local Union office receives the request for tradesmen (except Saturdays, Sundays and Holidays), the Employer has the right to transfer Union members already in its employ to the project, subject to 701 A (iii). Following this, the Local Union will furnish travel card members as available. Then the Employer shall be afforded the right to employ travel card or permit holders as available. The Local Union will issue clearance cards to those hired in these circumstances. All employees will report to the EPSCA Office, or the Employer's office, prior to commencing work. Travel card members may be replaced by Local Union members and permit holders may be replaced by Local Union members or travel card members who maintain a regular residence in the geographic area of the project after three (3) working days' notice to the Employer, but in no case until a tradesman has worked a minimum of one (1) week.

NEW

(iii) It is agreed that when the Local Union cannot supply local members to a job or project, the employer will be allowed to transfer current employees who have been in their employ for a minimum of one (1) year, to the site or project. The employer must notify the union when placing a call of the number of current employees eligible for transfer to the site.

B. In all cases of layoff, the Employer shall layoff its employees in the following sequence:

(i) permit holders;
(ii) travel card members from Local Unions outside Ontario;
(iii) travel card members from Local Unions within Ontario;
(iv) Applicable Local Union members.

C. When possible, the Employer shall notify the Local Union Office three (3) days prior to layoff but no later than by the day of the layoff. Failure of the Employer to notify the Union office by the day of layoff will entitle the Employee to an additional one (1) hour's pay.

D. Notwithstanding 701 A, 701 B and 701 C, re-employment as required by the Workplace Safety and Insurance Board shall not be a violation of this collective agreement nor be subject to the provisions of Section 7.

E. Any Employer undertaking electrical work within the jurisdiction of a Local Union shall be allowed two (2) Key Trades Persons. Such Key Trades Person(s) shall be Members of the IBEW and shall notify the Local Union Office in the appropriate jurisdiction, prior to commencing work. Such Key Trades Person(s) shall be issued a referral(s). Upon completion of said work the Key Trades Person(s) shall notify the applicable Local Union in the area where the work was completed of his/her departure. Should additional Key Trades Person(s) be required, the number will be determined by mutual agreement.

SECTION 8 HOURS OF WORK

Section 8 is applicable to work which is _not_ covered by _Appendix A - Modified Provisions of this Construction Agreement._ Please refer to the _GENERAL NOTE_ preceding the Index Page of this Agreement

800 Hours of Work

A. The normal weekly hours of work for all employees of Employers covered by this Agreement shall be thirty-eight (38) except as described in subsection 800B below. The weekly hours shall be worked in four (4) eight (8) hour days, Monday to Thursday inclusive, with the remaining six (6) hours to be worked on Friday.

B. The normal hours of work for employees working the third shift shall be thirty-two and one-half (32-1/2) made up of five (5) days of six and one-half (6-1/2) hours each.

The hours of work on Miscellaneous Projects (excluding Lakeview and R.L. Hearn Generating Stations) shall be forty (40) hours per week made up of five (5) days of eight (8) hours each, Monday to Friday inclusive.

A Miscellaneous Project is any work which will require less than one year to complete and comprise a total Employers' work force of not more than one hundred employees at one time.

801 Daily Hours

A. The normal starting time for day work hours shall be 8:00 a.m. By mutual agreement between EPSCA and the Union, the starting time may be varied by one-half (1/2) hour either way. This variance will be established at the prejob conference or while the job is in progress.

802 Rest Periods

A. For employees working normal hours, a fifteen (15) minute rest period will be allotted, at the time directed by the Employer, for each half shift worked. Where a half shift is less than four (4) hours, there shall be no rest period excluding the third shift.

B. For employees required to work overtime, a ten (10) minute rest period will be allotted prior to the end of the normal shift before commencing overtime work.

C. For employees working overtime, a fifteen (15) minute rest period will be allotted, at the time directed by the Employer, after each two hours of overtime worked.

803 Reporting Pay

A. An employee who reports for work, unless directed not to report the previous day by his Employer, shall receive a minimum of three (3) hours' pay plus his appropriate daily travel or board allowance at the applicable rate when he reports for work but is unable to commence or continue to work because of circumstances beyond his control. An employee will not receive this allowance if he is unable to complete his shift as a result of inclement weather.

B. Notwithstanding Subsection 803, Item A above, when an Employer considers it necessary to shut down a job to avoid the possible loss of human life, because of an emergency situation that could endanger the life and safety of an employee, in such cases, employees will be compensated only for the actual time worked.

804 Inclement Weather Pay

A. An employee who reports for work at the beginning of a shift and is unable to commence work due to inclement weather will receive three (3) hours' pay at the applicable rate. To qualify, the employee must remain at a protected place or area as designated by the Employer for three (3) hours unless excused by an authorized representative of his Employer.

B. An employee who reports for and commences work but is unable to continue work due to inclement weather shall receive three (3) hours' pay at the applicable rate or pay for the actual time worked for that shift, whichever is the greater.

C. An employee in receipt of inclement weather pay shall also receive travel or board allowance if applicable.

805 Recognized Holidays

A. The holidays recognized under this Agreement are:

New Year's Day	Civic Holiday
Good Friday	Labour Day
Easter Monday	Thanksgiving Day
Victoria Day	Christmas Day
Canada Day	Boxing Day

B. EPSCA agrees to recognize Heritage Day when proclaimed by legislation.

C. Recognized holidays falling on a Saturday or Sunday shall be observed on the following Monday. When Christmas Day falls on a Saturday or Sunday, it shall be observed on the following Monday and Boxing Day on the following Tuesday. When New Year's Day falls on a Saturday or Sunday, it shall be observed either on the preceding Friday or following Monday.

D. EPSCA reserves the right to change the day of observation of a recognized holiday when such holiday falls on a Tuesday or Thursday.

806 Overtime Rates

A. Overtime shall be paid at two times the straight time rate for all work performed outside of normal hours as defined in Section 8 and for work performed on Saturday, Sunday and the recognized holidays listed in Subsection 805, Item A above.

B. When an employee has not been notified the previous day that he will be required to work for more than two (2) hours beyond the normal quitting time of his shift and after approximately two (2) hours has been worked, he shall be provided with a lunch and allowed thirty (30) minutes to consume same and be paid at the base hourly rate of pay. After each additional four (4) hours is worked, the employee shall be allowed thirty (30) minutes to eat and be paid at the base hourly rate of pay and a lunch when work is required beyond that four (4) hour period. Where an employee has been notified the previous day, no lunch will be provided, but the employee will be allowed thirty (30) minutes to eat and be paid at the base hourly rate of pay.

When a paid meal period overlaps a rest period, the paid meal period will supplant the rest period.

To qualify for the above-noted provisions, on a Friday, an employee will be required to work for more than four (4) hours beyond the normal quitting time of his shift.

The above-noted is not applicable to the first eight (8) hours worked on Saturdays, Sundays and Recognized Holidays.

807
Call-In
Pay

A. When an employee is called in to work outside of his normal hours of work, he shall receive a minimum of two (2) hours' work at the appropriate premium rate plus travel allowance where applicable.

B. If the employee's normal hours of work commences within this two (2) hour period, the employee will be paid premium time for the actual hours worked and revert to his normal rate at the commencement of his normal hours of work.

808
Shift Work

A. (i) Shift work may be established providing there are at least four (4) consecutive days of shifts to be worked excluding Saturdays, Sundays and Recognized Holidays.

(ii) Where shift work is established, the normal shift hours shall be the same as the day hours. The third shift hours shall be worked between 1:00 a.m. and 8:00 a.m. Monday through Friday with an unpaid one-half (1/2) hour lunch period.

(iii) The normal starting time for day shift hours shall be the same as the day work hours described in Subsection 801.

(iv) On Monday to Thursday inclusive, the second shift hours shall start at 4:30 p.m. or a variance of one-half (1/2) hour either way to coincide with the end of the day shift. On Friday, the second shift hours may start at 4:30 p.m. or at the end of the day shift.

B. (i) Employees required to work shift work on the second shift of a two or three-shift operation shall receive a shift differential of time and one-seventh (1/7) for normal scheduled shift hours worked. Employees required to work shift work on the third shift shall receive a shift differential of time and one-fifth (1/5) for normal scheduled shift hours worked.

(ii) No employee shall be required to work more than one shift in any twenty-four (24) hour period unless the overtime rate is paid.

(iii) The shift rate will be based on the day in which the shift begins.

809 Special Circumstances

A. The normal days of work and normal hours of work established in the Subsections 800, 801 and 808 may be varied. Any amendments to the hours of work or working days will established by mutual agreement between the Local Union, the Employer and EPSCA.

SECTION 9 WAGES AND PAY PROCEDURE

900 Wages

A. The rates of pay for employees in the classifications listed in Subsection 200, Item B, of this Agreement and working on Generation Station Projects shall be as set forth in the wage schedules attached hereto.

B. When properly authorized by the Local Union, EPSCA shall increase or decrease all Union benefit funds once per contract year as well as at previously negotiated wage rate change dates. Adjustments shall be made to the wage schedules in such a manner that the overall monetary package does not change. EPSCA shall be given a minimum notice of two (2) months if such a change is contemplated.

901 Pay Procedure

A. Normal

(i) Employees shall be paid weekly and payment for any given week will be made not later than the sixth working day after the close of the payroll period, but in any event not later than Thursday of the following week.

REV

(ii) Wages shall be paid by the employers on the job site, before quitting time, in cash or by cheque, payable at par in the locality of the job site. The employer may implement direct deposit pay by mutual agreement. Accompanying each payment of wages shall be a statement, in writing, which can be retained by the employee, setting forth:

(a) the period of time or the work for which the wages are being paid;

(b) the rate of wages to which the employee is entitled;

(c) the amount of wages to which the employee is entitled;

(d) the amount of each deduction from the wages of the employee and the purpose for which each deduction is made;

(e) any allowance or other payment to which the employee is entitled;

(f) the amount of vacation pay for which the employee is being credited;

(g) the amount of recognized holiday pay for which the employee is being credited; and

(h) the net amount of money being paid to the employee.

(iii) In cases of inclement weather being declared on pay day, employees will receive their pay before leaving the site provided it is available on the site.

B. <u>On Termination</u>

(i) An employee who voluntarily terminates his employment will be provided his final pay on the next regular pay day.

REV

(ii) In all cases of layoff at work locations where the employer does not have an on-site pay office, an employee will have his final pay and termination documents mailed to his residence within two (2) business days of his termination by Express Post. At work locations where the employer has an on-site pay office, the employee shall receive his final pay and record of employment on the day of layoff.

(iii) An employee who is discharged shall be provided with his final pay immediately if the Employer's pay facilities are on site or as per Item B (ii) above if the Employer's pay facilities are not on site.

(iv) Failure of the Employer to comply with the requirements in Clause 901 B (i), (ii) and (iii) will entitle the employee to two (2) hours at the straight time rate for each normal work day of non-compliance.

902 Vacation and Recognized Holiday Pay

A. The vacation and recognized holiday pay rate shall be ten (10) percent of hourly earnings. For conditions applying to vacation and recognized holiday pay, refer to Section 10, Subsection 1001.

SECTION 10

UNION AND BENEFIT FUNDS

1000 Benefit Funds

A. The Employer agrees to pay into operative welfare, pension and S.U.B. plans the amounts specified by the IBEW-EPCO and identified in the wage schedules attached hereto. Payment to the above-noted funds shall be based on each hour earned.

NEW

B. To reduce administrative costs the parties agree that the number of monthly separate remittance and deduction cheques will be kept to a minimum.

1001 Vacation and Recognized Holiday Pay

A. The Employer agrees to pay vacation and recognized holiday pay on a weekly basis. The vacation pay rate shall be four (4) percent of hourly earnings and the recognized holiday pay rate shall be six (6) percent of hourly earnings.

1002 Union Funds

A. The Employer agrees to deduct from wages and remit to the Union, Union Funds. The amounts to be deducted and remitted will be as set out in the wage schedules attached hereto.

1003 Administration

A. The Union agrees to supply the Employers with administrative material and information regarding the Funds identified in this Section.

1004 Assignment of Benefits

A. The trustees of the employee benefit plans referred to in this collective agreement shall promptly notify the union of the failure by any employer to pay any employee benefit contributions required to be made under this collective agreement and which are owed under the said plans in order that the program administrator of the Employee Wage Protection Plan may deem that there has been an assignment of compensation under the said program in compliance with the regulation to the Employment Standards Amendment Act, 1991 in relation to the Employee Wage Protection Program.

***Section 11* is applicable to work which is *not* covered by**
Appendix A - Modified Provisions of this Construction Agreement.
Please refer to the *GENERAL NOTE* preceding
the Index Page of this Agreement

SECTION 11
REV

TRAVEL AND ROOM AND BOARD ALLOWANCE

1100
Daily Travel
Allowance

A. The daily travel allowance will be paid by the Employers to their employees who are not receiving room and board allowance as referred to in Subsection 1101, on the following basis:

(i) If an employee lives within 20 radius kilometers* of the project, no travel allowance will be paid.

(ii) If an employee lives within 20 to 40 radius kilometers of the project, he shall receive $15.60 per day travel allowance effective May 1, 2000, ($16.10 effective May 1, 2001, $16.60 effective May 1, 2002 and $17.10 effective May 1, 2003) for each day worked or reported for.

(iii) If an employee lives within 40 to 56 radius kilometers of the project, he shall receive $18.85 per day travel allowance effective May 1, 2000, ($19.35 effective May 1, 2001, $19.85 effective May 1, 2002 and $20.35 effective May 1, 2003) for each day worked or reported for.

(iv) If an employee lives within 56 to 80 radius kilometers of the project, he shall receive $22.10 per day travel allowance effective May 1, 2000, ($22.60 effective May 1, 2001, $23.10 effective May 1, 2002 and $23.60 effective May 1, 2003) for each day worked or reported for.

(v) If an employee lives within 80 to 97 radius kilometers of the project, he shall receive $25.60 per day travel allowance effective May 1, 2000, ($26.10 effective May 1, 2001, $26.60 effective May 1, 2002 and $27.10 effective May 1, 2003) for each day worked or reported for.

* **For the purpose of this Section, "radius kilometers" shall be measured from the centre of the turbine hall on each project.**

Note: **Bruce G.S. "A", Bruce G.S. "B" and the Bruce Heavy Water Plants will be combined to form the Bruce Complex. Travel allowance for the Bruce Complex will be calculated from the midpoint of a straight line joining the centres of the Bruce G.S. "A' and Bruce G.S. "B" turbine halls.**

(vi) If an employee lives greater than 97 radius kilometers from the project and does not qualify for subsistence allowance under Subsection 1101 below, he shall receive $29.85 per day travel allowance effective May 1, 2000, ($30.35 effective May 1, 2001, $30.85 effective May 1, 2002 and $31.35 effective May 1, 2003) for each day worked or reported for provided he continues to travel greater than 97 radius kilometers daily.

(vii) When an employee is directed to report to a location that involves travelling around a natural barrier, the distance around the natural barrier shall be the shortest distance measured by a series of straight lines. The sum of the distances of these straight lines shall be applied to the ring concept to establish the employee's travel allowance entitlement, board allowance entitlement and initial and return allowance entitlement.

(viii) A natural barrier is defined as any obstruction or impediment which creates an unreasonable relationship between radius kilometers and actual kilometers travelled.

(ix) Upon application, payment of Room and Board/Travel Allowance will be issued for the first two pay periods. Failure to provide satisfactory proof of eligibility during this period, will result in cessation of payments and the recovery in two equal amounts. In the event of termination for any reason before full recovery, any balance owing will be deducted from the final pay.

NEW

B. When the employee is in receipt of Room & Board Allowance on remote projects, where the roads from the temporary accommodation to the work location are loose surface and where the nearest place of accommodation is in excess of twenty (20) radius kilometres from the job, the employer shall have the option of providing transportation from the temporary accommodation, or paying travel allowance in accordance with Section 1100 A (i) to (viii).

1101
Room and
Board Allowance

A. The following conditions will apply for employees whose regular residence* is more than 97 radius kilometers from the project:

*** An Employee's "Regular Residence" is:**

1. **The place where the employee maintains a self-contained, domestic establishment (a dwelling house, apartment or similar place of residence where a person generally eats and sleeps and for which he can show proof of financial commitment). This is in contrast to a boarding house facility which is not self-contained; and**

2. **The employee normally resides in the residence except for those periods of time when, because of the location of the work, the employee obtains temporary accommodation for that work location.**

(i) An Employer may supply either:

(a) free room and board in camp or a good standard of board and lodging within a reasonable distance of a project; or

(b) a subsistence allowance; or

(c) a travel allowance.

(ii) An employee may exercise his option not to stay in a camp or accept free room and board. An employee who exercises this option shall receive a room and board allowance as follows:

(a) When an employee's regular residence is more than 97 radius kilometers from a Project located North of the French River and the employee maintains temporary accommodation at or near the Project, the employee shall be paid a subsistence allowance of $70.00 per day effective May 1, 2000, ($72.00 effective May 1, 2001, $74.00 effective May 1, 2002 and $76.00 effective May 1, 2003) for each day worked or reported for.

(b) When an employee's regular residence is more than 97 radius kilometers from a Project located South of the French River and the employee maintains temporary accommodation at or near the project, the employee shall be paid a subsistence allowance of $57.00 per day effective May 1, 2000, ($59.00 effective May 1, 2001, $61.00 effective May 1, 2002 and $63.00 effective May 1, 2003) for each day worked or reported for, subject to (d) below .

(c) When an employee's regular residence is more than 97 radius kilometers from the Project and the employee commutes to work on a daily basis, the employee shall receive $31.10 per day effective May 1, 2000, ($33.10 effective May 1, 2001, $35.10 effective May 1, 2002 and $37.10 effective May 1, 2003) for each day worked or reported for.

(d) At the Pickering and Darlington Projects, employees who live beyond 97 radius kilometers from the Project, shall receive $45.00 per day effective May 1, 2000, ($48.00 effective May 1, 2001, $51.00 effective May 1, 2002 and $54.00 effective May 1, 2003) for each day worked or reported for.

B. An employee shall not qualify for daily travel allowance or room and board allowance as provided for in Subsection 1100 and Subsection 1101, Item A above, when such employee reports for work but does not remain at work for his scheduled daily hours unless excused by an authorized representative of his Employer. Such permission shall not be unreasonably denied.

C. The Union recognizes the Employer's right to charge for board and other existing services. The Employer fixes the charge for board and other existing services in camps at $25.00 per day. This will be applied on the following basis:

(i) An employee who remains in camp on a normally scheduled work day on which he does not work will be charged $25.00 per day unless he is excused from work for a legitimate reason by the Project medical attendant or an authorized representative of his Employer.

(ii) An employee who is absent from work on Friday without approval and who remains in camp and who is still absent from work on the following Monday without approval will be charged for room and board for Friday, Saturday, Sunday and Monday.

(iii) An employee who remains in camp and who is absent from work without approval on Friday but who works the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

(iv) An employee who remains in camp and who works the Friday and is absent from work without approval on the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

1102
Initial and Return Travel and Transportation

A. On recruitment of tradesmen who live between 97 and 161 radius kilometers from the project, the Employer shall pay $21.00 effective May 1, 2000, ($22.00 effective May 1, 2001, $23.00 effective May 1, 2002 and $24.00 effective May 1, 2003) for the initial trip to the project.

B. On recruitment of tradesmen who live beyond 161 radius kilometers from the project, the Employer shall pay $0.34 effective May 1, 2000, ($0.35 effective May 1, 2001, $0.36 effective May 1, 2002 and $0.37 effective May 1, 2003) per radius kilometer plus travel time based on one hour's pay for each 80 radius kilometers of travel, or part thereof, to a maximum of 8 hours' pay for the initial trip to the project from where the tradesman lives or the Local Union Referral Hall for the project, whichever is closer to the project.

C. To qualify for payment in Items A or B, the employee must remain at the project for a minimum of fifteen (15) working days or the duration of the job, whichever is lesser.

D. On termination of employment due to a reduction of staff, an employee entitled to payment under Items A or B shall be entitled to return expenses calculated in the same manner as in Items A or B above for the return trip from the project to where the tradesman lives or place of recruitment, whichever is closer to the project. An employee whose employment terminates for any reason other than reduction of staff shall not be eligible for return payment.

E. (i) On the Thunder Bay Project and Atikokan Project, an employee shall qualify for a return trip from the Project to his regular residence for each thirty (30) days worked on the Project providing his regular residence is more than four hundred (400) radius kilometers from the Project.

(ii) For each entitlement, the Employer shall pay travel expenses on the basis of the equivalent cost of public transportation plus travel time based on one (1) hour's pay for each eighty (80) radius kilometers of travel, or part thereof, to a maximum of eight (8) hours' pay.

1103 Use of Personal Vehicle

A. An employee who is requested or receives approval from an authorized representative of his Employer to use his personal vehicle for the convenience of his Employer shall be reimbursed $0.37 per kilometer travelled effective May 1, 2000, ($0.38 effective May 1, 2001, $0.39 effective May 1, 2002 and $0.40 effective May 1, 2003) for such use of his vehicle.

SECTION 12 TOOLS AND CLOTHING

1200 Tools and Clothing

A. Employees shall be required to provide themselves with the ordinary hand tools of the trade as specified in the attached tool list. The Employer will provide insofar as is practical, separate facilities for storing the tools, but shall not be held responsible for losses, except as noted hereunder:

(i) When personal tools valued in excess of $15.00 are lost due to fire, the Employer will consider replacement or payment value to a maximum of $500.00 based on the merit of each case. This will include only personal tools that a tradesman is required to have to perform his normal duties with the Employer.

(ii) The Employer agrees to compensate employees for tools lost by theft, as supported by claims submitted in writing with substantiating evidence to establish theft resulting from forcible entry to locked storage provided by the Employer to a maximum of $500.00.

(iii) In the event of a loss by fire at a work location, replacement or payment of the full estimated value in excess of $15.00 but not exceeding $500.00 for the loss of personal clothing will be made.

(iv) In the event of a loss by fire at an Employer operated camp, replacement or payment of the full estimated value in excess of $15.00 but not exceeding $750.00 for the loss of personal clothing will be made.

B. Employees who have obtained tools from the Employer's tool crib shall be allowed sufficient time, in the opinion of Management, to return such tools to the tool crib during working hours. Employees receiving tools from such tool crib shall be held responsible for the return of such tools in good condition, subject to normal wear and tear. On layoff, employees will be allowed reasonable time to return tools to the tool crib.

C. Gang tools are tools which are issued to a foreman and are used by one or more members of the crew. Such tools are not identified on trade tool lists, nor are they the tools and equipment identified in Items A and B of this Section. Such tools shall be the responsibility of the Employer.

D. Employees eligible for payment under A above shall be reimbursed within 60 days after the date of submitting a claim. The Employer shall provide tools for the employee to use during the replacement period.

1201 Protective Clothing and Equipment

A. Employees are required to wear protective clothing and use protective equipment appropriate for the work being done. The Employer shall supply employees working in close proximity to obvious fire hazards (i.e. open flame) with fire retardant coveralls.

On abnormally dirty and/or corrosive work, in which the employee's clothing may be excessively or permanently damaged, the Employer will supply protective clothing and equipment (including gloves and coveralls where appropriate) at no cost to the employee.

B. Employees shall supply themselves with, and wear at all times on the job, an approved safety helmet and safety shoes.

When an Employer wishes an employee to wear a specifically identified safety helmet, the Employer shall provide it on loan, complete with a new liner.

C. Protective clothing and equipment (including gloves, coveralls and fire retardant coveralls) and rainwear that is provided by the Employer will be charged out to an employee and the employee shall be responsible for the return of such protective clothing and equipment (including gloves, coveralls and fire retardant coveralls) and rainwear upon completion of the work involved.

SECTION 13 GRIEVANCES AND ARBITRATIONS

1300
Grievances

A. Grievances within the meaning of the grievance and arbitration procedure shall consist only of disputes about the interpretation or application of particular clauses of this Agreement and about alleged violations of this Agreement. In the event of any dispute concerning the meaning or application of any provision of this Agreement or a dispute concerning an alleged violation of this Agreement, there shall be no suspension or disruption of work, but such dispute shall be treated as a grievance and shall be settled, if possible, by EPSCA and the Union. In the interests of expediting the procedure, the parties shall process grievances in the following manner.

B. PRELIMINARY DISCUSSION

Disputes arising out of the interpretation or alleged violation of this Agreement shall, if possible, be settled by discussion between the employee and/or his steward and the employee's supervisor.

C. FIRST STEP

If a dispute cannot be resolved by this method, the Accredited Union Representative for the Union may file a formal grievance on the prescribed form with the Manager of Construction. Such grievance shall be filed within fifteen (15) working days of the alleged grievous act.

Within ten (10) working days of the filing of the grievance, the Manager of Construction shall investigate the grievance and convene a meeting which he or the Accredited Union Representative considers necessary to resolve it. The Manager of Construction shall give his reply on the prescribed form to the Accredited Union Representative within five (5) working days from the date of the First Step meeting.

Copies of completed grievance forms signed by the appropriate parties shall be filed by the Manager of Construction with the General Manager of EPSCA and by the Accredited Union Representative with the Secretary of the IBEW Electrical Power Council of Ontario.

If a First Step grievance meeting is considered appropriate, the Management Committee shall comprise the Manager of Construction plus two Management officials, one of whom shall be a representative of the Employer against whom the grievance has been filed. The Union Committee shall comprise the Accredited Union Representative plus two additional Union officials.

D. SECOND STEP

If a dispute has not been resolved at the first Step of the grievance procedure, the Accredited Union Representative may refer the grievance on the prescribed form to EPSCA's Grievance Officer. Such grievances shall be referred within ten (10) working days after the disposition has been issued under the First Step of this procedure. A copy of the grievance form shall be forwarded by the Accredited Union Representative to the Secretary of the IBEW Electrical Power Council of Ontario.

The EPSCA Grievance Officer shall investigate the grievance and convene a meeting which he or the Secretary of the IBEW Electrical Power Council of Ontario considers necessary to resolve it and give his reply on the prescribed form to the Secretary of the IBEW Electrical Power Council of Ontario within five (5) working days from the receipt of the grievance form which was completed at First Step.

If a Second Step grievance meeting is considered appropriate, the Management Committee shall comprise the EPSCA Grievance Officer plus two other Management representatives, one of whom shall be a representative of the Employer against whom the grievance has been filed. The Union Committee shall comprise three persons, including one of the Secretary-Treasurer, Chairman or a designate appointed by the Secretary-Treasurer or Chairman of the IBEW Electrical Power Council of Ontario and the Accredited Representative for the grievor, plus one other representative of the Union.

E. EPSCA OR UNION GRIEVANCES

The processing of EPSCA grievances shall begin at the Second Step. EPSCA may submit either policy or specific grievances. The Union may also institute policy grievances at this Step. Such policy or specific grievances shall be submitted within thirty (30) days of the alleged grievous act.

F. TIME LIMITS

The time limits as to both documents and procedure set out in the above Subsections shall be complied with by the parties to this Agreement provided, however, that the parties may mutually agree in writing in respect to an extension or waiver of any of the time limits imposed. Where no answer is given within the time limits specified in the grievance procedure, the employee concerned, the Union or EPSCA shall be entitled to submit the grievance to the next step of the grievance procedure. Any grievance not processed within the time limits specified in the grievance procedure shall be deemed to have been withdrawn and ineligible for arbitration.

G. Alleged unjustified termination, discharge, suspension or disciplinary action may be grieved beginning at First Step.

H. Disputes about the interpretation or application of particular clauses of this Agreement and about alleged violations of this Agreement shall not be processed under Section 133 of the Labour Relations Act of Ontario by either party until the provisions set forth in this Section for the resolution of such disputes have been fully exhausted.

I. GRIEVANCE FACILITIES

EPSCA shall provide the necessary facilities for all grievance meetings.

1301 Arbitrations

A. If any dispute about the interpretation or application of particular clauses of this Agreement or about an alleged violation of this Agreement cannot be settled through the grievance procedure outlined in Subsection 1300, the matter may be submitted within thirty (30) days of its failure of settlement by grievance procedure by either EPSCA or the Union to a Board of Arbitration for adjudication. The party desiring to submit the dispute to arbitration shall notify the other party in writing of its desire and the notice shall contain the name of the first party's nominee to an arbitration board. The recipient of the notice shall, within five (5) working

days, inform the other party of the name of its nominee to the arbitration board. The two nominees so selected shall, within ten (10) working days of the appointment of the second of them, appoint a third person who shall be the Chairman. If the recipient of the notice fails to appoint a nominee, or if the nominees fail to agree upon a Chairman, the appointment shall be made by the Minister of Labour for Ontario upon the request of either party. The arbitration board, when selected or appointed, will proceed as soon as practicable to hear and determine the dispute and it shall issue a decision which is final and binding upon the parties and upon their respective members. The decision of a majority is the decision of the arbitration board, but if there is no majority, the decision of the Chairman governs.

B. The arbitration board shall have no power to add to or subtract from or modify any of the terms of this Agreement. The arbitration board shall not substitute its discretion for that of the parties except where the board determines that an employee has been discharged or otherwise disciplined for cause when this Agreement does not contain a specific penalty for the infraction that is the subject matter of the arbitration. In such cases, the arbitration board may substitute such other penalty for the discharge or discipline as to the arbitration board seems just and reasonable in all circumstances. The arbitration board shall not exercise any responsibility or function of the parties. The arbitration board shall not deal with any matter not contained in the original statement of grievance filed by the party referring the matter to arbitration.

C. In arbitration proceedings, each party shall pay the fees and expenses of its nominee, whether appointed by the party or by the Minister of Labour for Ontario, and the fees and expenses of the Chairman shall be shared equally by the parties.

D. The time limits as to both documents and procedure set out in this Subsection shall be observed by the parties to this Agreement provided, however, that the parties may mutually agree in writing in respect to an extension or waiver of any of the time limits imposed.

1302
No Strike-
No Lockout

A. There shall be no strikes or lockouts so long as this Agreement continues to operate.

SECTION 14 COMMITTEES

1400 Executive Committee

A. To advance harmonious relations between EPSCA, the Employers, the Union, and the employees, EPSCA and the Union shall each appoint an Executive Committee. The Executive Committee of EPSCA shall consist of the Board of Directors and Officers of the Association. The Executive Committee of the Union shall consist of the IBEW Electrical Power Council of Ontario.

The Committee shall meet together at least annually to review matters associated with the administration of this Collective Agreement with the intent of achieving uniformity of application of this Agreement wherever employees are working in the Province.

The Committees may also consider matters related to construction safety.

1401 Apprenticeship Committee

A. An Apprenticeship Council shall be established within each Local Union's jurisdictional area and shall meet on a regular basis. This Council shall consist of an equal number of members of the Local Union and representative of the Employers from the area covered by the Local Union. Where applicable, a representative of the Apprenticeship Branch of the Ontario Government may also be appointed as an advisor to the regular Council members.

B. The Joint Apprenticeship Council shall be responsible for the establishment and maintenance of an apprenticeship training program, as well as adopting operating rules and conditions with respect thereto which are complementary to and in keeping with the intent of the Apprenticeship and Tradesmen's Qualification Act R.S.O. 1970 as amended.

C. All founding documents and/or agreements, and terms of reference establishing and guiding the activities of the local Apprenticeship Councils shall be registered with the Provincial Joint Council.

D. Apprentices shall be hired by the Employers, as and when required, from a pool of qualified apprentices established by the local JAC (or LAC) in accordance with the procedures established under the local JAC (LAC) Terms of Reference.

E. All apprentices shall be governed by the Ontario Apprenticeship and Tradesman's Qualification Act and Regulations but the ratio of apprentices to journeymen may be set from time to time by the Executive Committee.

F. In order to expedite the Apprentice's entrance into Journeyman status, the following policy shall apply:

(i) The Apprentice must apply to the Apprenticeship Branch to write his examination as soon as possible after he has reached his total hours, less 300.

(ii) The Apprentice will give the LAC/JAC two weeks' notice that he is going to write his examination.

(iii) After writing the examination, the Apprentice will check his hours in his Progress Record Book, with LAC/JAC.

(iv) The Employer will commence paying the Journeyman's rate of pay the day after the Apprentice completes his hours and providing the following conditions have been met:

(a) The Employer is satisfied that the Apprentice has completed his hours. If there is a question concerning the completion of hours, confirmation will be supplied by the LAC/JAC and/or the Union, and,

(b) The Employer is shown written proof of Certification from the Apprenticeship Branch, or has verbal confirmation from the LAC/JAC and/or the Union, and

(c) The Apprentice has passed his examination for his Certification of Qualification (C of Q).

G. In the event that an Apprentice fails his examination for his C of Q, he will be paid the journeyman rate of pay from the day he passes any future examinations.

H. Where the Apprenticeship Council is unable to reach an agreement on any matter concerning apprenticeship, the issue shall be referred to the Executive Committee for their decision.

SECTION 15 LUNCHROOM FACILITIES

1500 Lunchroom Facilities

A. Adequately heated accommodation separate from changerooms and washrooms shall be provided by the Employer on each project when necessary and where such accommodation can be reasonably provided for. Such accommodation shall be weatherproof and shall be kept reasonably clean. A table and sufficient benches or seats for the employees on the job shall be provided in the accommodation. Trailerized or portable accommodation shall include tables, benches, light, heat maintained at a minimum sixty-eight (68) degrees Fahrenheit, proper access and egress, and shall not be used for material storage.

Washroom Facilities

B. The Employer will provide, where practical, clean, heated, lighted and ventilated facilities containing flush toilets and hand basins.

SECTION 16 ASSOCIATION FUND

1600 Association Fund

A. Each Employer bound by this agreement shall contribute to the Electrical Power Systems Construction Association Fund, the amount specified on the wage schedules attached hereto for each hour worked by each employee covered by this Agreement.

The Employer shall remit such contribution to EPSCA together with the supporting information as required on the reporting forms.

SECTION 17 RADIATION WORK

1700

A. A copy of Ontario Power Generation Radiation Protection Procedures and any revisions will be made available to the Local Union.

B. Each employee will have access to his personal radiation exposure record.

C. Long-term employees who reach their exposure limit will be given alternate employment until they can resume radiation work.

D. Short-term employees will be given a guaranteed period of employment at their time of hire.

E. Employees working in a radiation area, in plastic suits or replacement material of the fully enveloping type with an independent air supply, will receive $8.00 per day. A day for the purpose of this item shall be defined as any period up to twelve (12) hours.

SECTION 18 **ABORIGINAL CONTENT COMMITMENT**

1800 A. Where an aboriginal commitment has been established on a project, the Union will cooperate in meeting the content commitments.

For projects, or jobs within a project, that are less than $100,000 field labour, and have aboriginal content commitments, the terms of the collective agreement will not apply to these aboriginal commitments.

Dated at Toronto, this *17th* day of *May* , *2000.*

For:

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION

Joe Dotchin

Barry Roberts

For:

THE IBEW ELECTRICAL POWER COUNCIL OF ONTARIO

John Pender

Larry Lineham

TOOL LIST

All journeymen electricians are required to have the following tools:

1 Centre Punch
1 1/2" Cold Chisel
1 Half-round File
1 Ball Peen Hammer
1 Adjustable Hacksaw Frame
1 Knife
1 Medium Level
5 Prs. of Pliers -
8" Sidecutters, Diagonal, Longnose and 2 pairs of Channelock
6 Screwdrivers, Robertson and Standard types
1 6" Square or Combination Square
1 Steel Tape, 10 or 12-foot
1 Small Tap Wrench
1 Tool box
1 Tool Pouch and belt for hand tools

APPENDIX A

MODIFIED PROVISIONS OF THIS CONSTRUCTION AGREEMENT

1. **These provisions will apply to:**

   (a) All work on existing generating sites except the construction of:

   - a new facility which provides a new function
   - a new (ie. additional generating unit

2. **Definitions:**

Facility	Something that is built composed of multi-systems which serves a specific function
Function	Examples - Generation, Administration, Warehousing, Heavy Water Production, Flue Gas Desulphurization, Tritium Removal, Site Services (eg. Shops)

3. **Dispute Resolution Process**

A dispute as to whether the "Modified Provisions of this Construction Agreement" apply to the construction of a new facility will be referred to the Executive Committee for resolution and the Executive Committee will meet within five (5) working days. If the Executive Committee is unable to resolve the dispute, the dispute will be referred to a single arbitrator within ten (10) working days for a final and binding resolution. The arbitrator shall give an oral decision within five (5) working days, and a written decision, if requested, within twenty (20) working days.

All terms of this collective agreement shall apply to work covered by Appendix A, with the exception of Section 8 - Hours of Work, and Section 11 - Travel and Room and Board Allowance.

EPSCA/IBEW EPCO
GENERATION PROJECTS
COLLECTIVE AGREEMENT

APPENDIX A

MODIFIED PROVISIONS

OF THIS CONSTRUCTION AGREEMENT

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Article 1

100
Hours of
Work

HOURS OF WORK

A. A shift will be deemed to be established providing at least four (4) consecutive days of a shift are to be worked, excluding Saturdays, Sundays and Recognized Holidays. If an employee is removed from their scheduled shift prior to completing four (4) consecutive shifts, the employee will be paid shift differential for the balance of the four (4) consecutive shifts that would have been worked had the employee not been reassigned.

It may be necessary from time to time to vary the hours of work established in this Article. Any amendments to the hours of work will be established by mutual agreement between EPSCA and the Union.

B. One (1) or Two (2) Shift Operation

The weekly hours of work shall consist of forty (40) hours for all employees of Employers covered by this agreement and working on a one (1) or two (2) shift operation.

The weekly hours of work (Monday to Friday inclusive) for all employees may be arrived at by having the employees work four (4) consecutive ten-hour shifts or by having the employees work five (5) consecutive eight-hour shifts. Each Employer will notify the Local Union of the weekly hours of work that the site has elected to work (4 days x 10 hours per day or 5 days x 8 hours per day).

Weekly hours of work will be established for a minimum period of two (2) weeks.

If an Employer intends to change the weekly hours of work, a minimum of seven (7) days written notice shall be sent to the Local Union.

REV

The start time for the day shift shall be 8:00 a.m. with a possible one (1) hour variance either way. The start time for the afternoon shift shall be immediately following the day shift or within one (1) hour either way to coincide with the end of the day shift.

The shift differential for those employees working the afternoon shift when a two shift operation has been established by the Employer will be one-seventh (1/7) for scheduled hours worked on that shift.

C. Three (3) Shift Operation

When a three (3) shift operation is established by the Employer, the following conditions will apply:

Those employees working on the day shift shall work eight (8) hours at the straight time rate.

Those employees working on the afternoon shift shall work seven and one-half (7 1/2) hours per shift. A shift differential of one-seventh (1/7) shall be paid for all normal scheduled shift hours worked.

Those employees working on the night shift shall work seven (7) hours per shift. A shift differential of one-fifth (1/5) shall be paid for all normal scheduled shift hours worked.

101 Rest Periods

A. For employees working normal hours, a fifteen (15) minute rest period will be allotted, at the time directed by the Employer, for each half shift worked. Where a half shift is less than four (4) hours, there shall be no rest period excluding the third shift.

B. For employees required to work overtime, a ten (10) minute rest period will be allotted prior to the end of the normal shift before commencing overtime work.

C. For employees working overtime, a fifteen (15) minute rest period will be allotted, at the time directed by the Employer, after each two hours of overtime worked.

102 Reporting Pay

A. An employee who reports for work, unless directed not to report the previous day by his Employer, shall receive a minimum of three (3) hours' pay plus his appropriate daily travel or board allowance at the applicable rate when he reports for work but is unable to commence or continue to work because of circumstances beyond his control. An employee will not receive this allowance if he is unable to complete his shift as a result of inclement weather.

B. Notwithstanding Subsection 102, Item A above, when an Employer considers it necessary to shut down a job to avoid the possible loss of human life, because of an emergency situation that could endanger the life and safety of an employee, in such cases, employees will be compensated only for the actual time worked.

103 Inclement Weather Pay

A. An employee who reports for work at the beginning of a shift and is unable to commence work due to inclement weather will receive three (3) hours' pay at the applicable rate. To qualify, the employee must remain at a protected place or area as designated by the Employer for three (3) hours unless excused by an authorized representative of his Employer.

B. An employee who reports for and commences work but is unable to continue work due to inclement weather shall receive three (3) hours' pay at the applicable rate or pay for the actual time worked for that shift, whichever is the greater.

C. An employee in receipt of inclement weather pay shall also receive travel or board allowance if applicable.

104 Recognized Holidays

A. The holidays recognized under this Agreement are:

New Year's Day	Civic Holiday
Good Friday	Labour Day
Easter Monday	Thanksgiving Day
Victoria Day	Christmas Day
Canada Day	Boxing Day

B. EPSCA agrees to recognize Heritage Day when proclaimed by legislation.

C. Recognized holidays falling on a Saturday or Sunday shall be observed on the following Monday. When Christmas Day falls on a Saturday or Sunday, it shall be observed on the following Monday and Boxing Day on the following Tuesday. When New Year's Day falls on a Saturday or Sunday, it shall be observed either on the preceding Friday or following Monday.

D. EPSCA reserves the right to change the day of observation of a recognized holiday when such holiday falls on a Tuesday or Thursday.

105
Overtime
Rates

A. When working on an eight (8) hour day and five (5) day per week work schedule (Monday to Friday inclusive), overtime work shall be paid at one and one-half (1 1/2) times the basic hourly rate for all hours worked beyond the normal daily scheduled number of hours up to a maximum of two (2) hours per day. All hours in excess of 10 hours per day shall be paid at two (2) times the base hourly rate.

When working on a ten (10) hour day and four (4) day per week work schedule (Monday to Friday inclusive), overtime work shall be paid at one and one-half (1 1/2) times the basic hourly rate for all hours worked beyond the normal daily scheduled number of hours up to a maximum of two (2) hours per day. All hours in excess of 12 hours per day shall be paid at two (2) times the base hourly rate.

Overtime work performed on Saturday, Sunday, Recognized Holidays and non-shift days shall be paid at two (2) times the basic hourly rate.

B. When an employee has not been notified the previous day that he will be required to work for more than two (2) hours beyond the normal quitting time of his shift and after approximately two (2) hours has been worked, he shall be provided with a lunch and allowed thirty (30) minutes to consume same and be paid at the base hourly rate of pay.

After each additional four (4) hours is worked, the employee shall be allowed thirty (30) minutes to eat and be paid at the base hourly rate of pay and a lunch when work is required beyond that four (4) hour period. Where an employee has been notified the previous day, no lunch will be provided, but the employee will be allowed thirty (30) minutes to eat and be paid at the base hourly rate of pay.

When a paid meal period overlaps a rest period, the paid meal period will supplant the rest period.

The above-noted is not applicable to the first eight (8) hours worked on Saturdays, Sundays and Recognized Holidays.

106
Call-In
Pay

A. When an employee is called in to work outside of his normal hours of work, he shall receive a minimum of two (2) hours' work at the appropriate premium rate plus travel allowance where applicable.

B. If the employee's normal hours of work commences within this two (2) hour period, the employee will be paid premium time for the actual hours worked and revert to his normal rate at the commencement of his normal hours of work.

ARTICLE 2
REV

TRAVEL AND ROOM AND BOARD ALLOWANCE

200
Daily
Travel
Allowance

A. The daily travel allowance will be paid by the Employers to their employees who are not receiving room and board allowance as referred to in Article 201, on the following basis:

(i) If an employee lives within forty (40) radius kilometers* of the project, no travel allowance will be paid.

(ii) If an employee lives within 40 to 56 radius kilometers of the project, he shall receive $18.85 per day travel allowance effective May 1, 2000, ($19.35 effective May 1, 2001, $19.85 effective May 1, 2002 and $20.35 effective May 1, 2003) for each day worked or reported for.

(iii) If an employee lives within 56 to 80 radius kilometers of the project, he shall receive $22.10 per day travel allowance effective May 1, 2000, ($22.60 effective May 1, 2001, $23.10 effective May 1, 2002 and $23.60 effective May 1, 2003) for each day worked or reported for.

(iv) If an employee lives within 80 to 97 radius kilometers of the project, he shall receive $25.60 per day travel allowance effective May 1, 2000, ($26.10 effective May 1, 2001, $26.60 effective May 1, 2002 and $27.10 effective May 1, 2003) for each day worked or reported for.

(v) If an employee lives greater than 97 radius kilometers from the project and does not qualify for subsistence allowance under Subsection 1101 below, he shall receive $29.85 per day travel allowance effective May 1, 2000, ($30.35 effective May 1, 2001, $30.85 effective May 1, 2002 and $31.35 effective May 1, 2003) for each day worked or reported for provided he continues to travel greater than 97 radius kilometers daily.

* **For the purpose of this Section, "radius kilometers" shall be measured from the centre of the turbine hall on each project.**

Note: **Bruce G.S. "A", Bruce G.S. "B" and the Bruce Heavy Water Plants will be combined to form the Bruce Complex. Travel allowance for the Bruce Complex will be calculated from the midpoint of a straight line joining the centres of the Bruce G.S. "A' and Bruce G.S. "B" turbine halls.**

(vi) When an employee is directed to report to a location that involves travelling around a natural barrier, the distance around the natural barrier shall be the shortest distance measured by a series of straight lines. The sum of the distances of these straight lines shall be applied to the ring concept to establish the employee's travel allowance entitlement, board allowance entitlement and initial and return allowance entitlement.

(vii) A natural barrier is defined as any obstruction or impediment which creates an unreasonable relationship between radius kilometers and actual kilometers travelled.

(viii) Upon application, payment of Room and Board/Travel Allowance will be issued for the first two pay periods. Failure to provide satisfactory proof of eligibility during this period, will result in cessation of payments and the recovery in two equal amounts. In the event of termination for any reason before full recovery, any balance owing will be deducted from the final pay.

NEW

B. When the employee is in receipt of Room & Board Allowance on remote projects, where the roads from the temporary accommodation to the work location are loose surface and where the nearest place of accommodation is in excess of forty (40) radius kilometres from the job, the employer shall have the option of providing transportation from the temporary accommodation, or paying travel allowance in accordance with Article 200 A (i) to (vii).

201 Room and Board Allowance

A. The following conditions will apply for employees whose regular residence* is more than 97 radius kilometers from the project:

(i) An Employer may supply either:

(a) free room and board in camp or a good standard of board and lodging within a reasonable distance of a project; or

*** An Employee's "Regular Residence" is:**

1. **The place where the employee maintains a self-contained, domestic establishment (a dwelling house, apartment or similar place of residence where a person generally eats and sleeps and for which he can show proof of financial commitment). This is in contrast to a boarding house facility which is not self-contained; and**

2. **The employee normally resides in the residence except for those periods of time when, because of the location of the work, the employee obtains temporary accommodation for that work location.**

(b) a subsistence allowance; or
(c) a travel allowance.

(ii) An employee may exercise his option not to stay in a camp or accept free room and board. An employee who exercises this option shall receive a room and board allowance as follows:

(a) When an employee's regular residence is more than 97 radius kilometers from a Project located North of the French River and the employee maintains temporary accommodation at or near the Project, the employee shall be paid a subsistence allowance of $70.00 per day effective May 1, 2000, ($72.00 effective May 1, 2001, $74.00 effective May 1, 2002 and $76.00 effective May 1, 2003) for each day worked or reported for.

(b) When an employee's regular residence is more than 97 radius kilometers from a Project located South of the French River and the employee maintains temporary accommodation at or near the project, the employee shall be paid a subsistence allowance of $57.00 per day effective May 1, 2000, ($59.00 effective May 1, 2001, $61.00 effective May 1, 2002 and $63.00 effective May 1, 2003) for each day worked or reported for, subject to (d) below .

(c) When an employee's regular residence is more than 97 radius kilometers from the Project and the employee commutes to work on a daily basis, the employee shall receive $31.10 per day effective May 1, 2000, ($33.10 effective May 1, 2001, $35.10 effective May 1, 2002 and $37.10 effective May 1, 2003) for each day worked or reported for.

(d) At the Pickering and Darlington Projects, employees who live beyond 97 radius kilometers from the Project, shall receive $45.00 per day effective May 1, 2000, ($48.00 effective May 1, 2001, $51.00 effective May 1, 2002 and $54.00 effective May 1, 2003) for each day worked or reported for.

NEW

(e) When an employee's regular residence is more than five hundred (500) radius kilometres from the project, and the job or project is worked on a four ten (4 x 10's) hour work week, the employee shall receive room and board on a five (5) day basis for a regular work week. If the employee is required to work an additional ten (10) hour shift(s) beyond the normal four ten (4 x 10) hour shift, the employee will be entitled to room and board for an additional ten (10) hour shift worked to a maximum of seven (7) days room and board in a week.

B. An employee shall not qualify for daily travel allowance or room and board allowance as provided for in Article 200 and Article 201, Item A above, when such employee reports for work but does not remain at work for his scheduled daily hours unless excused by an authorized representative of his Employer. Such permission shall not be unreasonably denied.

C. The Union recognizes the Employer's right to charge for board and other existing services. The Employer fixes the charge for board and other existing services in camps at $25.00 per day. This will be applied on the following basis:

(i) An employee who remains in camp on a normally scheduled work day on which he does not work will be charged $25.00 per day unless he is excused from work for a legitimate reason by the Project medical attendant or an authorized representative of his Employer.

(ii) An employee who is absent from work on Friday without approval and who remains in camp and who is still absent from work on the following Monday without approval will be charged for room and board for Friday, Saturday, Sunday and Monday.

(iii) An employee who remains in camp and who is absent from work without approval on Friday but who works the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

(iv) An employee who remains in camp and who works the Friday and is absent from work without approval on the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

202
Initial and Return Travel and Transportation

A. On recruitment of tradesmen who live between 97 and 161 radius kilometers from the project, the Employer shall pay $21.00 effective May 1, 2000, ($22.00 effective May 1, 2001, $23.00 effective May 1, 2002 and $24.00 effective May 1, 2003) for the initial trip to the project.

B. On recruitment of tradesmen who live beyond 161 radius kilometers from the project, the Employer shall pay $0.34 effective May 1, 2000, ($0.35 effective May 1, 2001, $0.36 effective May 1, 2002 and $0.37 effective May 1, 2003) per radius kilometer plus travel time based on one hour's pay for each 80 radius kilometers of travel, or part thereof, to a maximum of 8 hours' pay for the initial trip to the project from where the tradesman lives or the Local Union Referral Hall for the project, whichever is closer to the project.

C. To qualify for payment in Items A or B, the employee must remain at the project for a minimum of fifteen (15) working days or the duration of the job, whichever is lesser.

D. On termination of employment due to a reduction of staff, an employee entitled to payment under Items A or B shall be entitled to return expenses calculated in the same manner as in Items A or B above for the return trip from the project to where the tradesman lives or place of recruitment, whichever is closer to the project. An employee whose employment terminates for any reason other than reduction of staff shall not be eligible for return payment.

E. (i) On the Thunder Bay Project and Atikokan Project, an employee shall qualify for a return trip from the Project to his regular residence for each thirty (30) days worked on the Project providing his regular residence is more than four hundred (400) radius kilometers from the Project.

(ii) For each entitlement, the Employer shall pay travel expenses on the basis of the equivalent cost of public transportation plus travel time based on one (1) hour's pay for each eighty (80) radius kilometers of travel, or part thereof, to a maximum of eight (8) hours' pay.

203
Use of
Personal
Vehicle

A. An employee who is requested or receives approval from an authorized representative of his Employer to use his personal vehicle for the convenience of his Employer shall be reimbursed $0.37 per kilometer travelled effective May 1, 2000, ($0.38 effective May 1, 2001, $0.39 effective May 1, 2002 and $0.40 effective May 1, 2003) for such use of his vehicle.

APPENDIX B

7 DAY COVERAGE

These provisions would only apply to work covered by the "Modified Provisions of this Construction Agreement."

When working under the provisions of this appendix all conditions listed below will supersede those contained in the main agreement. Where this appendix is silent, the appropriate article in the collective agreement applies.

NEW The overtime rates will be as per the Modified Provisions.

This shift schedule is intended for work greater than four (4) weeks in duration, however, it is recognized that unforeseen circumstances may require the cancellation of this schedule.

It in the transition onto or off this 7 day shift schedule an employee would receive less than 40 paid hours in a pay period, the employee shall receive the difference between the total paid hours for that pay period and 40 hours pay. This does not apply to those employees who are laid off during or at the end of the schedule. The employee(s) shift schedule consists of four consecutive shifts (day, afternoon, or night) followed by four scheduled days off. Shift overlap may be required.

Shift work may be established by the employer to provide seven (7) days per week work coverage, on a one (1), two (2), or three (3) shift per day basis. When this occurs, a specific shift arrangement will be established by the employer detailing the shift schedule to be worked. The employer will provide the Union with forty-eight (48) hours notice prior to the implementation of these shift provisions.

Day Shift

Regularly scheduled hours of work Monday to Friday inclusive shall be paid at straight time hourly rates.

Afternoon Shift

Regularly scheduled hours of work, Monday to Friday inclusive shall be paid at straight time hourly rates plus a shift differential of one-seventh (1/7) of the straight time hourly rate.

Night Shift

Regularly scheduled hours of work, Monday to Friday inclusive shall be paid at straight time hourly rates plus a shift differential of one-fifth (1/5) of the straight time hourly rate.

All Shifts

Regularly scheduled hours of work on Saturday, Sunday, Statutory and Recognized Holidays shall be paid at two (2) times the straight time hourly rate. Recognized Holidays will be observed on the actual day on which the holiday occurs or as declared by legislation.

The rate for the shift will be based on the day in which the shift begins.

An unpaid lunch period of one-half (1/2) hour shall be allowed to be taken no later than five (5) hours after the commencement of a shift.

For employees working regularly scheduled hours, two (2) fifteen (15) minute rest periods will be allotted at a time and location directed by the employer for employees to rest.

It may be necessary, from time to time, to vary the established shift arrangements. When this occurs, a revised shift arrangement will be established.

LETTER #1

June 23 1992

Mr. J. SPRACKETT
President,
Electrical Power Systems
Construction Council of Ontario
International Brotherhood of
Electrical Workers
61 International Blvd.
Toronto, Ontario

Dear Mr. Sprackett:

Room & Board Allowance Understanding
North of the French River

This letter will confirm an understanding reached at current bargaining between EPSCA and the IBEW EPSCCO ("Generation Project") as follows:

Individuals in the 80-97 kilomtre radius ring working north of the French River will be eligible for room and board allowance if their actual road kilometres travelled exceed their radius distance by more than thirty-three (33%) percent.

Yours truly,

V.W. Medri
Secretary-Treasurer

LETTER OF UNDERSTANDING #1

Employment Referrals to Nuclear Generating Facilities

It is agreed by the parties to this understanding that, prior to any member being referred for employment at a nuclear generating facility, the member must submit to a security check. Only members who successfully obtain security clearance will be referred to the facility for employment. Once these referrals have been hired on, they will be paid fifty ($50.00) dollars on their first week's pay cheque, in consideration of their time spent filling out the security clearance forms.

The Union will be notified, as soon as possible, whether or not an individual has successfully obtained security clearance. This pre-clearance process does not prohibit the Union from filing a grievance against the Employer on behalf of any member who is refused employment due to his/her failure to obtain security clearance.

Dated at Toronto this 23rd Day of April, 1999

For the EPSCA

Barry Roberts

Dave Radtke

For the IBEW CCO

Larry Lineham, Chair.

Ken Scott, President

John Pender, Exe. Sec.Treasurer

Bob Hill, Executive Chairman

Bill Daniels, Local Union 402

LETTER OF UNDERSTANDING #2

As discussed during negotiations, in order to ensure an adequate supply of qualified tradesmen for employment opportunities, it is agreed that the IBEW and/or Local Union(s) will cooperate in a training process as follows:

When it is determined that a requirement can be foreseen for IBEW/Local Union members with particular skills or qualifications, the Employer will provide the instructor(s) and the facilities at his cost and the IBEW members, on their own time, will attend such training courses to acquire such skills and/or qualifications.

For the EPSCA

Barry Roberts

Dave Radtke

For the IBEW CCO

Larry Linteham, Chair

Keri Scott, President

John Pender, Exe. Sec. Treasurer

Bob Hill, Executive Chairman

Bill Daniels, Local Union 402

Dated at Toronto this 23rd Day of April 1999.

LETTER OF UNDERSTANDING #3

LETTER OF UNDERSTANDING

BETWEEN

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION (EPSCA)

AND

THE IBEW CONSTRUCTION COUNCIL OF ONTARIO (IBEW CCO)

Mr. Barry Roberts, Chairman
EPSCA Negotiating Committee

Dear Sir:

The IBEW CCO/EPSCA Negotiating Committees agree to the following:

Regarding: **LOCAL AREA HIRING HALL PRACTICES**

It is agreed that Local area Hiring Hall practices shall be available to the Employers under this Agreement.

Dated this 23rd Day of April 1999

Expiry: Duration of this Collective Agreement

For the EPSCA

Barry Roberts

Dave Bodtke

For the IBEW CCO

Larry Lincham, Chair

Kerl Scott, President

John Pender, Exc. Sec.Treasurer

Bob Hill, Executive Chairman

Bill Daniels, Local Union 402

LETTER OF UNDERSTANDING #4

LETTER OF UNDERSTANDING

BETWEEN

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION (EPSCA)

AND

THE IBEW CONSTRUCTION COUNCIL OF ONTARIO (IBEW CCO)

Mr. Barry Roberts, Chairman
EPSCA Negotiating Committee

Dear Sir:

The IBEW CCO/EPSCA Negotiating Committees agree to the following:

Regarding: **SECTOR TO SECTOR 'TRANSFERS'**

It is agreed for Local Union jurisdictions which do not permit 'transfers' from Sector to Sector, that the following conditions shall apply; for work requiring one month or less to complete, the Employer will be allowed to 'transfer' six (6) employees, who shall be Members of the Local Union, already in their employ.

For Local Union jurisdictions that do allow Sector to Sector 'transfers' they may continue to do so, as is their practice.

Dates this 23rd Day of April 1999

Expiry: Duration of this Collective Agreement.

For the EPSCA

Barry Roberts

Dave Radtke

For the IBEW CCO

Larry Linteham, Chair

Ken Scott, President

John Pender, Exec. Sec.Treasurer

Bob Hill, Executive Chairman

Bill Daniels, Local Union 402

LETTER OF UNDERSTANDING # 5

LETTER OF UNDERSTANDING

BETWEEN

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION (EPSCA)

AND

THE IBEW CONSTRUCTION COUNCIL OF ONTARIO (IBEW CCO)

Regarding: **CLARIFICATION NOTE**

As discussed in negotiations, the Employment Practices/Hiring provisions in Section 7 allow for the transfer of personnel within a Local Union's geographic jurisdiction (as described in Article 202 A) within the Power Sector, e.g. from one contract to another contract on the same project site and/or from project site to project site.

For the IBEW:

John Pender

John D. Pender

Larry Lineham

Larry Lineham

For the EPSCA:

Neil Donnelly

Neil Donnelly

Denis Flynn

Denis Flynn

Jack Gibson

Jack Gibson

MEMORANDUM OF SETTLEMENT

BETWEEN

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION

AND

THE IBEW ELECTRICAL POWER COUNCIL OF ONTARIO
representing the following affiliated Local Unions
105, 115, 120, 303, 353, 402, 530, 586, 773, 804, 894, 1687, 1739

Dated this 15th day of May, 2004

It is agreed that the existing agreement between the parties which expires April 30, 2004 will be renewed with the following amendments:

SECTION 2 SCOPE OF AGREEMENT

Amend Section 200 – Recognition, to add Bruce Power LP

Amend Section 202 – Geographic Jurisdiction, to accept Union proposal dated May 12, 2004 (see attached document)

SECTION 3 DURATION OF AGREEMENT

Amend Section 300 to read as follows:

> "This agreement shall become effective May 1, 2004 and will expire on April 30, 2010."

SECTION 7 EMPLOYMENT PRACTICES/HIRING

Add NEW sentence to 701 A (ii) as follows:

> "On Nuclear sites only, local members replacing travel cards must be security cleared prior to hire and possess the same owner specific nuclear training as the employee being replaced. On Nuclear sites only, replacement of travel cards will not occur during outages."

SECTION 8 HOURS OF WORK

New Section 8 proposed. See attached EPSCA document.

SECTION 9 WAGES AND PAY PROCEDURE

WAGES:

Effective May 1, 2004 – Increase journeyman TWP by $1.10
Effective May 1, 2005 – Increase journeyman TWP by $1.10
Effective May 1, 2006 – Increase journeyman TWP by $1.20

Additional ICI wage increase - effective date of ICI increase

ICI increase/date for the following three years of agreement.

Replace 900 B with the following:

> "Wage schedule, dues and remittance changes are to be provided in writing to EPSCA and changes shall only take place during the months of April and November of each calendar year. The effective date of such changed wage schedules, dues and remittances shall be the date of issuance"

Add to 901 A (i) the following:

> "Failure by the Employer to comply with the requirements of this clause will entitle the employee to one (1) hour's pay at the straight time rate."

Add to 901 A (ii) the following:

> "In the case of a holiday falling on a Thursday or Friday, the employee shall be paid on the Wednesday prior to this holiday."

SECTION 10 UNION AND BENEFIT FUNDS

Amend 1004 to indicate most current ESA reference.

SECTION 11 TRAVEL AND ROOM AND BOARD ALLOWANCE

Amend Section 1101 - Travel rings and Board and Travel to be increased (and rounded to the nearest 5 cents) as follows:

- May 1, 2004 – 4%
- May 1, 2005 – 2%
- May 1, 2006 – 2%
- May 1, 2007 – 4%
- May 1, 2008 – 2%
- May 1, 2009 – 2%

Amend Section 1102 A as follows:

- May 1, 2004 – $25.00
- May 1, 2005 – $26.00
- May 1, 2006 – $27.00
- May 1, 2007 – $28.00
- May 1, 2008 – $29.00
- May 1, 2009 – $30.00

Amend Section 1102 B as follows:

- May 1, 2004 – 40 cents
- May 1, 2006 – 42 cents
- May 1, 2008 – 44 cents

SECTION 17 RADIATION WORK

Amend 1700 E to $12.00 per day

NEW F. Add the following language:

Construction Radiation Protection Assistant (R.P.A.) is a Construction Trades Person (Greenman) who has achieved the full radiation qualification via (i) the approved Ontario Power Generation Inc. and/or Bruce Power Training Program, (ii) has successfully completed the construction R.P.A. training and checkouts, and (iii) has performed R.P.A. functions while under supervision of a fully qualified Construction R.P.A. to the satisfaction of the Construction Site Safety Officer and the Station Health Physics Unit.

The Employer will select for Greenman training only those employees who are members of the Local Union for the Project.

R.P.A. will be paid the appropriate equivalent foreman's rate when performing an R.P.A. function and will report to the Site Safety Unit. An R.P.A. is a "qualification" and not a "trade function" irrespective of union or trade affiliation.

In the case of a recall to work, Employers reserve the right to recall qualified Greenmen in sequence from the out-of-work list to the location from where they were laid off. Recalled Greenmen will perform sufficient Greenman work to maintain their skill level.

APPENDIX A INDEX

Revise Modified Provisions Index - Article 1 replace Hours of Work to read Overtime Rates.

ARTICLE 1 OVERTIME RATES

NEW Article 1 as follows:

When working on an eight (8) hour day and five (5) day per week work schedule (Monday to Friday inclusive), overtime work shall be paid at one and one-half (1 ½) times the basic hourly rate for all hours worked beyond the normal daily scheduled number of hours up to a maximum of two (2) hours per day. All hours in excess of 10 hours per day shall be paid at two (2) times the base hourly rate.

When working on a ten (10) hour day and four (4) day per week work schedule (Monday to Friday inclusive), overtime work shall be paid at one-half (1 ½) times the basic hourly rate for all hours worked beyond the normal daily scheduled number of hours up to a maximum of two (2) hours per day. All hours in excess of 12 hours per day shall be paid at two (2) times the base hourly rate.

Overtime work performed on Saturday, Sunday, Recognized Holidays and non-shift days shall be paid at two (2) times the basic hourly rate.

B. When an employee has not been notified the previous day that he will be required to work for more than two (2) hours beyond the normal quitting time of his shift and after approximately two (2) hours has been worked, he shall be provided with a lunch and allowed thirty (30) minutes to consume same and be paid at the base hourly rate of pay.

After each additional four (4) hours is worked, the employee shall be allowed thirty (30) minutes to eat and be paid at the base hourly rate of pay and a lunch when work is required beyond that four (4) hour period. Where an employee has been notified the previous day, no lunch will be provided, but the employee will be allowed thirty (30) minutes to eat and be paid at the base hourly rate of pay.

When a paid meal period overlaps a rest period, the paid meal period will supplant the rest period.

The above-noted is not applicable to the first eight (8) hours worked on Saturdays, Sundays and Recognized Holidays.

ARTICLE 2 TRAVEL AND ROOM AND BOARD ALLOWANCE

Amend Article 200. Travel rings and Board and Travel to be increased (and rounded to the nearest 5 cents) as follows:

- May 1, 2004 – 4%
- May 1, 2005 – 2%
- May 1, 2006 – 2%
- May 1, 2007 – 4%
- May 1, 2008 – 2%
- May 1, 2009 – 2%

Amend Article 202 A as follows:

- May 1, 2004 – $25.00
- May 1, 2005 – $26.00
- May 1, 2006 – $27.00
- May 1, 2007 – $28.00
- May 1, 2008 – $29.00
- May 1, 2009 – $30.00

Amend Article 202 B as follows:

- May 1, 2004 – .40 cents
- May 1, 2006 – .42 cents
- May 1, 2008 – .44 cents

SECTION 8 HOURS OF WORK

800 A. One (1) or Two (2) Shift Operation

The weekly hours of work Monday to Friday inclusive shall consist of forty (40) hours for all employees of Employers covered by this agreement and working on a one (1) or two (2) shift operation.

The weekly hours of work may be arrived at by having the employees work either:

- four (4) consecutive ten-hour shifts, Monday to Thursday or;
- four (4) consecutive ten-hour shifts, Tuesday to Friday or;
- five (5) consecutive eight-hour shifts

but not concurrently on the same work program.*

Each Employer will notify the Local Union of the weekly hours of work for each work program* at the site.

Weekly hours of work will be established for a minimum period of two (2) weeks.

If an Employer intends to change the weekly hours of work, a minimum of seven (7) days written notice shall be sent to the Local Union.

The start time for the day shift shall be 8:00 a.m. with a possible one (1) hour variance either way. The start time for the afternoon shift shall be immediately following the day shift or within two (2) hours to coincide with the end of the day shift.

The shift differential for those employees working the afternoon shift when a two shift operation has been established by the Employer will be one-seventh (1/7) for scheduled hours worked on that shift.

For the purposes of this section, a work program will be defined as work taking place on a site that includes the following:

- ***Outages,***
- ***Specific contracted scopes of work,***
- ***Various and different modifications in an operating plant where the owner dictates the hours of work, or***
- ***Subcontracts for a prime contractor where the prime contractor dictates the hours of work.***

B. Three (3) Shift Operation

When a three (3) shift operation is established by the Employer, the following conditions will apply:

Those employees working on the day shift shall work eight (8) hours at the straight time rate.

Those employees working on the afternoon shift shall work seven and one-half (7 1/2) hours per shift. A shift differential of one-seventh (1/7) shall be paid for all normal scheduled shift hours worked.

Those employees working on the night shift shall work seven (7) hours per shift. A shift differential of one-fifth (1/5) shall be paid for all normal scheduled shift hours worked.

C. A shift will be deemed to be established providing at least four (4) consecutive days of a shift are to be worked, excluding Saturdays, Sundays and Recognized Holidays. If an employee is removed from their scheduled shift prior to completing four (4) consecutive shifts, the employee will be paid shift differential for the balance of the four (4) consecutive shifts that would have been worked had the employee not been reassigned.

D. The shift rate will be based on the day in which the shift begins.

E. IBEW members assigned to fire watch duties may commence work after the start of the rest of the crew. In these cases, normal scheduled hours of work beyond the quit time of the rest of the crew will not be subject to overtime rate of pay.

F. It may be necessary from time to time to vary the hours of work established in this Article. Any amendments to the hours of work will be established by mutual agreement between EPSCA and the Union.

801 Rest Periods

A. For employees working normal hours, a fifteen (15) minute rest period will be allotted, at the time directed by the Employer, for each half shift worked. Where a half shift is less than four (4) hours, there shall be no rest period excluding the third shift.

B. For employees required to work overtime, a ten (10) minute rest period will be allotted prior to the end of the normal shift before commencing overtime work.

C. For employees working overtime, a fifteen (15) minute rest period will be allotted, at the time directed by the Employer, after each two hours of overtime worked.

802
Reporting
Pay

A. An employee who reports for work, unless directed not to report the previous day by his Employer, shall receive a minimum of three (3) hours' pay plus his appropriate daily travel or board allowance at the applicable rate when he reports for work but is unable to commence or continue to work because of circumstances beyond his control. An employee will not receive this allowance if he is unable to complete his shift as a result of inclement weather.

B. Notwithstanding Subsection 802, Item A above, when an Employer considers it necessary to shut down a job to avoid the possible loss of human life, because of an emergency situation that could endanger the life and safety of an employee, in such cases, employees will be compensated only for the actual time worked.

803
Inclement
Weather Pay

A. An employee who reports for work at the beginning of a shift and is unable to commence work due to inclement weather will receive three (3) hours' pay at the applicable rate. To qualify, the employee must remain at a protected place or area as designated by the Employer for three (3) hours unless excused by an authorized representative of his Employer.

B. An employee who reports for and commences work but is unable to continue work due to inclement weather shall receive three (3) hours' pay at the applicable rate or pay for the actual time worked for that shift, whichever is the greater.

C. An employee in receipt of inclement weather pay shall also receive travel or board allowance if applicable.

804
Recognized
Holidays

A. The holidays recognized under this Agreement are:

New Year's Day	Civic Holiday
Good Friday	Labour Day
Easter Monday	Thanksgiving Day
Victoria Day	Christmas Day
Canada Day	Boxing Day

B. EPSCA agrees to recognize Heritage Day when proclaimed by legislation.

C. Recognized holidays falling on a Saturday or Sunday shall be observed on the following Monday. When Christmas Day falls on a Saturday or Sunday, it shall be observed on the following Monday and Boxing Day on the following Tuesday. When New Year's Day falls on a Saturday or Sunday, it shall be observed either on the preceding Friday or following Monday.

D. EPSCA reserves the right to change the day of observation of a recognized holiday when such holiday falls on a Tuesday or Thursday.

805
Call-In
Pay

A. When an employee is called in to work outside of his normal hours of work, he shall receive a minimum of two (2) hours' work at the appropriate premium rate plus travel allowance where applicable.

B. If the employee's normal hours of work commences within this two (2) hour period, the employee will be paid premium time for the actual hours worked and revert to his normal rate at the commencement of his normal hours of work.

Section 8 sub 806 Overtime Rates* is applicable to work which is *not* covered by *Appendix A - Modified Provisions of this Construction Agreement.
Please refer to the *GENERAL NOTE* preceding the Index Page of this Agreement

806 Overtime Rates

A. Overtime shall be paid at two times the straight time rate for all work performed outside of normal hours as defined in Section 8 and for work performed on Saturday, Sunday and the recognized holidays listed in Subsection 804, Item A above.

B. When an employee has not been notified the previous day that he will be required to work for more than two (2) hours beyond the normal quitting time of his shift and after approximately two (2) hours has been worked, he shall be provided with a lunch and allowed thirty (30) minutes to consume same and be paid at the base hourly rate of pay. After each additional four (4) hours is worked, the employee shall be allowed thirty (30) minutes to eat and be paid at the base hourly rate of pay and a lunch when work is required beyond that four (4) hour period. Where an employee has been notified the previous day, no lunch will be provided, but the employee will be allowed thirty (30) minutes to eat and be paid at the base hourly rate of pay.

When a paid meal period overlaps a rest period, the paid meal period will supplant the rest period.

To qualify for the above-noted provisions, on a Friday, an employee will be required to work for more than four (4) hours beyond the normal quitting time of his shift.

The above-noted is not applicable to the first eight (8) hours worked on Saturdays, Sundays and Recognized Holidays.

LETTER OF UNDERSTANDING #6

BETWEEN

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION (EPSCA)

AND

THE IBEW CONSTRUCTION COUNCIL OF ONTARIO (IBEW CCO)

Clarification Note – Replacement of Travel card members

As discussed in negotiations, in cases relating to Article 701 A (ii), the Local Union will notify the Employer and the EPSCA Office in writing at the time it seeks to replace a travel card with a Local Union member who does not possess the owner specific training required.

In these instances, the Employer will provide such training when the training is available and Local member, on his own time, will complete such training before he can replace a travel card.

Dated this 15th day of May, 2004 at Toronto, Ontario.

FOR EPSCA

_____

FOR the IBEW CCO

_____

LETTER OF UNDERSTANDING #7

BETWEEN

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION (EPSCA)

AND

THE IBEW CONSTRUCTION COUNCIL OF ONTARIO (IBEW CCO)

Re: Payment of Board Allowance North of the French River

During current negotiation discussions, the Union raised concerns about room and board/travel at certain Generating sites north of the French River.

The Parties agree to meet by the end of July 2004 to identify those Generating stations where the Union has issues and reach a mutual agreement as to appropriate compensation for Room and Board/Travel at those sites.

Dated this 15th day of May, 2004 at Toronto, Ontario.

FOR EPSCA

_____

FOR the IBEW CCO

_____

- Letters of Understanding 1 through 5 to be renewed.

The parties agree to recommend this settlement for ratification. This agreement is conditional upon ratification by June 22, 2004. Following ratification, all terms and conditions will become effective May 1, 2004 (unless otherwise noted) and shall form the new agreement between the Parties.

Dated this 15th day of May, 2004 at Toronto, Ontario.

For EPSCA	For the IBEW CCO
_____	_____
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MAP CODE:
E-7-C

ISSUED:
SEPTEMBER 4, 2002

REVISED:
OCTOBER 14, 2004

ELECTRICAL WORKERS
Local 303
Niagara Peninsula

EPSCA WAGE SCHEDULE FOR ALL ELIGIBLE CONTRACTORS PERFORMING ELECTRICAL CONSTRUCTION WORK ON OPGI AND BRUCE POWER FACILITIES

GRADE AND STEP	CLASSIFICATIONS OCCUPATION CODES & EFFECTIVE DATES	BASE HOURLY RATE	VACATION & STAT. HOLIDAY	WELFARE (2)	PENSION (2)	UNION FUNDS (2)	TOTAL WAGE PACKAGE	BILL 162 (2)	EPSCA ASSOC. FUND(1)
	ELECTRICIAN FOREMAN - 410165								
07-9	2004-05-01	33.65	3.37	2.75	2.75	3.40	45.92	0.03	0.15
	2005-05-01	33.65	3.37	2.75	2.75	4.50	47.02	0.03	0.15
	2006-05-01	33.65	3.37	2.75	2.75	5.70	48.22	0.03	0.15
	SUBFOREMAN - 410155								
07-8	2004-05-01	32.65	3.27	2.75	2.75	3.40	44.82	0.03	0.15
	2005-05-01	32.65	3.27	2.75	2.75	4.50	45.92	0.03	0.15
	2006-05-01	32.65	3.27	2.75	2.75	5.70	47.12	0.03	0.15
	JOURNEYMAN - 410135, WELDER - 410136 COMMUNICATIONS ELECTRICIAN - 410137								
07-6	2004-05-01	30.65	3.07	2.75	2.75	3.40	42.62	0.03	0.15
	2005-05-01	30.65	3.07	2.75	2.75	4.50	43.72	0.03	0.15
	2006-05-01	30.65	3.07	2.75	2.75	5.70	44.92	0.03	0.15
	ELECTRICIAN APPRENTICE - 410115								
	1st Period								
07-0	2004-05-01	12.26	1.23	2.75	2.75	3.40	22.39	0.03	0.15
	2005-05-01	12.26	1.23	2.75	2.75	4.50	23.49	0.03	0.15
	2006-05-01	12.26	1.23	2.75	2.75	5.70	24.69	0.03	0.15
	2nd Period								
07-1	2004-05-01	15.33	1.53	2.75	2.75	3.40	25.76	0.03	0.15
	2005-05-01	15.33	1.53	2.75	2.75	4.50	26.86	0.03	0.15
	2006-05-01	15.33	1.53	2.75	2.75	5.70	28.06	0.03	0.15
	3rd Period								
07-2	2004-05-01	18.39	1.84	2.75	2.75	3.40	29.13	0.03	0.15
	2005-05-01	18.39	1.84	2.75	2.75	4.50	30.23	0.03	0.15
	2006-05-01	18.39	1.84	2.75	2.75	5.70	31.43	0.03	0.15
	4th Period								
07-3	2004-05-01	21.46	2.15	2.75	2.75	3.40	32.51	0.03	0.15
	2005-05-01	21.46	2.15	2.75	2.75	4.50	33.61	0.03	0.15
	2006-05-01	21.46	2.15	2.75	2.75	5.70	34.81	0.03	0.15
	5th Period								
07-4	2004-05-01	24.52	2.45	2.75	2.75	3.40	35.87	0.03	0.15
	2005-05-01	24.52	2.45	2.75	2.75	4.50	36.97	0.03	0.15
	2006-05-01	24.52	2.45	2.75	2.75	5.70	38.17	0.03	0.15

(1) = per hour worked; (2) = per hour paid

ELECTRICAL WORKERS
Local 303
Niagara Peninsula

EPSCA WAGE SCHEDULE FOR ALL ELIGIBLE CONTRACTORS PERFORMING ELECTRICAL CONSTRUCTION WORK ON OPGI AND BRUCE POWER FACILITIES

GRADE AND STEP	CLASSIFICATIONS OCCUPATION CODES & EFFECTIVE DATES	BASE HOURLY RATE	VACATION & STAT. HOLIDAY	WELFARE (2)	PENSION (2)	UNION FUNDS (2)	TOTAL WAGE PACKAGE	BILL 162 (2)	EPSCA ASSOC. FUND(1)

OVERTIME:

Mon-Fri: 1 1/2 times for up to and including 2 hours beyond the normal daily scheduled number of hours. This applies for both 4 day x 10 hours per day schedule and 5 day by 8 hour per day schedule.
Non-Scheduled Work Days - 2 times for all hours worked.

Sat: 2 times for all hours worked.

Sun & Hol: 2 times for all hours worked.

UNION FUNDS

Union Funds include the following items:

Union Dues -	$0.74	per hour paid
DeNovo -	$0.02	per hour paid (includes $0.01 per hour employee deduction and $0.01 per hour employer contribution)
IBEW/EPSCA -	$0.04	per hour paid
Retiree's Fund -	$0.02	per hour paid
RRSP (non-taxable): -	$2.58	per hour paid
	$3.68	per hour paid - effective May 1, 2005
	$4.88	per hour paid - effective May 1, 2006

NOTE: Stabilization Fund is not included in Union Funds
Stabilization Fund amount is one hour's pay, at the Base Hourly Rate, per week. This amount is to be deducted for each classification. This amount to be deducted when an employee works more than 16 hours in a pay week. Tax is to be paid on the deduction; a T4 slip will be issued at year end for the total amount deducted.

UNION DUES

Union Dues are included in Union Funds for this Local.

BENEFITS

All remittances (employer contributions, employee deductions and Union Dues), excluding the EPSCA Association Fund, are to be sent to:

IBEW Local Union 303 Administrator
P.O. Box 68
THOROLD, ON
L2V 1Y7

GEOGRAPHIC AREA: Niagara (RM); in Haldimand-Norfolk (RM), the Town of Dunnville

Power Council of Unions

MASTER PORTION

The amendments contained in the Statement of Settlement, dated May 12, 2000 have been incorporated into the Master Portion of the Collective Agreement in accordance with Article 33.1 of the Collective Agreement negotiated between the Senior Bargaining Committees of The Electrical Power Systems Construction Association and the Power Council of Unions.

EPSCA/POWER COUNCIL OF UNIONS COLLECTIVE AGREEMENT

MASTER PORTION

GENERAL NOTE

REV

This Collective Agreement distinguishes between two broad categories of work; namely, work that is covered by the *"modified provisions"* of this construction agreement and work that is not. *"Modified provisions"* apply to all work on Lines & Stations and most work on existing generating sites. Following is a more detailed explanation:

The *"Modified Provisions"* of this Construction Agreements will apply to:

(a) all work on Lines and Stations, and

(b) all work on existing generating sites except the construction of:
- **a new facility which provides a new function**
- **a new (i.e. additional) generating unit**

Appendix D - contains the *"Modified Provisions of this Construction Agreement"*. All terms of this collective agreement shall apply to work covered by Appendix D, with the exception of Article 16 – Reporting Pay, Article 17 - Generation Projects Daily Travel Allowance and Room and Board, Article 23 – Meals on Overtime and Article 26 - Hours of Work. Articles 16, 17, 23 and 26 do not apply when working under the terms and conditions of the *"modified provisions"*, as they are replaced by Sections 1 through 4 of Appendix D.

When work does not fall within the jurisdiction of Appendix D, all terms of this agreement, with the exception of Appendix D, apply.

A chart to illustrate the above applications follows:

Lines & Stations - Existing and New Sites	Generating - Existing Sites Excluding construction of new facility (new function) &/or new (additional) generating unit(s)	Generating - Existing Sites Involving construction of new facility (new function) & /or new (additional) generating unit(s)	Generating - New Sites (i.e. Greenfield Work)
Use Article 18 for L&S Construction Daily Travel Allowance and Room & Board; use Modified Provisions (Appendix D) for Reporting Pay, Meals on Overtime and Hours of Work	Use Modified Provisions (Appendix D) for Reporting Pay, Generation Projects Daily Travel Allowance and Room & Board, Meals on Overtime and Hours of Work	Use Articles 16, 17, 23 and 26 for Reporting Pay, Generation Projects Daily Travel Allowance & Room and Board, Meals on Overtime and Hours of Work	Use Articles 16, 17, 23 and 26 for Reporting Pay, Generation Projects Daily Travel Allowance and Room & Board, Meals on Overtime and Hours of Work

EPSCA/POWER COUNCIL OF UNIONS COLLECTIVE AGREEMENT
MASTER PORTION

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COLLECTIVE AGREEMENT

by and between

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION
(hereinafter called "EPSCA")

and the

POWER COUNCIL OF UNIONS
(hereinafter called the "Council")

WHEREAS EPSCA is an Association formed to represent Employers in collective bargaining and on their behalf enter into collective agreements covering those of their employees in the bargaining unit as hereinafter defined;

AND WHEREAS the Council is formed to represent the Unions listed in Article 2 in collective bargaining with EPSCA and to enter into collective agreements on their behalf and on behalf of their members in the bargaining unit as hereinafter defined;

AND WHEREAS it is the desire of the parties to conclude an agreement with a new concept designed to bring stability, harmony, and an effective method to amicably resolve problems in the electrical power systems sector of the construction industry, in the Province of Ontario;

NOW THEREFORE the parties hereby agree as follows:

Article 1

RECOGNITION

1.1 EPSCA recognizes the Council as the exclusive bargaining agency for a bargaining unit comprising employees as defined in Section 1.4 and foremen as defined in Section 1.5 engaged in all construction industry work* performed in the Province of Ontario on Ontario Power Generation Inc (OPGI) and Hydro One property for the bulk power system, save and except the building of commercial-type office facilities at urban locations remote from operating facilities.

For the purpose of clarity, the bulk power system comprises generating stations, hydraulic works, heavy water facilities, transmission lines (voltages over 50 kV), transmission stations, microwave and repeater stations.

1.2 The work described in Section 1.1 shall also include work on property acquired by Ontario Power Generation Inc (OPGI) and Hydro One for:

(a) the supply of aggregate and concrete used in the construction of said facilities; and

(b) ancillary material yards which are defined as property acquired by Ontario Power Generation Inc (OPGI) and Hydro One for the storage of materials to be used on a project by Employers.

1.3 The Council recognizes EPSCA as the exclusive bargaining representative for all Employers in respect of work performed by their respective employees in the bargaining unit set forth in Section 1.1.

1.4 The term "employee" shall include all employees of the Employers in the classifications set out in the trade appendices provided in Article 4, Sections 4.1 and 4.2, save and except those described hereunder:

(a) Carpenters and Laborers employed by an Employer signatory to the National Agreement for Canada, Stacks-Chimneys-Silos, when performing work covered by the scope of that agreement; and

* ***For the purpose of The Electrical Power Systems Construction Association, the work performed is deemed to be under the responsibility of the Engineering and Construction Services Branch. The work encompasses:***

- ***construction of new facilities***
- ***additions to existing facilities***
- ***major - modifications***
  - ***rehabilitation***
  - ***reconstruction of existing facilities***

(b) Operating Engineers employed by an Employer signatory to the Crane and Equipment Rental Agreement with Local Union 793, when performing work covered by the scope of that agreement; and

The term "employee" includes foremen in Articles 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24.1(b), 24.1(c), 26, and in the applicable Vacation Pay and Statutory Holiday Articles in each Appendix.

1.5 The term "foreman" shall include all foremen of the Employers between the ranks of, but not including, working foreman and general foreman, save and except those described hereunder:

(a) Carpenter foremen and Laborer foremen employed by an Employer signatory to the National Agreement for Canada, Stacks-Chimneys-Silos, when performing work covered by the scope of that agreement; and

(b) Operating Engineer foremen employed by an Employer signatory to the crane and Equipment Rental Agreement with Local Union 793, when performing work covered by the scope of that agreement; and

1.6 The term "Employers" shall include individual members of EPSCA and any company, partnership, sole proprietorship, joint venture, contractor, subcontractor or any person that is bound by the terms and conditions of this Agreement.

1.7 EPSCA and the Council agree the use of nomenclature is meant to refer to both genders.

Article 2

MEMBERS OF THE COUNCIL

2.1 It is recognized that the Council comprises certain International Unions whose names are listed hereunder:

International Union of Operating Engineers
Laborers' International Union of North America
United Brotherhood of Carpenters and Joiners of America

2.2 Individual Unions of the Council shall be hereinafter called the "Union".

Article 3

FORM OF AGREEMENT

3.1 This Agreement shall consist of a master portion which shall apply to employees and to foremen who work for Employers while such employees and foremen are engaged in work as described in Article 1, Recognition. There shall be one appendix negotiated by and for each member Union of the Council and one appendix for foremen. The appendices shall apply province-wide.

Article 4

APPENDICES

4.1 The trade appendix applicable to each member Union of the Council will contain those provisions which are not common to all member Unions of the Council, and those provisions will apply to appropriate members of each International Union as provided in its appendix while they are working under the terms of this Collective Agreement. Such appendices shall be deemed to be part of this Agreement.

4.2 Items which can be included in the trade appendices are:

- wages
- classifications
- benefits (pension, welfare and supplementary unemployment benefits)
- hours of work not covered in the master portion of this Agreement
- overtime rate
- premiums
- shift differential rate
- inclement weather pay
- apprenticeship and training programs
- seniority
- supply of tools
- key tradesmen
- protective clothing and equipment
- welding tests
- travel and transportation
- employer's responsibility
- vacation pay
- statutory holidays

4.3 Because a variety of practices exist in the construction industry regarding representation of foremen, an appendix applicable to foremen shall form part of this Agreement. The Foreman Appendix will be negotiated by the executive officers of EPSCA and the Council.

4.4 The "classifications" referred to in Subsection 4.2 appearing in the trade appendices do not establish craft jurisdiction. Such jurisdiction is established in accordance with Articles 10 and 11 of this Collective Agreement.

Article 5

EXECUTIVE COMMITTEES

5.1 The Council and EPSCA shall each appoint an Executive Committee. The Executive Committee of EPSCA shall consist of the Board of Directors and the officers of EPSCA. The Executive Committee of the Council shall consist of the officers of the Council and the senior representative of each Union. The Committees will meet together at least annually to review matters associated with the administration of this Collective Agreement, with the intent that administrative policies will be formulated for consideration by each Executive Committee. The Executive Committees will also meet together to receive reports of joint committees established under this Agreement.

Article 6

PROJECT COMMITTEES

6.1 A Project Committee shall be established for each of the Major Projects and the Construction and Services Division.

6.2 The Committee will be responsible for conducting EPSCA/Power Council of Unions concerns for each Major Project or Construction and Services Division and will meet quarterly or as necessary to deal with working and living conditions on the job, excluding matters which may be grieved or negotiated and disputes involving work assignments.

6.3 On the part of EPSCA, each Project Committee shall comprise the appropriate Manager of Construction, General Superintendent, EPSCA Representative, and a like number of contractor representatives elected from among and by the contractors on each particular Major Project or Construction and Services Division. In addition, the officers of EPSCA are ex officio members of this Committee.

6.4 On the part of the Council, each Project Committee shall comprise the appropriate accredited Union Representative for each Major Project or Construction and Service

Division, as defined in Article 7, and may include the senior union representatives. In addition, the officers of the Council are ex officio members of this Committee.

6.5 The chairman of each EPSCA Project Committee shall be the Manager of Construction for the appropriate Major Project or Construction and Services Division, as the case may be.

6.6 The chairman of each Council Project Committee shall be appointed by the Council members.

6.7 Chairmanship of the meetings will alternate between the EPSCA Project Committee chairman and the Council Project Committee chairman.

6.8 Answers to questions raised by either party shall be given, in writing, within five (5) working days of the meeting by the party answering the questions to the party who raised the questions.

6.9 When an urgent answer is needed to a problem not relevant to negotiation, grievance or work assignment, the Project Committee will be called to meet within forty-eight (48) hours, where practicable, to deal with the problem. The Committee's answer will be given, in writing, to the party raising the question within forty-eight (48) hours of the meeting.

6.10 EPSCA and the Power Council of Unions will set the time and place of all Project Committee meetings.

Article 7

ACCREDITED UNION REPRESENTATIVES

7.1 The senior representative of each Union will designate local union representatives as Accredited Union Representatives to handle the day-to-day administration of this Agreement on the basis of not more than two representatives from each Union for each Major Project and a suitable number for the Construction and Services Division. The Council will notify the General Manager of EPSCA, in writing, of the names of such Union representatives, or alternates in the event of illness or unavailability, so that they may be issued identification cards to permit entry to the site. Such representatives, after identifying themselves to the EPSCA representative upon entering the job site, will be free to observe the progress and conduct of the work and to conduct normal union business. The Council undertakes that these representatives will not hinder or interfere in any way with the said work.

7.2 An Accredited Union Representative may be appointed by the International Representative to be his designate in matters requiring the involvement of the International Representative.

The International Representative will inform EPSCA, in writing, of the name, duration of, appointment and function of such designate.

Article 8

UNION STEWARDS

8.1 Accredited Union Representatives shall inform the appropriate EPSCA Representative and the Employer of the steward, in writing, of the names of all stewards, one of whom shall be designated Chief Steward, as they are appointed and when they cease to act as stewards. A steward, other than a Chief Steward, shall exercise his duties only in respect to employees of his Employer. A Chief Steward, in order to carry out his duties in respect to employees of other than his Employer, shall first involve the EPSCA Representative. A steward shall obtain permission from his immediate supervisor before leaving his work area for union business. Such permission shall not be unreasonably denied.

Except at Bruce Nuclear Power Development (BNPD):

Only in situations where an accredited Union Representative is unable to attend pre-job and/or mark-up meetings, may the Chief Steward be designated and attend, as part of the Chief Steward's duties, on behalf of the accredited union representative.

8.2 The appropriate Union shall receive written notice before the employment of a steward is terminated by his Employer, and provided the steward is able to perform the work required, he will be the last employee to be retained by his Employer in a layoff/standoff situation.

8.3 The chief steward will be informed of all scheduled overtime. Where practical, a steward, in accordance with practices set out in individual trade appendices, shall be given the first opportunity to work the overtime providing he is qualified to perform the work.

8.4 No foreman or subforeman shall be permitted to act as a steward.

Article 9

ADVANCE NOTICE

9.1 EPSCA will advise the Council of all new Generation Station Projects and Lines and Stations Construction Projects coming under the provisions of this Agreement for the construction field forces of the Employers.

Upon the request of the Council, EPSCA will convene a prejob conference before work commences to discuss preliminary details of the proposed work to be performed and to establish conditions in accordance with this Agreement for the project. EPSCA will record the minutes of prejob conferences and forward them within fifteen (15) working days to the Council and those affiliates in attendance at the conference.

9.2 Subsequent prejob conferences will be convened by EPSCA before specific portions of work commence to discuss the final details of the work and to establish conditions in accordance with this agreement for that work.

9.3 EPSCA will provide written notice to the Council as far in advance as possible of new work and prejob conferences as noted in Sections 9.1 and 9.2 above. For work of less than one week's duration and requiring five (5) or less employees, prejob meetings must be arranged with as much advance notice as possible by the office of the General Manager of EPSCA, but without formal notice, in writing, unless the prejob meeting has been waived by the parties.

Article 10

WORK ASSIGNMENT

10.1 The jurisdiction of the Unions shall be that jurisdiction established by Agreements between International Unions claiming the work or Decisions of Record recognized by the AFL-CIO for the various classifications and the character of work performed, having regard for the special requirements of thermal, nuclear or hydraulic generation and transmission and transformation construction. An Agreement or Decision of Record is one that is published by the Building and Construction Trades Department, AFL-CIO (Agreement and Decisions Rendered Affecting the Building Industry).

Where no Decision or Agreement applies, the Employer agrees to consider evidence of established practices within the industry when making jurisdictional assignments.

10.2 REV (a) A markup process will be utilized when an Employer intends to perform work on a project site*. The purpose of this markup process is to indicate to the Council and union affiliates the work which is planned to be carried out by the Employer in order to minimize the potential for jurisdictional disputes.

(b) When work is to be performed on a project site and it meets the following criteria: same employer, same work, same project site, the markup process will not be required. This procedure shall not preclude a Union's right to contest previously disputed work.

In the Electricity Production Zones when work falls within this criteria the EPSCA Office will send out a "Notification of Work" along with a copy of the original minutes of mark-up meeting(s) to the Local Unions prior to work commencing. This procedure shall not preclude the Union's right to contest previously assigned work, if the work is in a Local Union jurisdiction other than the one it was marked up in.

(c) When an Employer has work that is less than a 3 week duration and there are ten (10) or fewer employees covered by EPSCA Collective Agreements employed on this specific work, the Council and union affiliates will be notified of the scope of work and the Employer's proposed work assignments. The Unions will have two (2) weeks from the date of notification to submit jurisdictional claims and supporting evidence to the Employer for consideration. The Employer will notify the Council and Union affiliates of the final work assignments prior to the commencement of the work.

(d) All work that does not meet the criteria set out in clauses 10.2(b) or 10.2(c) will be reviewed and assigned at a markup meeting.

(e) EPSCA will provide written notice to the Council as far in advance as possible of markup meetings. The Unions may attend these markup meetings, and every effort will be made to settle questions of jurisdiction before the work is expected to commence.

(f) The Employer who has the responsibility for the work shall make a proposed assignment of the work involved. The Employer shall be responsible for providing copies of proposed assignments to the Council and union affiliates in attendance at the markup meeting. The Employer will specify a reasonable time limit for the Unions involved to submit evidence of their claims. The Employer will evaluate all evidence submitted and make a final assignment of the work involved. This final assignment will be in accordance with the procedural rules established by the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry. The Employer will advise the Unions of the final assignments prior to the work commencing.

REV **** For the purposes of this Article, Nanticoke, Lambton, Lakeview/Hearn, BNPD, Pickering, Darlington, Lines and Stations and the 5 Electricity Production Zones are each considered individual project sites.***

(g) The EPSCA representative will record the proposed assignments and jurisdictional claims and forward a copy of them within fifteen (15) working days to the Council and Union affiliates.

(h) The parties recognize that circumstances may arise, particularly with discovery and emergency work, where the process set out above may not be practical or possible, however reasonable effort will be made by the Employer to adhere to the appropriate trade jurisdiction.

Article 11

JURISDICTIONAL DISPUTES

11.1 (a) In the event there is a jurisdictional dispute which cannot be settled on a local basis by the Unions involved, it shall be submitted to the International Unions involved for settlement without permitting it to interfere in any way with the progress of the work at any time.

Any Union shall have the right to elect to pursue or respond to any jurisdictional disputes at the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry. In the event the Union elects to pursue or respond to the jurisdictional disputes at the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry, clauses 11.1(b), 11.2, 11.3, and 11.4 will apply.

In the event another Union (or other Unions) not signatory to this collective agreement has (have) the option to pursue jurisdictional disputes at the Ontario Labour Relations Board, the Council Affiliates shall have the right to pursue or respond to any jurisdictional disputes at the Ontario Labour Relations Board when these Unions are involved in the jurisdictional dispute.

In the event the Union elects to pursue or respond to the jurisdictional dispute at the Ontario Labour Relations Board, clauses 11.1(b), 11.2, 11.3, and 11.4 will NOT apply.

(b) In the event that a jurisdictional dispute arises over a work assignment, the Employer will make an assignment for the work in dispute in accordance with the Procedural Rules and Regulations of the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry. Any Union which protests that a contractor has failed to assign work in accordance with the procedures specified above, shall remain at work and process the complaint through its international office. The parties will settle such jurisdictional dispute in accordance with procedure as outlined by the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry of the Building Trades Department, AFL-CIO or any successor agency of the Impartial Jurisdictional Disputes Board authorized by the Building Trades Department.

11.2 In the event the dispute is not settled by the International Unions involved, it shall then be submitted to the Administrator of the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry for resolution. In the event that the International Office of the Union elects not to file with the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry, EPSCA agrees to file the dispute at the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry at the request of the International Representative of the Union. Those Unions and Employers involved shall advise the Council and EPSCA respectively, in writing, of an intent to submit a jurisdictional dispute to the Impartial Jurisdictional Disputes Board and will identify the work in question. An arbitration decision under the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry will be final and binding to the parties to this Agreement with no further recourse to the Ontario Labour Relations Board on the issue decided by the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry.

11.3 EPSCA shall have direct recourse to the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry when the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry has under its consideration a dispute involving the assignment of work being done by employees who are covered by this Agreement.

11.4 In the event that an arbitration decision under the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry is not rendered within sixty (60) days of the disputed assignment being referred to the Plan, EPSCA and/or the Council Affiliates shall have recourse to the Ontario Labour Relations Board for a decision provided it is processed as a jurisdictional dispute.

11.5 When a jurisdictional dispute exists in the electrical power systems sector, upon request by the International Representative of either of the Unions involved, Employers shall furnish the International Representative with a letter from a duly authorized official of the Employer on the Employer's stationery, stating that the Union requesting the letter was employed on specific types of work on a given project. The Union requesting the information will supply the Employer with the name of the other Union involved in the dispute and the Employer will provide that Union's International Representative with a copy of the letter being given to the requesting Union.

When a jurisdictional dispute exists in the electrical power system sector between Unions and upon written request by the International Representative of the Union, the Employer shall supply the International Representative of the Union involved with a copy of the evidence submitted by the other Union(s) involved along with drawings and/or prints plus a description of the work or process in dispute.

11.6 In the event the Union elects to pursue or respond to the Jurisdictional Dispute at the Ontario Labour Relations Board as governed by 11.4 above, the arbitration board panel appointed by the Ontario Labour Relations Board pursuant to the Act is not authorized to award damages in respect of a mis-assignment of work only in circumstances where the other union(s) involved in the proceedings is (are) equally restricted in their ability to claim for damages. However this clause 11.6 shall not apply where the Jurisdictional Dispute and the mis-assignment of work involves the same employer and the same work, and on the same job previously the subject of a Jurisdictional Dispute before the Ontario Labour Relations Board or the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry.

11.7 The board panel appointed by the Ontario Labour Relations Board will govern its decision pursuant to its normal criteria.

11.8 In the event the Union elects to pursue or respond to the Jurisdictional Dispute at the Ontario Labour Relations Board as governed by 11.4 above, the decision of the panel of the Ontario Labour Relations Board will be final and binding upon the parties to this agreement with no further recourse to the Plan on the issue decided by the Ontario Labour Relations Board.

Article 12

UNION SECURITY

12.1 UNION MEMBERSHIP

(a) Employees

As a condition of employment, all employees covered by this Agreement shall either be members of, or will apply for membership in, the appropriate member Union of the Council within seven (7) days of employment. It shall also be a condition of continued employment that employees maintain their union membership in good standing.

(b) Foremen

As a condition of employment, all foremen covered by this Agreement shall either be members of, or will apply for membership in, the appropriate member Union of the Council within seven (7) days of employment. It shall also be a condition of continued employment that foremen maintain their union membership in good standing.

12.2 CHECKOFF

The Employers shall deduct union initiation fees and dues from their employees' and foremen's wages. Such fees and dues will be deducted weekly or monthly and transmitted to the designated officials of the Unions, on or before the 15th day of the month following the month in which deductions are made, together with full checkoff lists of employees and foremen subject to checkoff.

The Council and member Unions shall indemnify EPSCA and the Employers for any liability arising from the deduction of initiation fees and dues.

The Union, through its International Office, will notify EPSCA, in writing, of the appropriate initiation fees and Union dues and of any changes to such fees and dues. Within three (3) weeks of receipt of an acceptable written notice, any changes to such fees and dues will be implemented. The effective date will be the date of implementation.

The Employer will check off initiation fees on receipt from the Union of authorization signed by the employee.

12.3 The Union may designate dues from any of the following options:

- a fixed dollar amount per month,
- a fixed percentage of vacationable gross earnings (as defined in the applicable Article in each Appendix) per month,
- a fixed cents per hour worked or paid,
- a fixed cents per hour worked or paid plus a fixed dollar amount per week or month,
- a fixed dollar amount per month plus a percentage of vacationable gross earnings.

Regardless of the option selected, the Employer will only remit monies to a single location. Any redistribution is the responsibility of the Union. By mutual agreement with the Union, an Employer may elect to continue current administrative practices relative to the deduction of union dues.

Article 13

EMPLOYMENT

13.1 (a) For purposes of this Article, a geographic area will be established for each Major Project and geographic areas for the Construction and Services Division. The size of these geographic areas will be dependent upon the location of the work and the trade concerned.

(b) The boundaries of the geographic areas will be jointly established at prejob conferences.

13.2 An office will be established by EPSCA, or the Employer with the approval of EPSCA, for each Major Project and the Construction and Services Division. A purpose of this office will be to co-ordinate employment as specified in this Article.

13.3 EPSCA, or the Employer with the approval of EPSCA, and the Council will exchange the names of their representatives in each of the areas described in 13.1(a), who will be responsible for co-operating in the referral and employment of reliable and competent union members.

13.4 EPSCA, or the Employer with the approval of EPSCA, will notify the appropriate Unions of future manpower requirements for all employees coming within the scope of this Agreement.

13.5 Where key tradesmen are required, Employers reserve the right to employ and transfer key tradesmen to effectively utilize their special skills, having regard for the special requirements of thermal, nuclear or hydraulic generation projects and transmission and transformation construction.

The employment of key tradesmen and tradesmen employed through the Employment Request Article will be negotiated between EPSCA and the Union for each trade and will be contained in the trade appendices.

13.6 The employment of additional tradesmen and apprentices, excluding key tradesmen and tradesmen employed through the Employment Request Article, shall be carried out on the following basis and sequence:

(a) The EPSCA office, or the Employer with the approval of EPSCA, will request the appropriate local union office for tradesmen and apprentices required. The request will include a description of the work, the number of qualified tradesmen and apprentices required, and the name of the Employer for whom the tradesmen and apprentices will be working.

(b) The Union members who are resident in the designated geographic area will be referred by the Union for employment through the EPSCA office. As much as their out-of-work lists will permit, the Unions will supply members on a fan-out basis from the project or work location.

The Employers will either hire such persons or substantiate their reasons, in writing, for not doing so.

The Union will co-operate with the Employer and advise the EPSCA office of the name, address and telephone number of members being referred for work with Lines and Stations Construction as soon as they are known.

(c) If, after a request has been made, the Union is unable to supply sufficient tradesmen and apprentices to meet the manpower requirements of the Employers, the Employers may employ tradesmen and apprentices who are resident within the geographic area. Such tradesmen and apprentices shall comply with the requirements of Article 12 of this Agreement. EPSCA shall promptly notify the Accredited Union Representative, in writing, of the names, addresses, date of hire, social insurance numbers, telephone numbers, job location and classification of the persons hired.

(d) Once the supply of suitable tradesmen and apprentices within the geographic area has been exhausted and additional tradesmen and apprentices are required, EPSCA will contact the International Representative for the trade concerned, or his designee, in order to determine whether suitable union tradesmen and apprentices are available outside of the geographic area. EPSCA will co-operate in providing employment to such union tradesmen and apprentices on the basis that they be supplied from the nearest location where they are available.

13.7 Notwithstanding the provisions of Articles 13.5 and 13.6, re-employment as required by the Workers Compensation Board shall not be a violation of this collective agreement nor be subject to the provisions of Articles 27 and 28.

Article 14

PAY PROCEDURE

14.1 NORMAL

(a) Employees shall be paid weekly and payment for any given week will be made not later than the sixth working day after the close of the payroll period, but in any event not later than Thursday of the following week. Except as provided for in 14.1(c) employees who are at work on Thursday and are not paid will be paid on Friday. Such employees will be released one (1) hour, with pay, prior to normal quitting time on Friday to enable them to cash their cheque.

(b) Wages shall be paid by the Employers on the job site, before quitting time, in cash or by cheque, payable at par in the locality of the job site. Accompanying each payment of wages shall be a statement, in writing, which can be retained by the employee, setting forth:

(i) the period of time or the work for which the wages are being paid;
(ii) the rate of wages to which the employee is entitled;
(iii) the amount of wages to which the employee is entitled;
(iv) the amount of each deduction from the wages of the employee and the purpose for which each deduction is made;
(v) any allowance or other payment to which the employee is entitled;
(vi) the amount of vacation pay for which the employee is being credited;
(vii) the amount of statutory holiday pay for which the employee is being credited; and
(viii) the net amount of money being paid to the employee.

(c) In cases of inclement weather being declared on payday, employees will receive their pay before leaving the site provided it is available on the site.

14.2 ON TERMINATION

(a) An employee who voluntarily terminates his employment will be provided his final pay on the next regular payday.

(b) An employee who is laid off from a Generation Project will have his final pay and termination documents mailed to his last known address on file with the Employer by Priority Post within five (5) working days of termination. An employee who is laid off from a Lines and Stations construction site will have his final pay and termination documents mailed to his last known address on file with the Employer within eight (8) working days of termination. This does not preclude an employee being issued his final pay and termination documents on the job prior to the five or eight-day period. After 48 hours of notifying the Employer, the Employee will be entitled to four (4) hours at straight time for each normal workday for which there is non-compliance thereafter.

(c) An employee who is discharged shall be provided with his final pay immediately if the Employer's pay facilities are on site or as per 14.2(b) if the Employer's pay facilities are not on site.

(d) Employers will provide one hour's notice of layoff or one hour's pay in lieu of notice to employees who are to be laid off.

When possible, the Employer shall notify the Local Union three (3) days prior to layoff.

(e) When an employee is laid off, he will be paid for a reasonable amount of time by the Employer if he is required to travel or wait unduly before he receives his final pay.

(f) In established cases of long-term sickness, compensable accident or jury duty, an employee will be maintained on the Employer's payroll until his normal date of layoff.

Article 15

CALL-IN PAY

15.1 When an employee is called in to work outside of his normal hours of work, he shall receive a minimum of four (4) hours' work at the appropriate premium rate plus travel allowance where applicable.

If the employee's normal hours of work commence within this four (4) hour period, the employee will be paid premium time from the time he commences work until the start of his normal hours and will revert to his normal hourly rate at the commencement of his normal hours of work.

Article 16

REPORTING PAY

Article 16 is applicable to work at Existing Generating Sites where work involves construction of a new facility (new function) and/or new (additional) generating unit(s) and at New Generating Sites (ie: Greenfield Work).

For work at Existing Generating Sites excluding work involving construction of a new facility (new function) and/or new (additional) generating unit(s) please refer to Section 3, Appendix D – Modified Provisions of this Construction Agreement.

16.1 An employee who reports for work, unless directed not to report the previous day by his Employer, shall receive a minimum of four (4) hours' pay at the applicable rate when he reports for work, but is given no opportunity to work because none is available. This allowance will be paid to an employee if he is requested to report for work for any part of the first half of a shift and an additional four (4) hours on the first and second shifts or two and one-half (2-1/2) hours on the third shift will also be paid if he is requested to report for work for any part of the second half of the same shift. It is not intended by this Article that an employee receive a reporting pay allowance greater than his pay for normal daily hours.

16.2 An employee in receipt of reporting pay shall also receive travel or board allowance, if applicable.

16.3 Notwithstanding that work is available and an employee is able to commence or continue work, the Employer may shut down a job to avoid the possible loss of human life because of an emergency situation such as H_2S leaks, bomb threats, fire, etc., that could endanger the life and safety of an employee. In such cases, employees will be compensated only for the actual time worked.

Article 17

GENERATION PROJECTS DAILY TRAVEL ALLOWANCE AND ROOM AND BOARD

***Article 17* is applicable *to* work at Existing Generating Sites where work involves construction of a new facility (new function) and/or new (additional) generating unit(s) and at New Generating Sites (i.e. Greenfield Work).**

For work at Existing Generating Sites excluding work involving construction of a new facility (new function) and/or new (additional) generating unit(s) please refer to Section 1, Appendix D - Modified Provisions of this Construction Agreement.

DAILY TRAVEL ALLOWANCE

17.1 **REV** The daily travel allowance will be paid by the Employers to employees who are not receiving room and board as referred to in Section 17.2, on the following basis:

(a) If an employee lives within twenty (20) radius kilometers* of the project, no travel allowance will be paid.

(b) If an employee lives within 20 to 40 radius kilometers of the project, he shall receive $15.60 per day travel allowance effective May 1, 2000 ($16.10 effective May 1, 2001, $16.60 effective May 1, 2002, $17.10 effective May 1, 2003) for each day worked or reported for.

(c) If an employee lives within 40 to 56 radius kilometers of the project, he shall receive $18.85 per day travel allowance effective May 1, 2000 ($19.35 effective May 1, 2001, $19.85 effective May 1, 2002, $20.35 effective May 1, 2003) for each day worked or reported for.

(d) If an employee lives within 56 to 80 radius kilometers of the project, he shall receive $22.10 per day travel allowance effective May 1, 2000 ($22.60 effective May 1, 2001, $23.10 effective May 1, 2002, $23.60 effective May 1, 2003) for each day worked or reported for.

(e) If an employee lives within 80 to 97 radius kilometers of the project, he shall receive $25.60 per day travel allowance effective May 1, 2000 ($26.10 effective May 1, 2001, $26.60 effective May 1, 2002, $27.10 effective May 1, 2003) for each day worked or reported for.

* ***For the purpose of this Article, "radius kilometers" shall be measured from the centre of the turbine hall on each project.***

Bruce G.S. "A", Bruce G.S. "B", and the Bruce Heavy Water Plants will be combined to form the Bruce Complex. Travel allowance for the Bruce complex will be calculated from the midpoint of a straight line joining the centres of the Bruce G.S. "A" and Bruce G.S. "B" turbine halls.

(f) If an employee lives greater than 97 radius kilometers from the project and does not qualify for subsistence allowance under Section 17.2 below, he will receive $29.85 per day travel allowance effective May 1, 2000 ($30.35 effective May 1, 2001, $30.85 effective May 1, 2002, $31.35 effective May 1, 2003) provided he continues to travel greater than 97 radius kilometers for each day worked or reported for.

When an employee is directed to report to a location that involves travelling around a natural barrier, the distance around the natural barrier shall be the shortest distance measured by a series of straight lines. The sum of the distances of these straight lines shall be applied to the ring concept to establish the employee's travel allowance entitlement.

A natural barrier is defined as any obstruction or impediment which creates an unreasonable relationship between the radius kilometers and actual kilometers travelled.

ROOM AND BOARD

17.2 **REV** The following conditions will apply for employees whose regular residence* is more than 97 radius kilometers from the project:

(a) An Employer may supply either:

(i) Room and board in camp or a good standard of board and lodging within a reasonable distance of a project; or

(ii) a subsistence allowance;

subject to Sections 17.2(b), (c) and (d) below.

(b) An employee may exercise his option not to stay in a camp or accept room and board. An employee who exercises this option and qualifies for subsistence allowance shall receive a subsistence allowance of $56.00 per day effective May 1, 2000 ($58.00 effective May 1, 2001, $60.00 effective May 1, 2002, $62.00 effective May 1, 2003) for each day worked or reported for when employed at a location south of the French River and $70.00 per day effective May 1, 2000 ($72.00 effective May 1, 2001, $74.00 effective May 1, 2002, $76.00 effective May 1, 2003) for each day worked or reported for when employed at a location north of the French River subject to Sections 17.2(c) and 17.2(d) below.

* ***An employee's 'regular residence' is:***

1. ***The place where the employee maintains a self-contained, domestic establishment (a dwelling house, apartment or similar place of residence where a person generally eats and sleeps and for which he can show proof of financial commitment). This is in contrast to a boarding house facility which is not self-contained; and***

2. ***The employee normally resides in the residence except for those periods of time when, because of the location of the work, the employee is forced to obtain temporary accommodation at that work location.***

(c) To qualify for subsistence allowance an employee must maintain temporary accommodation at or near a project. Employees who travel daily to locations beyond 97 radius kilometers from the project will be entitled $31.60 per day effective May 1, 2000 ($33.60 effective May 1, 2001, $35.60 effective May 1, 2002, $37.60 effective May 1, 2003) worked or reported for.

(d) An employee employed at the Pickering or Darlington Project who qualifies for a subsistence allowance as provided for above shall receive a subsistence allowance of $41.50 per day effective May 1, 2000 ($44.50 effective May 1, 2001, $47.50 effective May 1, 2002, $49.50 effective May 1, 2003) worked or reported for.

17.3 An employee shall not qualify for daily travel allowance or room and board allowance as provided for in Sections 17.1 and 17.2 above when such employee reports for work but does not remain at work for his scheduled daily hours unless excused by an authorized representative of his Employer.

17.4 An employee who maintained a regular residence within the geographic area for the purposes of employment and who relocates outside the geographic area will not be entitled to an increase in travel or room and board allowance entitlement as a result of this relocation.

17.5 The Council recognizes the Employer's right to charge for board and other existing services. The Employer fixes the charge for board and other existing services in camps at $25.00 per day. This will be applied on the following basis:

(a) An employee who remains in camp on a normally scheduled work day on which he does not work will be charged $25.00 per day, unless he is excused from work for a legitimate reason by the project medical attendant or an authorized representative of his Employer.

(b) An employee who is absent from work on Friday without approval and who remains in camp and who is still absent from work on the following Monday without approval will be charged for room and board for Friday, Saturday, Sunday and Monday.

(c) An employee who is absent from work without approval on Friday but who works the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

(d) An employee who works the Friday and is absent from work without approval on the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

Article 18

LINES AND STATIONS CONSTRUCTION
DAILY TRAVEL ALLOWANCE AND ROOM AND BOARD

***Article 18* is applicable *to all* work on Lines & Stations at both existing and new sites**

DAILY TRAVEL ALLOWANCE

18.1 **REV** The daily travel allowance will be paid by the Employers to their employees who are not living in camp or receiving a subsistence allowance as referred to in Section 18.3 on the following basis:

(a) Effective May 1, 1996, if an employee lives within forty (40) radius kilometers of the work location or declared assembly point, no travel allowance will be paid.

(b) If an employee lives within 40 to 56 radius kilometers of the work location or declared assembly point, he shall receive $18.60 per day travel allowance effective May 1, 2000 ($19.10 effective May 1, 2001, $19.60 effective May 1, 2002, $20.10 effective May 1, 2003) for each day worked or reported for.

(c) If an employee lives within 56 to 80 radius kilometers of the work location or declared assembly point, he shall receive $22.10 per day travel allowance effective May 1, 2000 ($22.60 effective May 1, 2001, $23.10 effective May 1, 2002, $23.60 effective May 1, 2003) for each day worked or reported for.

(d) If an employee lives within 80 to 97 radius kilometers of the work location or declared assembly point, he shall receive $25.60 per day travel allowance effective May 1, 2000 ($26.10 effective May 1, 2001, $26.60 effective May 1, 2002, $27.10 effective May 1, 2003) for each day worked or reported.

(e) If an employee lives greater than 97 radius kilometers from the work location or declared assembly point, and does not qualify for subsistence allowance under Section 18.3 below, he shall receive $28.85 per day travel allowance effective May 1, 2000 ($29.35 effective May 1, 2001, $29.85 effective May 1, 2002, $30.35 effective May 1, 2003) provided he continues to travel greater than 97 radius kilometers daily for each day worked or reported for.

When an employee is directed to report to a location that involves travelling around a natural barrier, the distance around the natural barrier shall be the shortest distance measured by a series of straight lines. The sum of the distances of these straight lines shall be applied to the ring concept to establish the employee's travel allowance entitlement. A natural barrier is defined as any obstruction or impediment which creates an unreasonable relationship between radius kilometers and actual kilometers travelled.

18.2 The Employer reserves the right to base daily travel allowance on the distance in radius kilometers from where an employee lives to either the work location or declared assembly point, depending on where the employee is directed to report.

ROOM AND BOARD

18.3 **REV** The following conditions will apply for employees whose regular residence* is more than 97 radius kilometers from the work location:

(a) An employer may supply either:

(i) room and board in camp or a good standard of board and lodging; or

(ii) a subsistence allowance;

subject to Sections 18.3(b) and (c) below.

(b) An employee may exercise his option not to stay in a camp or accept room and board. An employee who exercises this option and qualifies for subsistence allowance shall receive a subsistence allowance of $69.00 per effective May 1, 2000 ($71.00 effective May 1, 2001, $73.00 effective May 1, 2002, $75.00 effective May 1, 2003)for each day worked or reported for subject to Section 18.3(c) below.

* ***An employee's 'regular residence' is:***

1. ***The place where the employee maintains a self-contained, domestic establishment (a dwelling house, apartment or similar place of residence where a person generally eats and sleeps and for which he can show proof of financial commitment). This is in contrast to a boarding house facility which is not self-contained; and***

2. ***The employee normally resides in the residence except for those periods of time when, because of the location of the work, the employee is forced to obtain temporary accommodation at that work location.***

3. ***For metro areas (Toronto and Hamilton) the calculation of distance shall be from the employee's regular residence.***

4. ***For all other areas, the calculation of distance shall be based on the location of the city or town hall of the municipality where an employee maintains a self-contained domestic establishment described above. In those municipalities where a city or town hall does not exist, then the post office serving his regular residence will apply.***

(c) To qualify for subsistence allowance an employee must maintain temporary accommodation at or near the work location. Employees who travel daily to locations beyond 97 radius kilometers from the project will be entitled to $29.85 per day effective May 1, 2000 ($31.85 effective May 1, 2001, $33.85 effective May 1, 2002, $35.85 effective May 1, 2003) for each day worked or reported for.

NEW (d) When an employee's regular residence is more than five hundred (500) radius kilometers from the project, and the job or project is worked on a four ten (4x10) hour work week, the employee shall receive room and board allowance on a five day basis for a regular work week. If the employee is required to work an additional ten (10) hour shift beyond the normal four ten (4x10) hour shift, the employee will be entitled to room and board allowance for an additional ten (10) hour shift worked to a maximum of seven (7) days room and board in a week.

18.4 An employee shall not qualify for daily travel allowance or room and board allowance as provided for in Sections 18.1 and 18.3 above, when such employee reports for work but does not remain at work for his scheduled daily hours unless excused by an authorized representative of his Employer. Such permission shall not be unreasonably denied.

18.5 An employee who maintained a regular residence within the geographic area for the purposes of employment and who relocates outside the geographic area will not be entitled to an increase in travel or room and board allowance entitlement as a result of this relocation.

18.6 The Council recognizes the Employer's right to charge for board and other existing services. The Employer fixes the charge for board and other existing services in camps at $25.00 per day. This will be applied on the following basis:

(a) An employee who remains in camp on a normally scheduled workday on which he does not work will be charged $25.00 per day unless he is excused from work by an authorized representative of his Employer.

(b) An employee who is absent from work on Friday without approval and who remains in camp and who is still absent from work on the following Monday without approval will be charged for room and board for Friday, Saturday, Sunday and Monday.

(c) An employee who is absent from work without approval on Friday but who works the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

(d) An employee who works the Friday and is absent from work without approval on the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

Article 19

LINES AND STATIONS CONSTRUCTION DAILY TRAVEL TIME

19.1 All travel time will be outside of normal working hours.

19.2 (a) An employee will be paid his straight-time rate for all time spent travelling from his assembly point to his work location on normal working days.

An employee will be paid premium time for all time spent travelling from his assembly point to his work location on days other than normal working days.

(b) An employee will travel up to a maximum of one hour on his own time when returning from his work location to his assembly point. An employee will be paid his straight-time rate for all time spent travelling in excess of one hour.

19.3 All time in excess of one hour spent travelling from the work location to the assembly point on non-working days shall be compensated for at the appropriate premium rates of pay.

19.4 The Employer will supply transportation between the assembly points and work locations.

Article 20

STANDOFF

20.1 When unable to proceed with his work, an Employer may elect to Standoff part or all of his crew. The parties agree Standoff is not intended to circumvent the layoff procedure.

The Employer reserves the right to Standoff its employees without pay up to a maximum of ten (10) consecutive working days. Notification of Standoff will be made by the Employer during normal working hours. A Record of Employment will be issued upon the commencement of the Standoff. No travel allowance will be paid to an employee for the Standoff period.

20.2 An employee who qualifies for subsistence allowance and who is placed on Standoff will be paid subsistence allowance up to a maximum of ten (10) consecutive working days.

20.3 If Standoff continues beyond ten (10) consecutive working days, an employee, at his option, may elect to remain on Standoff for an additional twenty (20) consecutive working days or be removed from Standoff. The Employer retains recall rights on employees electing to continue on Standoff. Subsistence allowance will cease after ten (10) consecutive working days on Standoff.

20.4 If an employee elects layoff beyond the tenth (10th) consecutive working day, it shall be carried out in accordance with the terms of the Layoff/Seniority provisions of the appropriate Trade Appendix of this Agreement. An employee laid off will be issued a Record of Employment form on his date of layoff indicating "Layoff – Shortage of Work". The Employer does not retain recall rights if the employee elects Layoff.

20.5 Standoff shall only continue beyond thirty (30) consecutive working days with the mutual consent of the Employer and the Union, in writing.

- For the purpose of this Article, when working on a 4 x 10 hour shift arrangement, the following will apply:

- eight (8) scheduled working days will be considered the equivalent of ten (10) consecutive working days.

- sixteen (16) scheduled working days will be considered the equivalent of twenty (20) consecutive working days.

- twenty-four (24) scheduled working days will be considered the equivalent of thirty (30) consecutive working days.

Article 21

REST PERIOD

21.1 For employees working normal hours, a fifteen (15) minute rest period will be allotted, at the time and in a reasonable location as directed by the Employer, for each half shift worked. Where a half shift is less than four (4) hours, there shall be no rest period.

21.2 For employees required to work overtime, a ten (10) minute rest period will be allotted prior to the end of the normal shift before commencing overtime work.

21.3 For employees working overtime, a fifteen (15) minute rest period will be allotted, at the time directed by the Employer, after each two hours of overtime worked.

Article 22

LUNCHROOM FACILITIES

22.1 Adequately heated accommodation separate from changerooms and washrooms shall be provided by the Employer on each project when necessary and where such accommodation can be reasonably provided for. Such accommodation shall be weatherproof and shall be kept reasonably clean. A table and sufficient benches or seats for the employees on the job shall be provided in the accommodation. Trailerized or portable accommodation shall include tables, benches, light, heat maintained at a minimum sixty-eight (68) degrees Fahrenheit, proper access and egress, and shall not be used for material storage.

Article 23

MEALS ON OVERTIME

Article 23 is applicable to work at Existing Generating Sites where work involves construction of a new facility (new function) and/or new (additional) generating unit(s) and at New Generating Sites (ie: Greenfield Work).

For work at Existing Generating Sites excluding work involving construction of a new facility (new function) and/or new (additional) generating unit(s) please refer to Section 4, Appendix D – Modified Provisions of this Construction Agreement.

23.1 If an employee is notified during the time he is working that he will be required to continue working for more than two (2) hours past the normal quitting time of the first or second shifts or for more than three and one-half (3-1/2) hours beyond the normal quitting time of the third shift, the Employer will provide a free meal to the employee after approximately two (2) hours of overtime worked (first or second shifts) or three and one-half (3-1/2) hours of overtime worked (third shift) and for each four (4) hours of overtime worked thereafter. The employee will be allowed thirty (30) minutes paid at the straight time rate to eat each meal at the time directed by the Employer. When a paid meal period overlaps a rest period, the paid meal period will supplant the rest period. The Employer will supply a hot meal when possible. When a free meal is not provided, the Employer will pay the employee one-half (1/2) hour at his appropriate rate.

To qualify for the above-noted on a Friday for work on the first and second shifts, an employee will be required to work for more than four (4) hours beyond the normal quitting time of his shift.

The above-noted is not applicable to the first eight (8) hours worked on Saturdays, Sundays or Statutory Holidays for employees who normally work the first or second shifts, nor is it applicable to the first six and one-half (6-1/2) hours worked on Sundays or recognized holidays for employees who normally work the third shift.

23.2 Where an employee has been notified the previous day, no meal will be provided but the employee will be allowed thirty (30) minutes paid at the straight time rate to eat each meal at the time directed by the Employer.

Article 24

TOOLS AND CLOTHING

24.1 An employee shall be required to provide himself with the ordinary hand tools of his trade, based on established trade union practices at the time of signing of this Agreement. EPSCA and the Council shall establish an appropriate tool list for each trade. Each Employer will provide, insofar as is practical, separate facilities for storing the tools of each trade, but shall not be held responsible for losses, except as noted hereunder:

(a) When personal tools valued in excess of $15.00 are lost due to fire, the Employer will consider the full estimated value on the merit of each case in determining replacement or payment. This will include only personal tools that a tradesman is required to have to perform his normal duties with his Employer.

(b) Each Employer will compensate his employees for ordinary hand tools and clothing lost by theft from locked storage provided by him for his employees. Claims must be submitted, in writing, and must provide substantiating evidence of forcible entry to locked storage. Payment or replacement for personal clothing lost by theft on the work site shall be limited to clothing that a tradesman is required to have to perform his normal duties with his Employer.

(c) In the event of loss by fire at an Employer's camp or on the work site in an Employer designated storage area, replacement or payment of the full estimated value in excess of $15.00 but not exceeding $500.00 for the loss of personal clothing will be made by the Employer. Payment or replacement for personal clothing lost by fire on the work site shall be limited to clothing that a tradesman is required to have to perform his normal duties with his Employer.

24.2 An employee who has obtained tools from his Employer shall be allowed sufficient time, in the opinion of Management, to return such tools to his Employer during working hours. An employee receiving tools from his Employer shall be held responsible for the return of such tools in good condition, subject to normal wear and tear. On layoff, an employee will be allowed reasonable time to return tools to his Employer.

24.3 Gang tools as described in the appendices shall be the responsibility of the Employer.

24.4 Employees working in a radiation area, in plastic suits or replacement material of the fully enveloping type with an independent air supply, will receive $8.00 per day. A day for the purposes of this item shall be defined as any period up to twelve (12) hours.

Article 25

APPRENTICESHIP AND TRADES TRAINING

25.1 Apprenticeship and other training programs should be instituted as required to maintain an adequate skilled and competent work force to perform work within the electrical power systems sector by apprenticeship training programs, upgrading programs and retraining programs.

25.2 Where a ratio of apprentices to journeymen employed has been established in a trade appendix, this ratio shall be maintained.

Article 26

HOURS OF WORK

***Article 26* is applicable *to* work at Existing Generating Sites where work involves construction of a new facility (new function) and/or new (additional) generating unit(s) and at New Generating Sites (i.e. Greenfield Work).**

For work at Existing and New Lines & Stations Sites and at Existing Generating Sites <u>excluding</u> work involving construction of a new facility (new function) and/or new (additional) generating unit(s) please refer to Section 2, Appendix D - Modified Provisions of this Construction Agreement.

26.1 The normal weekly hours of work for all employees of Employers covered by this Agreement shall be thirty-eight (38), except as described in Sections 26.2, 26.3, 26.4, 26.5, 26.6 and 26.7.

The weekly hours shall be worked in four (4) eight (8) hour days, Monday to Thursday inclusive, with the remaining six (6) hours to be worked on Friday.

26.2 The hours of work for such work as driveway and parking lot construction, railroad construction, landscaping, tunnelling, precast concrete erection, fencing or demolition, shall be as established in applicable local agreements for the class and character of work.

An applicable local agreement shall be an agreement between a local of any union signatory to this Agreement and a builders' exchange, contractors' association or contractor applicable in the locality of the project for the class and character of the work.

26.3 The weekly hours of work for structural steel erection shall be forty (40) hours made up of five (5) days of eight (8) hours each, Monday to Friday inclusive.

26.4 The weekly hours of work for site preparation and earth dams shall be 45 hours made up of five (5) days of nine (9) hours each, Monday to Friday inclusive.

26.5 The weekly hours of work for Watchmen shall be as set forth in the Laborers' International Union of North America Appendix, attached hereto.

26.6 The weekly hours of work for Operating Engineers engaged in tunnel work shall be as set forth in the International Union of Operating Engineers' Appendix attached hereto.

26.7 The normal weekly hours of work for employees working the third shift shall be thirty-two and one-half (32-1/2), made up of five (5) days of six and one-half (6-1/2) hours each.

The hours of work at all Lines and Stations Construction locations and Miscellaneous Projects (excluding Lakeview and R.L. Hearn Generating Stations), except those set forth in Sections 26.2 and 26.4, shall be 40 hours per week made up of five (5) days of eight (8) hours each, Monday to Friday inclusive. The normal daily hours are to be worked between 7:30 am and 5:00 pm.

A Miscellaneous Project is any work undertaken by Ontario Power Generation Inc's Generation Projects Division which will require less than one year to complete and comprise a total project work force of not more than one hundred men at one time.

26.8 PROJECT DAILY HOURS

(a) Day Work Only

The normal starting time for day work hours shall be 8:00 a.m. By mutual agreement between EPSCA and the Council, the starting time may be varied by one-half hour either way. This variance will be established at the prejob conference or while the job is in progress.

(b) Shift Work

(i) Shift work will be deemed to be established providing there are at least four consecutive days of shifts to be worked excluding Saturdays, Sundays and Statutory Holidays.

(ii) The normal starting time for day shift hours shall be the same as the day work hours described in Section 26.8(a).

(iii) Where shift work is established, the normal shift hours for the first (day) and second shifts shall be the same as the day hours. The third shift normal hours shall be six and one-half (6-1/2) hours' work, to be worked between 1:00 a.m. and 8:00 a.m., with an unpaid one-half (1/2) hour lunch period.

(iv) On Monday to Thursday inclusive, the second shift hours shall start at 4:30 p.m. or a variance of one-half hour either way, to coincide with the end of the day shift. On Friday, the second shift hours may start at 4:30 p.m. or at the end of the day shift.

(v) The third shift to start at 1:00 a.m. Monday.

(vi) Where the third shift is established as starting at 1:00 a.m. Monday, it shall be worked between 1:00 a.m. and 8:00 a.m. Monday, Tuesday, Wednesday, Thursday and Friday.

(c) Hours of Work - Special Circumstances

It may be necessary from time to time to vary the hours of work established in Sections 26.8(a) and (b). Any amendments to the hours of work will be established by mutual agreement between EPSCA and the Council at the prejob conference or while the job is in progress.

26.9 The shift rate will be based on the day in which the shift begins.

26.10 LUNCH PERIODS FOR MAJOR PROJECTS, AND CONSTRUCTION AND SERVICES DIVISION

A lunch period will be given no earlier than four (4) hours and no more than five (5) hours after the start of the shift and will be one-half (1/2) hour in duration.

A lunch period will be given no earlier than three and one-half (3-1/2) hours and no more than five (5) hours after the start of the third shift and will be one-half (1/2) hour in duration.

26.11 When an employee is required to return to work without an eight (8) hour break, all work performed shall be at the premium rate until such time as the employee receives an eight (8) hour break. This provision does not apply when a change in an employee's normal shift (as defined in this Article) occurs or to call-in situations.

Article 27

GRIEVANCE PROCEDURE

27.1 Grievances within the meaning of the grievance and arbitration procedure shall consist only of disputes about the interpretation or application of particular clauses of this Agreement and about alleged violations of this Agreement. In the event of any dispute concerning the meaning or application of any provision of this Agreement or a dispute concerning an alleged violation of this Agreement, there shall be no suspension or disruption of work, but such dispute shall be treated as a grievance and shall be settled, if possible, by EPSCA and the appropriate Union. In the interests of expediting the procedure, the parties shall process grievances in the following manner:

The grievance procedure and arbitration procedure in Article 27 do not apply to jurisdictional disputes.

27.2 PRELIMINARY DISCUSSION

Disputes arising out of the interpretation or alleged violation of this Agreement should, if possible, be settled by discussion between the employee and/or his steward and the employee's supervisor. If the employee affected is a foreman, the preliminary discussion will be between the Accredited Union Representative and the foreman's supervisor.

27.3 FIRST STEP

If a dispute cannot be resolved by this method, the Accredited Union Representative for the trade concerned may file a formal grievance on the prescribed form with the Manager of Construction or the Field Construction Manager within fifteen (15) working days of the alleged grievous act.

Within ten (10) working days of the filing of the grievance, the Manager of Construction or Field Construction Manager shall investigate the grievance and convene a First Step meeting which he or the Accredited Union Representative considers necessary to resolve it.

The Management Committee shall be comprised of the Manager of Construction or the Field Construction Manager or their designate plus at least one representative of the Employer named in the grievance. The Union Committee shall include at least two persons, one of whom shall be the Accredited Union Representative for the grievor.

The Manager of Construction or Field Construction Manager shall give his reply on the prescribed form to the Accredited Union Representative within five (5) working days from the date of the First Step meeting.

Copies of completed grievance forms signed by the appropriate parties shall be filed by the Manager of Construction or the Field Construction Manager with the General Manager of EPSCA. The Accredited Union Representative for the grievor will file a copy with the Council.

The EPSCA Representative will send a copy of any signed first step grievance settlement between the Accredited Union Representative and EPSCA to the Power Council of Unions and EPSCA office.

27.4 SECOND STEP

Within ten (10) working days after the disposition has been issued under the First Step of this procedure, the Accredited Union Representative may refer the grievance on the prescribed form to EPSCA's Grievance Officer. A copy of the grievance form shall be forwarded by the Accredited Union Representative to the International Representative of the Union.

The EPSCA Grievance Officer shall investigate the grievance and convene a meeting which he or the International Representative considers necessary to resolve it and give his reply on the prescribed form to the International Representative of the Union within five (5) working days from the receipt of the grievance form which was completed at First Step.

The Management Committee shall comprise the EPSCA Grievance Officer plus two other Management Representatives, one of whom shall be a representative of the Employer named in the grievance. The Union Committee shall be comprised of at least the International Representative or his designate for the grievor. If the International Representative elects to appoint a designate, he shall inform EPSCA, in writing, of the name of the designate and the duration of appointment.

27.5 EPSCA OR COUNCIL GRIEVANCES

The processing of EPSCA or Council grievances will begin at the Second Step. EPSCA or the Council may submit either policy or specific grievances. Such policy or specific grievances shall be submitted within thirty (30) days of the alleged grievous act.

27.6 TIME LIMITS

The time limits as to both documents and procedures set out in the above sections shall be complied with by the parties to this Agreement provided, however, that the parties may mutually agree, in writing, in respect to an extension or waiver of any of the time limits imposed. Where no answer is given within the time limits specified in the grievance procedure, the employee concerned, the Union, the Council or EPSCA shall be entitled to submit the grievance to the next step of the grievance procedure. Any grievance not processed within the time limits specified in the grievance procedure shall be deemed to have been settled and ineligible for arbitration.

27.7 Alleged unjustified termination, discharge, suspension or disciplinary action may be grieved beginning at First Step.

27.8 GRIEVANCE FACILITIES

EPSCA shall provide the necessary facilities for all grievance meetings.

Article 28

ARBITRATION

28.1 If any dispute about the interpretation or application of particular clauses of this Agreement or about an alleged violation of this Agreement cannot be settled through the grievance procedure outlined in Article 27, the matter may be submitted within thirty (30) days of its failure of settlement by grievance procedure by either EPSCA or the Council to a Board of Arbitration for adjudication.

The party desiring to submit the dispute to arbitration shall notify the other party, in writing, of its desire and the notice shall contain the name of the first party's nominee to an arbitration board. The recipient of the notice shall, within five (5) working days, inform the other party of the name of its nominee to the arbitration board. The two nominees so selected shall, within ten (10) working days of the appointment of the second of them, appoint a third person who shall be the Chairman. If the recipient of the notice fails to appoint a nominee, or if the nominees fail to agree upon a Chairman, the appointment shall be made by the Minister of Labour for Ontario upon the request of either party. The arbitration board, when selected or appointed, will proceed as soon as practicable to hear and determine the dispute and it shall issue a decision which is final and binding upon the parties and upon their respective members. The decision of a majority is the decision of the arbitration board, but if there is no majority, the decision of the Chairman governs.

28.2 The arbitration board shall have no power to add to or subtract from or modify any of the terms of this Agreement. The arbitration board shall not substitute its discretion for that of the parties except where the board determines that an employee has been discharged or otherwise disciplined for cause when this Agreement does not contain a specific penalty for the infraction that is the subject matter of the arbitration. In such cases, the arbitration board may substitute such other penalty for the discharge or discipline as to the arbitration board seems just and reasonable in all circumstances. The arbitration board shall not exercise any responsibility or function of the parties. The arbitration board shall not deal with any matter not contained in the original statement of grievance filed by the party referring the matter to arbitration.

28.3 In arbitration proceedings, each party shall pay the fees and expenses of its nominee, whether appointed by the party or by the Minister of Labour for Ontario, and the fees and expenses of the Chairman shall be shared equally by the parties.

28.4 The time limits as to both documents and procedure set out in the above sections shall be observed by the parties to this Agreement provided, however, that the parties may mutually agree, in writing, in respect to an extension or waiver of any of the time limits imposed.

Article 29

NO STRIKE - NO LOCKOUT

29.1 There shall be no strikes or lockouts so long as this Agreement continues to operate.

Article 30

ASSOCIATION FUND

30.1 Each Employer bound by this agreement shall contribute to the Electrical Power Systems Construction Association Fund, the amount specified on the wage schedules attached hereto for each hour worked by each employee covered by this agreement.

The Employer shall remit such contribution together with the supporting information as required on the reporting forms.

EPSCA shall indemnify the Council and member Unions for any liability arising from an Employer's failure to remit such contributions.

Article 31

RADIATION WORK

31.1 (a) Local Union to be provided with a copy of Ontario Power Generation Inc Radiation Protection Regulations and any revisions.

(b) Local Union to be provided with a copy of Ontario Power Generation Inc Radiation Protection Procedures and any revisions.

(c) Each employee will have access to his personal radiation exposure record.

(d) Long-term employees who reach their exposure limit will be given alternate employment until they can resume radiation work.

(e) Short-term employees will be given a guaranteed period of employment at their time of hire.

Article 32

ABORIGINAL CONTENT COMMITMENT

Where an aboriginal commitment has been established on a project, the Union will co-operate in meeting the content commitments.

For a project, or jobs within a project, that are less than $100,000 field labour, and have aboriginal content commitments, the terms of the collective agreement will not apply to those aboriginal content commitments.

Article 33

TERM OF AGREEMENT

33.1 **REV** This Agreement shall continue in full force and effect from May 1, 2000 until April 30, 2004 inclusive, and thereafter it shall be considered automatically renewed for successive periods of two (2) years unless at least sixty (60) days prior to the end of any two (2) year period, either party serves written notice upon the other that it desires termination, revision or modification of any provision or provisions of this Agreement."

In Witness Whereof, EPSCA and the Union have caused this Agreement to be executed in their names by duly authorized representatives at *Toronto* this *10th* day of *April* 2001.

For: The Electrical Power Systems Construction Association

Jim Coathup

_____

Joe Dotchin

_____

_____

_____

For: The Power Council of Unions

Rick Weiss

_____

Claude Cournoyer

_____

Phil Bertrand

_____

_____

APPENDIX A

MOOSE RIVER BASIN: NORTHERN ONTARIO

Where the Employer elects to establish a camp, the following conditions will apply for employees working in the Moose River Basin:

Camp Conditions

(a) An Employer may elect to provide free room and board in camp at no cost to the employee. Where the Employer elects to provide a camp such employees will not be entitled to receive a daily travel or room & board allowance.

(b) When an Employer does not elect to provide free room and board in camp, the employee will be entitled to receive a daily travel or room and board allowance as set out in Articles 17.1 and 17.2.

(c) An employee who remains in camp on a normally scheduled work day on which he does not work will be charged $25.00 per day unless he is excused from work for a legitimate reason by the project medical attendant or an authorized representative of his Employer.

(d) An employee who is absent from work without approval and who remains in camp and is still absent from work the following day without approval will be charged $25.00 for the day of absence and each successive day of unapproved absence.

Hours of Work

(1) The hours of work will consist of a 21 day cycle of fourteen (14) consecutive work days followed by seven (7) consecutive days off.

(2) Regularly scheduled hours of work of ten (10) hours per day shall be paid at straight time hourly rates.

(3) Regularly scheduled hours of work on Saturday, Sunday, Recognized Holidays, and the fifth (5th) consecutive weekday shall be paid at two times the straight time hourly rate.

Wrap Around

An employee shall qualify for a return trip from the project every second twenty-one (21) day cycle he is on the project on the following basis:

(a) If an employee lives within 161 radius kilometres from the project, the Employer shall pay forty dollars ($40.00).

(b) If an employee lives greater than 161 radius kilometres from the project, the Employer shall pay as an allowance, forty dollars ($40.00) plus travel time based on the equivalent of one (1) hour's base rate of pay for each eighty (80) kilometres from where the employee lives or place of recruitment, whichever is closer to the project.

APPENDIX B

7-DAY COVERAGE

NUCLEAR SITES

When working under the provisions of this 7-day shift schedule, all conditions listed below will supersede those in the other Articles/Sections of this Collective Agreement. Where this shift schedule is silent, the appropriate Article/Section in the Collective Agreement applies.

REV These provisions would only apply to work performed on a Nuclear Facility and the work must be covered by the "Modified Provisions of this Construction Agreement.

This shift schedule is intended for work of at least five (5) weeks in duration; however, it is recognized that unforeseen circumstances may require the cancellation of this schedule.

If in the transition onto or off this 7-day shift schedule an employee would receive less than 40 paid hours in a pay period, the employee shall receive the difference between the total paid hours for that pay period and 40 hours' pay. This does not apply to those employees who are laid off during or at the end of the schedule.

The employee(s) shift schedule consists of four consecutive shifts (day, afternoon, or night) followed by four scheduled days off. Shift overlap may be required.

Shift work may be established by the Employer to provide seven days per week work coverage, on a two or three ten (10) hour per day shift basis. When this occurs, a specific shift arrangement will be established by the Employer detailing the shift schedule to be worked.

Notice Provision

If this shift schedule is to be used for work on a "planned outage", the Employer will provide the Union with two (2) weeks' notice prior to the implementation of these shift provisions.

Shift Provisions

Day Shift

Regularly scheduled hours of work per shift, Monday to Friday inclusive, shall be paid at straight time hourly rates.

Afternoon Shift

Regularly scheduled hours of work per shift, Monday to Friday inclusive, shall be paid at straight time hourly rates, plus a shift differential which shall be equal to the Shift Differential as found in the appropriate trade appendix for this shift.

Night Shift

Regularly scheduled hours of work per shift, Monday to Friday inclusive, shall be paid at straight time hourly rates, plus a shift differential which shall be equal to the Shift Differential as found in the appropriate trade appendix for this shift.

All Shifts

Regularly scheduled hours of work on Saturday, Sunday, Statutory and Recognized Holidays shall be paid at the appropriate overtime rate for that trade. Recognized Holidays will be observed on the actual day on which the holiday occurs or as declared by legislation.

The rate for the shift will be based on the day in which the shift begins.

An unpaid lunch period of one-half hour shall be allowed to be taken no later than five hours after the commencement of a shift.

For employees working regularly scheduled hours, two fifteen (15) minute rest periods will be allotted at a time and location directed by the Employer for employees to rest.

It may be necessary, from time to time, to vary the established shift arrangements. When this occurs, a revised shift arrangement will be established.

APPENDIX C

7-DAY COVERAGE

HYDRO ONE (LINES AND STATIONS)

This shift schedule is intended for work greater than two (2) weeks in duration; however, it is recognized that unforeseen circumstances may require the cancellation of this schedule.

These provisions will only apply to work performed on Lines and Stations as follows:

"for emergency work until the system is restored to the pre-emergent state"

If in the transition onto or off this 7-day shift schedule an employee would receive less than 40 paid hours in a pay period, the employee shall receive the difference between the total paid hours for that pay period and 40 hours' pay. This does not apply to those employees who are laid off during or at the end of the schedule.

The employee(s) shift schedule consists of four consecutive shifts (day, afternoon, or night) followed by four scheduled days off. Shift overlap may be required.

Shift work may be established by the Employer to provide seven days per week work coverage, on a one, two, or three shift per day basis. When this occurs, a specific shift arrangement will be established by the Employer detailing the shift schedule to be worked. The Employer will provide the Union with 48 hours' notice prior to the implementation of these shift provisions.

First Shift

Regularly scheduled hours of work, Monday to Friday inclusive, shall be paid at straight time hourly rates.

Second Shift

Regularly scheduled hours of work, Monday to Friday inclusive, shall be paid at straight time hourly rates, plus a shift differential which shall be equal to the Shift Differential as found in the appropriate trade appendix for this shift.

Third Shift

Regularly scheduled hours of work, Monday to Friday inclusive, shall be paid at straight time hourly rates, plus a shift differential which shall be equal to the Shift Differential as found in the appropriate trade appendix for this shift.

All Shifts

Regularly scheduled hours of work on Saturday, Sunday, Statutory and Recognized Holidays shall be paid the appropriate overtime rate for that trade. Recognized Holidays will be observed on the actual day on which the holiday occurs or as declared by legislation.

The rate for the shift will be based on the day in which the shift begins.

An unpaid lunch period of one-half hour shall be allowed to be taken no later than five hours after the commencement of a shift.

For employees working regularly scheduled hours, two fifteen (15) minute rest periods will be allotted at a time and location directed by the Employer for employees to rest.

It may be necessary, from time to time, to vary the established shift arrangements. When this occurs, a revised shift arrangement will be established.

APPENDIX D

MODIFIED PROVISIONS OF THIS CONSTRUCTION AGREEMENT

These provisions will apply to:

(a) all work on Lines and Stations, and

(b) all work on existing generating sites except the construction of:

- a new facility which provides a new function
- a new (i.e. additional) generating unit

Definitions:

Facility	Something that is built composed of multi-systems which serves a specific function
Function	Examples - Generation, Administration, Warehousing, Heavy Water Production, Flue Gas Desulphurization, Tritium Removal, Site Services (e.g. Shops)

Dispute Resolution Process

A dispute as to whether the 'Modified Provisions of this Construction Agreement' apply to the construction of a new facility will be referred to the Executive Committee for resolution and the Executive Committee will meet within 5 (five) working days. If the Executive Committee is unable to resolve the dispute, the dispute will be referred to a single arbitrator within 10 (ten) working days for a final and binding resolution. The arbitrator shall give an oral decision within 5 (five) working days, and a written decision, if requested, within 20 (twenty) working days.

REV All terms of this collective agreement shall apply to work covered by this Appendix, with the exception of Article 16 – Reporting Pay, Article 17 – Generation Projects Daily Travel Allowance and Room and Board, Article 23 – Meals on Overtime and Article 26 – Hours of Work.

EPSCA/MASTER PORTION COLLECTIVE AGREEMENT

APPENDIX D

MODIFIED PROVISIONS

OF THIS CONSTRUCTION AGREEMENT

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Section 1

GENERATION PROJECTS
DAILY TRAVEL ALLOWANCE AND ROOM AND BOARD

DAILY TRAVEL ALLOWANCE

1.1 **REV** The daily travel allowance will be paid by the Employers to employees who are not receiving room and board as referred to in Section 1.2, on the following basis:

(a) If an employee lives within forty (40) radius kilometers* of the project, no travel allowance will be paid.

(b) If an employee lives within 40 to 56 radius kilometers of the project, he shall receive $18.85 per day travel allowance effective May 1, 2000 ($19.35 effective May 1, 2001, $19.85 effective May 1, 2002, $20.35 effective May 1, 2003) for each day worked or reported for.

(c) If an employee lives within 56 to 80 radius kilometers of the project, he shall receive $22.10 per day travel allowance effective May 1, 2000 ($22.60 effective May 1, 2001, $23.10 effective May 1, 2002, $23.60 effective May 1, 2003) for each day worked or reported for.

(d) If an employee lives within 80 to 97 radius kilometers of the project, he shall receive $25.60 per day travel allowance effective May 1, 2000 ($26.10 effective May 1, 2001, $26.60 effective May 1, 2002, $27.10 effective May 1, 2003) for each day worked or reported for.

(e) If an employee lives greater than 97 radius kilometers from the project and does not qualify for subsistence allowance under Section 17.2 below, he will receive $29.85 per day travel allowance effective May 1, 2000 ($30.35 effective May 1, 2001, $30.85 effective May 1, 2002, $31.35 effective May 1, 2003) provided he continues to travel greater than 97 radius kilometers for each day worked or reported for.

When an employee is directed to report to a location that involves travelling around a natural barrier, the distance around the natural barrier shall be the shortest distance measured by a series of straight lines. The sum of the distances of these straight lines shall be applied to the ring concept to establish the employee's travel allowance entitlement.

A natural barrier is defined as any obstruction or impediment which creates an unreasonable relationship between the radius kilometers and actual kilometers travelled.

* ***For the purpose of this Article, "radius kilometers" shall be measured from the centre of the turbine hall on each project.***

Bruce G.S. "A", Bruce G.S. "B", and the Bruce Heavy Water Plants will be combined to form the Bruce Complex. Travel allowance for the Bruce complex will be calculated from the midpoint of a straight line joining the centres of the Bruce G.S. "A" and Bruce G.S. "B" turbine halls.

ROOM AND BOARD

1.2 **REV** The following conditions will apply for employees whose regular residence* is more than 97 radius kilometers from the project:

(a) An Employer may supply either:

(i) Room and board in camp or a good standard of board and lodging within a reasonable distance of a project; or

(ii) a subsistence allowance;

subject to Sections 1.2(b), (c) and (d) below.

(b) An employee may exercise his option not to stay in a camp or accept room and board. An employee who exercises this option and qualifies for subsistence allowance shall receive a subsistence allowance of $56.00 per day effective May 1, 2000 ($58.00 effective May 1, 2001, $60.00 effective May 1, 2002, $62.00 effective May 1, 2003) for each day worked or reported for when employed at a location south of the French River and $70.00 per day effective May 1, 2000 ($72.00 effective May 1, 2001, $74.00 effective May 1, 2002, $76.00 effective May 1, 2003) for each day worked or reported for when employed at a location north of the French River subject to Sections 1.2(c) and 1.2(d) below.

(c) To qualify for subsistence allowance an employee must maintain temporary accommodation at or near a project. Employees who travel daily to locations beyond 97 radius kilometers from the project will be entitled $31.60 per day effective May 1, 2000 ($33.60 effective May 1, 2001, $35.60 effective May 1, 2002, $37.60 effective May 1, 2003) worked or reported for.

(d) An employee employed at the Pickering or Darlington Project who qualifies for a subsistence allowance as provided for above shall receive a subsistence allowance of $41.50 per day effective May 1, 2000 ($44.50 effective May 1, 2001, $47.50 effective May 1, 2002, $49.50 effective May 1, 2003) worked or reported for.

* ***An employee's 'regular residence' is:***

1. ***The place where the employee maintains a self-contained, domestic establishment (a dwelling house, apartment or similar place of residence where a person generally eats and sleeps and for which he can show proof of financial commitment). This is in contrast to a boarding house facility which is not self-contained; and***

2. ***The employee normally resides in the residence except for those periods of time when, because of the location of the work, the employee is forced to obtain temporary accommodation at that work location.***

1.3 An employee shall not qualify for daily travel allowance or room and board allowance as provided for in Sections 1.1 and 1.2 above when such employee reports for work but does not remain at work for his scheduled daily hours unless excused by an authorized representative of his Employer.

1.4 An employee who maintained a regular residence within the geographic area for the purposes of employment and who relocates outside the geographic area will not be entitled to an increase in travel or room and board allowance entitlement as a result of this relocation.

1.5 The Council recognizes the Employer's right to charge for board and other existing services. The Employer fixes the charge for board and other existing services in camps at $25.00 per day. This will be applied on the following basis:

(a) An employee who remains in camp on a normally scheduled work day on which he does not work will be charged $25.00 per day, unless he is excused from work for a legitimate reason by the project medical attendant or an authorized representative of his Employer.

(b) An employee who is absent from work on Friday without approval and who remains in camp and who is still absent from work on the following Monday without approval will be charged for room and board for Friday, Saturday, Sunday and Monday.

(c) An employee who is absent from work without approval on Friday but who works the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

(d) An employee who works the Friday and is absent from work without approval on the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

Section 2

HOURS OF WORK

2.1 One (1) or Two (2) Shift Operation

The weekly hours of work shall consist of forty (40) hours, worked between Monday and Friday, for all employees of Employers covered by this agreement and working on a one (1) or two (2) shift operation except as described in Sections 2.2, 2.3, 2.4, 2.5 and 2.6.

The weekly hours of work for all employees may be arrived at by having the employees work four (4) consecutive ten-hour shifts, either Monday –Thursday or Tuesday – Friday but not concurrently on the same project, or by having the employees work five (5) consecutive eight-hour shifts. Weekly hours of work will be established for a minimum period of thirty (30) days. If an employer, with the approval of the owner, intends to change the weekly hours of work, a minimum of fifteen (15) days written notice shall be sent to the Local Union.

The start time for the day shift shall be 8:00 a.m. with a possible one (1) hour variance either way. The start time for the afternoon shift shall be immediately following the day shift or within one (1) hour either way to coincide with the end of the day shift.

The shift differential for those employees working the afternoon shift when a two shift operation has been established by the Employer will be one-seventh (1/7) for scheduled hours worked on that shift.

Three (3) Shift Operation

When a three (3) shift operation is established by the Employer, the following conditions will apply:

Those employees working on the day shift shall work eight (8) hours per shift at the straight time rate.

Those employees working on the afternoon shift shall work seven and one-half (7 1/2) hours per shift at the straight time plus the appropriate shift differential as set out in the trade appendices.

Those employees working on the night shift shall work seven (7) hours per shift plus the appropriate shift differential as set out in the trade appendices.

2.2 The hours of work for such work as driveway and parking lot construction, railroad construction, landscaping, tunnelling, precast concrete erection, fencing or demolition, shall be as established in applicable local agreements for the class and character of work.

An applicable local agreement shall be an agreement between a local of any union signatory to this Agreement and a builders' exchange, contractors' association or contractor applicable in the locality of the project for the class and character of the work.

2.3 The weekly hours of work for structural steel erection shall be forty (40) hours made up of five (5) days of eight (8) hours each, Monday to Friday inclusive.

2.4 The weekly hours of work for site preparation and earth dams shall be 45 hours made up of five (5) days of nine (9) hours each, Monday to Friday inclusive.

2.5 The weekly hours of work for Watchmen shall be as set forth in the Laborers' International Union of North America Appendix, attached hereto.

2.6 The weekly hours of work for Operating Engineers engaged in tunnel work shall be as set forth in the International Union of Operating Engineers' Appendix attached hereto.

2.7 Shift Change

A shift will be deemed to be established providing at least four (4) consecutive days of a shift are to be worked excluding Saturdays, Sundays and recognized holidays. If an employee is removed from their scheduled shift prior to completing four (4) consecutive shifts, the employee will be paid shift differential for the balance of the four (4) consecutive shifts that would have been worked had the employee not been reassigned.

2.8 It may be necessary from time to time to vary the hours of work established in this Article. Any amendments to the hours of work will be established by mutual agreement between EPSCA and the Council.

2.9 LUNCH PERIODS FOR MAJOR PROJECTS, AND CONSTRUCTION AND SERVICES DIVISION

A lunch period will be given no earlier than four (4) hours and no more than five (5) hours after the start of the shift and will be one-half (1/2) hour in duration.

A lunch period will be given no earlier than three and one-half (3-1/2) hours and no more than five (5) hours after the start of the third shift and will be one-half (1/2) hour in duration.

2.10 When an employee is required to return to work without an eight (8) hour break, all work performed shall be at the premium rate until such time as the employee receives an eight (8) hour break. This provision does not apply when a change in an employee's normal shift (as defined in this Article) occurs or to call-in situations.

Section 3

REPORTING PAY ON 8 HOUR AND 10 HOUR SHIFTS

3.1 An employee who reports for work, unless directed not to report the previous day by his Employer, shall receive a minimum of a half shifts pay (4 hours or 5 hours) at the applicable rate when he reports for work, but is given no opportunity to work because none is available. This allowance will be paid to an employee if he is requested to report for any part of the first half of a shift and an additional half shifts pay (4 hours or 5 hours) will also be paid if he is requested to report for work for any part of the second half of the same shift. It is not intended by this Section that an employee receive a reporting pay allowance greater than his pay for normal daily hours.

3.2 An employee in receipt of reporting pay shall also receive travel or board allowance, if applicable.

3.3 Notwithstanding that work is available and an employee is able to commence or continue work, the Employer may shut down a job to avoid the possible loss of human life because of an emergency situation such as H2S leaks, bomb threats, fire, etc., that could endanger the life and safety of an employee. In such cases, employees will be compensated only for the actual time worked.

Section 4

MEALS ON OVERTIME

Scheduled Eight (8) Hour Shifts

When an employee has not been notified the previous day that he will be required to work for more than two (2) hours beyond the normal quitting time of the first or second shifts or for more than three and one half (3 ½) hours beyond the normal quitting time of the third shift, he shall be provided with a meal and be allowed thirty (30) minutes to consume same and the employee shall be paid at the base hourly rate of pay. This meal break will be taken following the first two (2) hours of overtime worked. After each additional four (4) is worked and when work is required beyond that four (4) hour period, the employee shall be allowed thirty (30) minutes to eat and be paid at the base hourly rate of pay and he shall be provided with a meal. The Employer will supply a hot meal when possible. Where an employee has been notified the previous day, no meal will be provided after the first two (2) hours of overtime worked, but the employee will be allowed thirty (30) minutes to eat and be paid at the base hourly rate of pay. After each additional four (4) hours is worked and when work is required beyond that four (4) hour period, the employee shall be allowed thirty (30) minutes to eat and be paid at the base hourly rate of pay and he shall be provided with a meal.

When a paid meal period overlaps a rest period, the paid meal period will supplant the rest period.

The above-noted is not applicable to the first eight (8) hours worked on Saturdays, Sundays or Recognized Holidays for employees who normally work the first or second shifts.

The above-noted is not applicable to the first six and one half (6 ½) hours worked on Saturdays, Sundays or Recognized Holidays for employees who normally work the third shift.

Scheduled Ten (10) Hour Shifts

When an employee has not been notified the previous day that he will be required to work beyond his normal quitting time, prior to commencing the overtime work, he shall be provided with a meal and be allowed thirty (30) minutes to consume same and the employee shall be paid at the base hourly rate of pay. After each additional four (4) hours is worked and when work is required beyond that four (4) hour period, the employee shall be allowed thirty (30) minutes to eat and be paid at the base hourly rate of pay and he shall be provided with a meal. The Employer will supply a hot meal when possible. Where an employee has been notified the previous day, no meal will be provided prior to commencement of overtime work, but the employee will be allowed thirty (30) minutes to eat and be paid at the base hourly rate of pay. After each additional four (4) hours is worked and when work is required beyond that four (4) hour period, the employee shall be allowed thirty (30) minutes to eat and be paid at the base hourly rate of pay and he shall be provided with a meal.

The above-noted is not applicable to the first ten (10) hours worked on Saturdays, Sundays or Recognized Holidays for employees who normally work the first and second shifts.

When a paid meal period overlaps a rest period, the paid meal period will supplant the rest period.

STATEMENT OF UNDERSTANDING NO. 1

Notwithstanding Article 1, Recognition, of the Collective Agreement between The Electrical Power Systems Construction Association and the Ontario Allied Construction Trades Council, it is recognized and agreed by The Electrical Power Systems Construction Association and the Ontario Allied Construction Trades Council that employees of Ontario Hydro, who, at April 30, 1953, possessed full regular status and who are engaged on property acquired for Ontario Hydro, are exempt from the provisions of this Agreement and that the Council or member Unions of the Council will not attempt to either negotiate for these employees, unless bargaining rights are obtained, or restrict their movements or work on such property.

Dated at Rexdale, Ontario, this 28th day of August, 1974.

For:

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION

President

Director

Director

Director

Director

General Manager

Secretary-Treasurer

For:

ONTARIO ALLIED CONSTRUCTION TRADES COUNCIL

President

Vice-President

Secretary-Treasurer

For the Member Unions

International Association of Heat and Frost Insulators and Asbestos Workers

International Brotherhood of Boilermakers, Iron Ship Builders, Blacksmiths, Forgers and Helpers

STATEMENT OF UNDERSTANDING NO. 1

International Brotherhood of
Painters and Allied Trades

International Brotherhood of
Teamsters, Chauffeurs,
Warehousemen and Helpers of
America

International Union of
Operating Engineers

Labourers' International Union
of North America

United Brotherhood of
Carpenters and Joiners of
America

STATEMENT OF UNDERSTANDING NO. 2

It is recognized and agreed by The Electrical Power Systems Construction Association and the Ontario Allied Construction Trades Council that foremen covered by the Collective Agreement between The Electrical Power Systems Construction Association and the Ontario Allied Construction Trades Council who are employed by Ontario Hydro and who possess full regular status will not be required to comply with subsection (b) section .1 of Article 12, Union Security, of the Master Portion of the Collective Agreement. However, if any of these foremen join a member Union of the Council they will be put on checkoff and will be required to maintain their membership in the Union.

Dated at Rexdale, Ontario, this 28th day of August, 1974.

For:

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION

President

Director

Director

Director

Director

General Manager

Secretary-Treasurer

For:

ONTARIO ALLIED CONSTRUCTION TRADES COUNCIL

President

Vice-President

Secretary-Treasurer

For the Member Unions

International Association of Heat and Frost Insulators and Asbestos Workers

International Brotherhood of Boilermakers, Iron Ship Builders, Blacksmiths, Forgers and Helpers

STATEMENT OF UNDERSTANDING NO. 2

International Brotherhood of
Painters and Allied Trades

International Brotherhood of
Teamsters, Chauffeurs,
Warehousemen and Helpers of
America

International Union of
Operating Engineers

Labourers' International Union
of North America

United Brotherhood of
Carpenters and Joiners of
America

LETTER OF UNDERSTANDING

between

THE ELECTRICAL POWER SYSTEMS
CONSTRUCTION ASSOCIATION

and the

ONTARIO ALLIED CONSTRUCTION
TRADES COUNCIL

It is agreed that STATEMENT OF UNDERSTANDING No. 3 which is dated August 28, 1974 and appended to the Master Portion of the EPSCA/OACTC Collective Agreement, is hereby withdrawn and cancelled effective January 28, 1999.

DATED at Toronto, Ontario, this *16th* day of *August*, 1999.

For:

THE ELECTRICAL POWER SYSTEMS
CONSTRUCTION ASSOCIATION

Joe Dotchin

Barry Roberts

For:

THE ONTARIO ALLIED CONSTRUCTION
TRADES COUNCIL

Matthew Elliot

Bryon Black

LETTER OF UNDERSTANDING

between

THE ELECTRICAL POWER SYSTEMS
CONSTRUCTION ASSOCIATION

and the

ONTARIO ALLIED CONSTRUCTION
TRADES COUNCIL

It is agreed that STATEMENT OF UNDERSTANDING NO. 4 which is dated August 28, 1974 and appended to the Master Portion of the EPSCA/OACTC Collective Agreement, is hereby withdrawn and cancelled effective May 31, 1984.

Dated at Toronto, Ontario, this *14th* day of *May*, 1984.

For: THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION

For: ONTARIO ALLIED CONSTRUCTION TRADES COUNCIL

STATEMENT OF UNDERSTANDING NO. 5

Nothing contained in any other Collective Agreement negotiated by EPSCA will prejudice any of the affiliates of the OACTC so far as the trade jurisdiction is concerned.

Replace Statement of Understanding - #6 dated January 28th, 1999, with the following:

STATEMENT OF UNDERSTANDING

Between

THE ELECTRICAL POWER SYSTEMS
CONSTRUCTION ASSOCIATION

And

THE INTERNATIONAL UNION OF OPERATING ENGINEERS

LABOURERS INTERNATIONAL UNION OF NORTH AMERICA

UNITED BROTHERHOOD OF CARPENTERS AND JOINERS OF AMERICA

EMPLOYMENT REFERRALS

It is agreed by the Parties to this understanding, that prior to any member being referred for employment under this agreement, the member must submit to a security check. Only members who successfully obtain security clearance will be referred for employment. Once a member has been hired on, they will receive an allowance of $50.00 on their first weeks pay cheque, in consideration of their time spent filling out the security clearance forms.

The union will be notified, as soon as possible, whether or not an individual has successfully obtained security clearance. This pre-clearance does not prohibit the Union from filing a grievance against the Employer on behalf of any member who is refused employment due to his/her failure to obtain security clearance.

Dated at Toronto, this 28th day of April, 2000.

Barry Roberts
Helen Viveiros
Ros Rioux
Robert Gibson
Denis Flynn
Doug Wilson

EPSCA

Phil Bertrand
John Anderson

IUOE

Rick Weiss

LIUNA

Claude Cournoyer

UBCJA

STATEMENT OF UNDERSTANDING NO.7

Between

THE ELECTRICAL POWER SYSTEMS

CONSTRUCTION ASSOCIATION

And

THE INTERNATIONAL UNION OF OPERATING ENGINEERS

LABOURERS INTERNATIONAL UNION OF NORTH AMERICA

UNITED BROTHERHOOD OF CARPENTERS AND JOINERS OF AMERICA

Re: Late Payment of Board Allowance

During the current negotiation discussions, the Unions raised concerns about the late payment of board allowance. It was unclear to what extent payments were being delayed. In order to assess how much of a problem this is, EPSCA agrees to investigate the payment process by June 15, 2000 to determine the extent of the problem and to pinpoint the cause. Once the investigation is complete and the Parties have determined that a problem exists, the Parties agree to re-open negotiations to negotiate an appropriate penalty clause.

Dated this 12th of May 2000.

Phil Bertrand

IUOE

Barry Roberts

EPSCA

Rick Weiss

LIUNA

Claude Cournoyer

UBCJA

STATEMENT OF UNDERSTANDING

Between

THE ELECTRICAL POWER SYSTEMS

CONSTRUCTION ASSOC IATION

And

THE INTERNATIONAL UNION OF OPERATING ENGINEERS

LABOURERS INTERNATIONAL UNION OF NORTH AMERICA

UNITED BROTHERHOOD OF CARPENTERS AND JOINERS OF AMERICA

ROOM AND BOARD ALLOWANCE

NORTH OF THE FRENCH RIVER

The Parties agree that individuals in the 80-97 kilometre radius ring working north of the French River will be eligible for room and board allowance if their actual road kilometres travelled exceeds 120 kilometres.

Dated at Toronto, this 28th day of April, 2000.

Phil Bertrand
John Anderson

IUOE

Barry Roberts
Helen Viveiros
Ros Rioux
Robert Gibson
Denis Flynn
Doug Wilson

EPSCA

Rick Weiss

LIUNA

Claude Cournoyer

UBCJA

FOREMAN APPENDIX

The amendments contained in the Statement of Settlement, effective May 12, 2000, have been incorporated into the Foreman Appendix in accordance with the "Term of Agreement" article contained in the Master Portion of this Agreement.

FOREMAN APPENDIX

to the

COLLECTIVE AGREEMENT

by and between

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION

(hereinafter called "EPSCA")

and the

POWER COUNCIL OF UNIONS (hereinafter called the "Council")

As provided in the "Appendices" article of the Master Portion of the Collective Agreement, EPSCA and the Council have agreed to the following conditions to apply to foremen.

Article 1

1.1 It is understood that foremen hold a key position in the relationship between the Employers and the Unions. Both parties agree that every effort should be made to recruit and retain foremen who have a high degree of efficiency in the performance of their jobs and in the handling of their men. Recognizing the responsibilities involved in being a supervisor and a member of a Union, the Employers, the Council and the Unions will make every effort to minimize problems that may arise which concern the relationship between the foremen, the Employers and the Unions.

Article 2

2.1 Foremen are the first level of management supervision and, as such, are management representatives. In this capacity, they will exercise duties and responsibilities, as established by their Employers, and will not work with the tools of the trade, except as provided for in the individual trade appendices' articles.

The parties recognize the responsibility of foremen to discharge their managerial duties. If a Union feels that a foreman is not discharging his managerial duties in a manner that is fair, equitable and without bias, or if an Employer feels that a Union is interfering with a foreman in the performance of his managerial duties, the Employer or the Union may refer the problem to the Project Committee for resolution. If the matter cannot be resolved by the Project Committee, the grievance procedure may be invoked by either party.

Article 3

EMPLOYERS' RIGHT TO SELECT

3.1 The selection and retention of foremen will be the responsibility of the Employers. When making appointments to the foreman level, the Employers will give consideration to those journeymen they presently employ. The appointment of foremen in charge of composite or mixed crews will take into account the nature of the work to be done.

Article 4

UNION AFFILIATION

4.1 In accordance with the "Union Security" article of the Master Portion, and in accordance with Article 3, Employers' Right to Select, contained in this Appendix, the appropriate Union affiliation for foremen shall be determined, as follows:

(a) Foremen appointed by internal promotion shall retain the Union membership held prior to appointment.

(b) Foremen recruited externally shall:

(i) if a Union member, continue that Union membership; or

(ii) if not a Union member, join the appropriate Union in keeping with the nature of the work to be done.

NOTE

Article 5 does NOT apply to Foreman working in Lines and Stations under the Modified Provisions of the Carpenter Appendix or of the Laborer Appendix; see the Modified Provisions Section of the Carpenter and Laborer Appendices for the Lines and Stations Foremen Rate

Article 5

WAGES

5.1 (a) The rates of pay for foremen covered by this Appendix shall be the greater of:

REV

(i) $3.00 per hour above the journeyman rate; or

(ii) the Employer's current practice; or

(iii) the rate negotiated in appropriate local agreements; except, as noted, in (b) hereunder:

(b) The rates of pay for foremen engaged in the supervision of work covered by the "exceptions" contained in the Operating Engineer and Laborer Appendices shall be the greater of:

(i) the Employer's current practice; or

(ii) the locally negotiated rate for work of the same class and character.

Article 6

WEEKLY HOURS OF WORK

6.1 When the normal weekly hours of work are amended by the "exceptions" recognized under this Agreement, the weekly hours of work for foremen shall be the same as for the tradesmen represented by the Unions with which the foreman is affiliated.

Article 7

SHIFT DIFFERENTIAL RATE

7.1 Foremen required to work shift work other than the regular day shift shall receive the same shift differential rate as the tradesmen represented by the Union with which the foreman is affiliated.

Article 8

OVERTIME RATES

8.1 Overtime rates for work performed outside normal hours as defined in the "Hours of Work" article contained in the Master Portion of this Agreement and outside hours of work amended by the "exceptions" recognized under this Agreement, shall be the same as for tradesmen represented by the Union with which the foreman is affiliated.

Article 9

BENEFITS

9.1 The Employer agrees to pay into operative welfare, pension, and supplementary unemployment benefit plans on behalf of foremen covered by this Appendix. Payments will be made on the same basis and in the same amounts as are paid on behalf of tradesmen represented by the Unions with which the foremen are affiliated.

Article 10

MOBILITY

10.1 To maintain efficiency and productivity, an Employer shall have the right to move foremen from construction site to construction site, as determined at the pre-job conference.

Article 11

APPRENTICESHIP AND TRAINING PROGRAMS

11.1 The Employer agrees to pay into operative apprenticeship and training funds on behalf of foremen covered by this Appendix. Payments will be made on the same basis and in the same amounts as are paid on behalf of tradesmen represented by the Unions with which the foremen are affiliated.

Article 12

TOOLS AND CLOTHING

12.1 On a charge-out basis, the Employer shall supply foremen with protective clothing appropriate for the conditions under which the work is being done.

12.2 Foremen shall be accountable, but not liable, for gang tools used by their crew.

Ontario Allied Construction Trades Council

MASTER PORTION

The amendments contained in the Statement of Settlement, dated January 28, 1999 have been incorporated into the Master Portion of the Collective Agreement in accordance with Article 34.5 of the Collective Agreement negotiated between the Senior Bargaining Committees of The Electrical Power Systems Construction Association and the Ontario Allied Construction Trades Council.

EPSCA/OACTC COLLECTIVE AGREEMENT

MASTER PORTION

GENERAL NOTE

This Collective Agreement distinguishes between two broad categories of work; namely, work that is covered by the *"modified provisions"* of this construction agreement and work that is not. *"Modified provisions"* apply to all work on Lines & Stations and most work on existing generating sites. Following is a more detailed explanation:

The *"Modified Provisions"* of this Construction Agreements will apply to:

(a) all work on Lines and Stations, and

(b) all work on existing generating sites except the construction of:
- **a new facility which provides a new function**
- **a new (i.e. additional) generating unit**

Article 33 - contains the *"Modified Provisions of this Construction Agreement"*. All terms of this collective agreement shall apply to work covered by Article 33, with the exception of Article 17 - Generation Projects Daily Travel Allowance and Room and Board and Article 26 - Hours of Work. Articles 17 and 26 do not apply when working under the terms and conditions of the *"modified provisions"*, as they are replaced by Articles 33.5 and 33.6 respectively.

When work does not fall within the jurisdiction of Article 33, all terms of this agreement, with the exception of Article 33, apply.

A chart to illustrate the above applications follows:

Lines & Stations - Existing and New Sites	Generating - Existing Sites Excluding construction of new facility (new function) &/or new (additional) generating unit(s)	Generating - Existing Sites Involving construction of new facility (new function) & /or new (additional) generating unit(s)	Generating - New Sites (i.e. Greenfield Work)
Use Article 18 for L&S Construction Daily Travel Allowance and Room & Board; use Modified Provisions (Article 33) for Hours of Work	Use Modified Provisions (Article 33) for Generation Projects Daily Travel Allowance and Room & Board and Hours of Work	Use Articles 17, and 26 for Generation Projects Daily Travel Allowance & Room and Board and Hours of Work	Use Articles 17 and 26 for Generation Projects Daily Travel Allowance and Room & Board and Hours of Work

ADDENDUM

to the

Collective Agreement

by and between

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION

and the

ONTARIO ALLIED CONSTRUCTION TRADES COUNCIL

May 1, 1974 - April 30, 2000

WHEREAS the Operative Plasterers' and Cement Masons' International Association of the United States and Canada sent a letter to the Ontario Allied Construction Trades Council, dated May 9, 1977, requesting that it be accepted as an affiliate of the Council and thereby become a party to the Collective Agreement in effect between the Ontario Allied Construction Trades Council and The Electrical Power Systems Construction Association; and

WHEREAS the Ontario Allied Construction Trades Council notified The Electrical Power Systems Construction Association by letter, dated June 2, 1977, that the Operative Plasterers' and Cement Masons' International Association of the United States and Canada is a member of said Council;

THEREFORE, the Operative Plasterers' and Cement Masons' International Association of the United States and Canada is represented by the Ontario Allied Construction Trades Council and is a party to the Ontario Allied Construction Trades Council Agreement with The Electrical Power Systems Construction Association, which is attached hereto and which consists of a Master Portion including Statements of Understanding Nos. 1 and 2, a Foreman Appendix, and individual Trade Appendices applicable to the members of the Ontario Allied Construction Trades Council, including the Operative Plasterers' and Cement Masons' International Association of the United States and Canada.

IN WITNESS WHEREOF, the parties through their duly authorized officers have executed this Agreement, this *12th* day of ***December***, 1977.

For:

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION

President

Director

Director

Director

Director

General Manager

Secretary-Treasurer

For:

ONTARIO ALLIED CONSTRUCTION TRADES COUNCIL

President

Vice-President

Secretary-Treasurer

For the Member Union

Operative Plasterers' and Cement Masons' International Association of the United States and Canada

EPSCA/OACTC COLLECTIVE AGREEMENT
MASTER PORTION

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COLLECTIVE AGREEMENT

by and between

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION
(hereinafter called "EPSCA")

and the

ONTARIO ALLIED CONSTRUCTION TRADES COUNCIL
(hereinafter called the "Council")

WHEREAS EPSCA is an Association formed to represent Employers in collective bargaining and on their behalf enter into collective agreements covering those of their employees in the bargaining unit as hereinafter defined;

AND WHEREAS the Council is formed to represent the Unions listed in Article 2 in collective bargaining with EPSCA and to enter into collective agreements on their behalf and on behalf of their members in the bargaining unit as hereinafter defined;

AND WHEREAS it is the desire of the parties to conclude an agreement with a new concept designed to bring stability, harmony, and an effective method to amicably resolve problems in the electrical power systems sector of the construction industry, in the Province of Ontario;

NOW THEREFORE the parties hereby agree as follows:

Article 1

RECOGNITION

1.1 EPSCA recognizes the Council as the exclusive bargaining agency for a bargaining unit comprising employees as defined in Section 1.4 and foremen as defined in Section 1.5 engaged in all construction industry work* performed in the Province of Ontario on Ontario Hydro property for the bulk power system, save and except the building of commercial-type office facilities at urban locations remote from operating facilities.

For the purpose of clarity, the bulk power system comprises generating stations, hydraulic works, heavy water facilities, transmission lines (voltages over 50 kV), transmission stations, microwave and repeater stations.

1.2 The work described in Section 1.1 shall also include work on property acquired by Ontario Hydro for:

(a) the supply of aggregate and concrete used in the construction of said facilities; and

(b) ancillary material yards which are defined as property acquired by Ontario Hydro for the storage of materials to be used on a project by Employers.

1.3 The Council recognizes EPSCA as the exclusive bargaining representative for all Employers in respect of work performed by their respective employees in the bargaining unit set forth in Section 1.1.

1.4 The term "employee" shall include all employees of the Employers in the classifications set out in the trade appendices provided in Article 4, Sections 4.1 and 4.2, save and except those described hereunder:

(a) Carpenters and Laborers employed by an Employer signatory to the National Agreement for Canada, Stacks-Chimneys-Silos, when performing work covered by the scope of that agreement; and

* ***For the purpose of The Electrical Power Systems Construction Association, the work performed is deemed to be under the responsibility of the Engineering and Construction Services Branch. The work encompasses:***

- ***construction of new facilities***
- ***additions to existing facilities***
- ***major - modifications***
  - ***rehabilitation***
  - ***reconstruction of existing facilities***

(b) Operating Engineers employed by an Employer signatory to the Crane and Equipment Rental Agreement with Local Union 793, when performing work covered by the scope of that agreement; and

(c) When hiring trucks the Employer will give preference to Employers with contractual relations with the Teamsters Union provided they have suitable equipment and the rates are competitive.

The term "employee" includes foremen in Articles 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24.1(b), 24.1(c), 26, and in the applicable Vacation Pay and Statutory Holiday Articles in each Appendix.

1.5 The term "foreman" shall include all foremen of the Employers between the ranks of, but not including, working foreman and general foreman, save and except those described hereunder:

(a) Carpenter foremen and Laborer foremen employed by an Employer signatory to the National Agreement for Canada, Stacks-Chimneys-Silos, when performing work covered by the scope of that agreement; and

(b) Operating Engineer foremen employed by an Employer signatory to the crane and Equipment Rental Agreement with Local Union 793, when performing work covered by the scope of that agreement; and

1.6 The term "Employers" shall include individual members of EPSCA and any company, partnership, sole proprietorship, joint venture, contractor, subcontractor or any person that is bound by the terms and conditions of this Agreement.

1.7 EPSCA and the Council agree the use of nomenclature is meant to refer to both genders.

Article 2

MEMBERS OF THE COUNCIL

2.1 It is recognized that the Council comprises certain International Unions whose names are listed hereunder:

International Association of Heat and Frost Insulators and Asbestos Workers

International Brotherhood of Painters and Allied Trades

International Brotherhood of Teamsters

International Union of Operating Engineers

Laborers' International Union of North America

Operative Plasterers' and Cement Masons' International Association of the United States and Canada

United Brotherhood of Carpenters and Joiners of America

2.2 Individual Unions of the Council shall be hereinafter called the "Union".

Article 3

FORM OF AGREEMENT

3.1 This Agreement shall consist of a master portion which shall apply to employees and to foremen who work for Employers while such employees and foremen are engaged in work as described in Article 1, Recognition. There shall be one appendix negotiated by and for each member Union of the Council and one appendix for foremen. The appendices shall apply province-wide.

Article 4

APPENDICES

4.1 The trade appendix applicable to each member Union of the Council will contain those provisions which are not common to all member Unions of the Council, and those provisions will apply to appropriate members of each International Union as provided in its appendix while they are working under the terms of this Collective Agreement. Such appendices shall be deemed to be part of this Agreement.

4.2 Items which can be included in the trade appendices are:
REV

- wages
- classifications
- benefits (pension, welfare and supplementary unemployment benefits)
- hours of work not covered in the master portion of this Agreement
- overtime rate
- premiums
- shift differential rate

- inclement weather pay
- apprenticeship and training programs
- seniority
- supply of tools
- key tradesmen
- protective clothing and equipment
- welding tests
- travel and transportation
- employer's responsibility
- vacation pay
- statutory holidays

4.3 Because a variety of practices exist in the construction industry regarding representation of foremen, an appendix applicable to foremen shall form part of this Agreement. The Foreman Appendix will be negotiated by the executive officers of EPSCA and the Council.

4.4 The "classifications" referred to in Subsection 4.2 appearing in the trade appendices do not establish craft jurisdiction. Such jurisdiction is established in accordance with Articles 10 and 11 of this Collective Agreement.

Article 5

EXECUTIVE COMMITTEES

5.1 The Council and EPSCA shall each appoint an Executive Committee. The Executive Committee of EPSCA shall consist of the Board of Directors and the officers of EPSCA. The Executive Committee of the Council shall consist of the officers of the Council and the senior representative of each Union. The Committees will meet together at least annually to review matters associated with the administration of this Collective Agreement, with the intent that administrative policies will be formulated for consideration by each Executive Committee. The Executive Committees will also meet together to receive reports of joint committees established under this Agreement.

Article 6

PROJECT COMMITTEES

6.1 A Project Committee shall be established for each of the Major Projects and the Construction and Services Division.

6.2 The Committee will be responsible for conducting EPSCA/OACTC concerns for each Major Project or Construction and Services Division and will meet quarterly or as necessary to deal with working and living conditions on the job, excluding matters which may be grieved or negotiated and disputes involving work assignments.

6.3 On the part of EPSCA, each Project Committee shall comprise the appropriate Manager of Construction, General Superintendent, EPSCA Representative, and a like number of contractor representatives elected from among and by the contractors on each particular Major Project or Construction and Services Division. In addition, the officers of EPSCA are ex officio members of this Committee.

6.4 On the part of the Council, each Project Committee shall comprise the appropriate accredited Union Representative for each Major Project or Construction and Service Division, as defined in Article 7, and may include the senior union representatives. In addition, the officers of the Council are ex officio members of this Committee.

6.5 The chairman of each EPSCA Project Committee shall be the Manager of Construction for the appropriate Major Project or Construction and Services Division, as the case may be.

6.6 The chairman of each Council Project Committee shall be appointed by the Council members.

6.7 Chairmanship of the meetings will alternate between the EPSCA Project Committee chairman and the Council Project Committee chairman.

6.8 Answers to questions raised by either party shall be given, in writing, within five (5) working days of the meeting by the party answering the questions to the party who raised the questions.

6.9 When an urgent answer is needed to a problem not relevant to negotiation, grievance or work assignment, the Project Committee will be called to meet within forty-eight (48) hours, where practicable, to deal with the problem. The Committee's answer will be given, in writing, to the party raising the question within forty-eight (48) hours of the meeting.

6.10 EPSCA and the OACTC will set the time and place of all Project Committee meetings.

Article 7

ACCREDITED UNION REPRESENTATIVES

7.1 The senior representative of each Union will designate local union representatives as Accredited Union Representatives to handle the day-to-day administration of this Agreement on the basis of not more than two representatives from each Union for each Major Project and a suitable number for the Construction and Services Division. The Council will notify the General Manager of EPSCA, in writing, of the names of such Union representatives, or alternates in the event of illness or unavailability, so that they may be issued identification cards to permit entry to the site. Such representatives, after identifying themselves to the EPSCA representative upon entering the job site, will be free to observe the progress and conduct of the work and to conduct normal union business. The Council undertakes that these representatives will not hinder or interfere in any way with the said work.

7.2 An Accredited Union Representative may be appointed by the International Representative to be his designate in matters requiring the involvement of the International Representative.

The International Representative will inform EPSCA, in writing, of the name, duration of, appointment and function of such designate.

Article 8

UNION STEWARDS

8.1 Accredited Union Representatives shall inform the appropriate EPSCA Representative and the Employer of the steward, in writing, of the names of all stewards, one of whom shall be designated Chief Steward, as they are appointed and when they cease to act as stewards. A steward, other than a Chief Steward, shall exercise his duties only in respect to employees of his Employer. A Chief Steward, in order to carry out his duties in respect to employees of other than his Employer, shall first involve the EPSCA Representative. A steward shall obtain permission from his immediate supervisor before leaving his work area for union business. Such permission shall not be unreasonably denied.

Except at Bruce Nuclear Power Development (BNPD):

Only in situations where an accredited Union Representative is unable to attend pre-job and/or mark-up meetings, may the Chief Steward be designated and attend, as part of the Chief Steward's duties, on behalf of the accredited union representative.

8.2 REV The appropriate Union shall receive written notice before the employment of a steward is terminated by his Employer, and provided the steward is able to perform the work required, he will be the last employee to be retained by his Employer in a layoff/standoff situation.

8.3 The chief steward will be informed of all scheduled overtime. Where practical, a steward, in accordance with practices set out in individual trade appendices, shall be given the first opportunity to work the overtime providing he is qualified to perform the work.

8.4 No foreman or subforeman shall be permitted to act as a steward.

Article 9

ADVANCE NOTICE

9.1 EPSCA will advise the Council of all new Generation Station Projects and Lines and Stations Construction Projects coming under the provisions of this Agreement for the construction field forces of the Employers.

Upon the request of the Council, EPSCA will convene a prejob conference before work commences to discuss preliminary details of the proposed work to be performed and to establish conditions in accordance with this Agreement for the project. EPSCA will record the minutes of prejob conferences and forward them within fifteen (15) working days to the Council and those affiliates in attendance at the conference.

9.2 Subsequent prejob conferences will be convened by EPSCA before specific portions of work commence to discuss the final details of the work and to establish conditions in accordance with this agreement for that work.

9.3 EPSCA will provide written notice to the Council as far in advance as possible of new work and prejob conferences as noted in Sections 9.1 and 9.2 above. For work of less than one week's duration and requiring five (5) or less employees, prejob meetings must be arranged with as much advance notice as possible by the office of the General Manager of EPSCA, but without formal notice, in writing, unless the prejob meeting has been waived by the parties.

Article 10

WORK ASSIGNMENT

10.1 The jurisdiction of the Unions shall be that jurisdiction established by Agreements between International Unions claiming the work or Decisions of Record recognized by the AFL-CIO for the various classifications and the character of work performed, having regard for the special requirements of thermal, nuclear or hydraulic generation and transmission and transformation construction. An Agreement or Decision of Record is one that is published by the Building and Construction Trades Department, AFL-CIO (Agreement and Decisions Rendered Affecting the Building Industry).

Where no Decision or Agreement applies, the Employer agrees to consider evidence of established practices within the industry when making jurisdictional assignments.

10.2 (a) A markup process will be utilized when an Employer intends to perform work on a project site*. The purpose of this markup process is to indicate to the Council and union affiliates the work which is planned to be carried out by the Employer in order to minimize the potential for jurisdictional disputes.

(b) When work is to be performed on a project site and it meets the following criteria: same employer, same work, same project site, the markup process will not be required. This procedure shall not preclude a Union's right to contest previously disputed work.

(c) When an Employer has work that is less than a 3 week duration and there are ten (10) or fewer employees covered by EPSCA Collective Agreements employed on this specific work, the Council and union affiliates will be notified of the scope of work and the Employer's proposed work assignments. The Unions will have two (2) weeks from the date of notification to submit jurisdictional claims and supporting evidence to the Employer for consideration. The Employer will notify the Council and Union affiliates of the final work assignments prior to the commencement of the work.

(d) All work that does not meet the criteria set out in clauses 10.2(b) or 10.2(c) will be reviewed and assigned at a markup meeting.

* ***For the purposes of this Article, Lines and Stations will be considered a single project site and the Bruce Nuclear Power Development (BNPD) will be considered a single project site.***

(e) EPSCA will provide written notice to the Council as far in advance as possible of markup meetings. The Unions may attend these markup meetings, and every effort will be made to settle questions of jurisdiction before the work is expected to commence.

(f) The Employer who has the responsibility for the work shall make a proposed assignment of the work involved. The Employer shall be responsible for providing copies of proposed assignments to the Council and union affiliates in attendance at the markup meeting. The Employer will specify a reasonable time limit for the Unions involved to submit evidence of their claims. The Employer will evaluate all evidence submitted and make a final assignment of the work involved. This final assignment will be in accordance with the procedural rules established by the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry. The Employer will advise the Unions of the final assignments prior to the work commencing.

(g) The EPSCA representative will record the proposed assignments and jurisdictional claims and forward a copy of them within fifteen (15) working days to the Council and Union affiliates.

(h) The parties recognize that circumstances may arise, particularly with discovery and emergency work, where the process set out above may not be practical or possible, however reasonable effort will be made by the Employer to adhere to the appropriate trade jurisdiction.

Article 11

JURISDICTIONAL DISPUTES

11.1 (a) In the event there is a jurisdictional dispute which cannot be settled on a local basis by the Unions involved, it shall be submitted to the International Unions involved for settlement without permitting it to interfere in any way with the progress of the work at any time.

Any Union shall have the right to elect to pursue or respond to any jurisdictional disputes at the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry. In the event the Union elects to pursue or respond to the jurisdictional disputes at the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry, clauses 11.1(b), 11.2, 11.3, and 11.4 will apply.

In the event another Union (or other Unions) not signatory to this collective agreement has (have) the option to pursue jurisdictional disputes at the Ontario Labour Relations Board, the Council Affiliates shall have the right to pursue or respond to any jurisdictional disputes at the Ontario Labour Relations Board when these Unions are involved in the jurisdictional dispute.

In the event the Union elects to pursue or respond to the jurisdictional dispute at the Ontario Labour Relations Board, clauses 11.1(b), 11.2, 11.3, and 11.4 will NOT apply.

(b) In the event that a jurisdictional dispute arises over a work assignment, the Employer will make an assignment for the work in dispute in accordance with the Procedural Rules and Regulations of the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry. Any Union which protests that a contractor has failed to assign work in accordance with the procedures specified above, shall remain at work and process the complaint through its international office. The parties will settle such jurisdictional dispute in accordance with procedure as outlined by the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry of the Building Trades Department, AFL-CIO or any successor agency of the Impartial Jurisdictional Disputes Board authorized by the Building Trades Department.

11.2 In the event the dispute is not settled by the International Unions involved, it shall then be submitted to the Administrator of the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry for resolution. In the event that the International Office of the Union elects not to file with the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry, EPSCA agrees to file the dispute at the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry at the request of the International Representative of the Union. Those Unions and Employers involved shall advise the Council and EPSCA respectively, in writing, of an intent to submit a jurisdictional dispute to the Impartial Jurisdictional Disputes Board and will identify the work in question. An arbitration decision under the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry will be final and binding to the parties to this Agreement with no further recourse to the Ontario Labour Relations Board on the issue decided by the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry.

11.3 EPSCA shall have direct recourse to the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry when the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry has under its consideration a dispute involving the assignment of work being done by employees who are covered by this Agreement.

11.4 In the event that an arbitration decision under the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry is not rendered within sixty (60) days of the disputed assignment being referred to the Plan, EPSCA and/or the Council Affiliates shall have recourse to the Ontario Labour Relations Board for a decision provided it is processed as a jurisdictional dispute.

11.5 When a jurisdictional dispute exists in the electrical power systems sector, upon request by the International Representative of either of the Unions involved, Employers shall furnish the International Representative with a letter from a duly authorized official of the Employer on the Employer's stationery, stating that the Union requesting the letter was employed on specific types of work on a given project. The Union requesting the information will supply the Employer with the name of the other Union involved in the dispute and the Employer will provide that Union's International Representative with a copy of the letter being given to the requesting Union.

When a jurisdictional dispute exists in the electrical power system sector between Unions and upon written request by the International Representative of the Union, the Employer shall supply the International Representative of the Union involved with a copy of the evidence submitted by the other Union(s) involved along with drawings and/or prints plus a description of the work or process in dispute.

11.6 In the event the Union elects to pursue or respond to the Jurisdictional Dispute at the Ontario Labour Relations Board as governed by 11.4 above, the arbitration board panel appointed by the Ontario Labour Relations Board pursuant to the Act is not authorized to award damages in respect of a mis-assignment of work only in circumstances where the other union(s) involved in the proceedings is (are) equally restricted in their ability to claim for damages. However this clause 11.6 shall not apply where the Jurisdictional Dispute and the mis-assignment of work involves the same employer and the same work, and on the same job previously the subject of a Jurisdictional Dispute before the Ontario Labour Relations Board or the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry.

11.7 The board panel appointed by the Ontario Labour Relations Board will govern its decision pursuant to its normal criteria.

11.8 In the event the Union elects to pursue or respond to the Jurisdictional Dispute at the Ontario Labour Relations Board as governed by 11.4 above, the decision of the panel of the Ontario Labour Relations Board will be final and binding upon the parties to this agreement with no further recourse to the Plan on the issue decided by the Ontario Labour Relations Board.

Article 12

UNION SECURITY

12.1 UNION MEMBERSHIP

(a) Employees

As a condition of employment, all employees covered by this Agreement shall either be members of, or will apply for membership in, the appropriate member Union of the Council within seven (7) days of employment. It shall also be a condition of continued employment that employees maintain their union membership in good standing.

(b) Foremen

As a condition of employment, all foremen covered by this Agreement shall either be members of, or will apply for membership in, the appropriate member Union of the Council within seven (7) days of employment. It shall also be a condition of continued employment that foremen maintain their union membership in good standing.

12.2 CHECKOFF

The Employers shall deduct union initiation fees and dues from their employees' and foremen's wages. Such fees and dues will be deducted weekly or monthly and transmitted to the designated officials of the Unions, on or before the 15th day of the month following the month in which deductions are made, together with full checkoff lists of employees and foremen subject to checkoff.

The Council and member Unions shall indemnify EPSCA and the Employers for any liability arising from the deduction of initiation fees and dues.

The Union, through its International Office, will notify EPSCA, in writing, of the appropriate initiation fees and Union dues and of any changes to such fees and dues. Within three (3) weeks of receipt of an acceptable written notice, any changes to such fees and dues will be implemented. The effective date will be the date of implementation.

The Employer will check off initiation fees on receipt from the Union of authorization signed by the employee.

12.3 The Union may designate dues from any of the following options:
REV

- a fixed dollar amount per month,
- a fixed percentage of vacationable gross earnings (as defined in the applicable Article in each Appendix) per month,
- a fixed cents per hour worked or paid,
- a fixed cents per hour worked or paid plus a fixed dollar amount per week or month,
- a fixed dollar amount per month plus a percentage of vacationable gross earnings.

Regardless of the option selected, the Employer will only remit monies to a single location. Any redistribution is the responsibility of the Union. By mutual agreement with the Union, an Employer may elect to continue current administrative practices relative to the deduction of union dues.

Article 13

EMPLOYMENT

13.1 (a) For purposes of this Article, a geographic area will be established for each Major Project and geographic areas for the Construction and Services Division. The size of these geographic areas will be dependent upon the location of the work and the trade concerned.

(b) The boundaries of the geographic areas will be jointly established at prejob conferences.

13.2 An office will be established by EPSCA, or the Employer with the approval of
REV EPSCA, for each Major Project and the Construction and Services Division. A purpose of this office will be to co-ordinate employment as specified in this Article.

13.3 EPSCA, or the Employer with the approval of EPSCA, and the Council will
REV exchange the names of their representatives in each of the areas described in 13.1(a), who will be responsible for co-operating in the referral and employment of reliable and competent union members.

13.4 REV EPSCA, or the Employer with the approval of EPSCA, will notify the appropriate Unions of future manpower requirements for all employees coming within the scope of this Agreement.

13.5 Where key tradesmen are required, Employers reserve the right to employ and transfer key tradesmen to effectively utilize their special skills, having regard for the special requirements of thermal, nuclear or hydraulic generation projects and transmission and transformation construction.

The employment of key tradesmen and tradesmen employed through the Employment Request Article will be negotiated between EPSCA and the Union for each trade and will be contained in the trade appendices.

13.6 The employment of additional tradesmen and apprentices, excluding key tradesmen and tradesmen employed through the Employment Request Article, shall be carried out on the following basis and sequence:

REV (a) The EPSCA office, or the Employer with the approval of EPSCA, will request the appropriate local union office for tradesmen and apprentices required. The request will include a description of the work, the number of qualified tradesmen and apprentices required, and the name of the Employer for whom the tradesmen and apprentices will be working.

(b) The Union members who are resident in the designated geographic area will be referred by the Union for employment through the EPSCA office. As much as their out-of-work lists will permit, the Unions will supply members on a fan-out basis from the project or work location.

The Employers will either hire such persons or substantiate their reasons, in writing, for not doing so.

The Union will co-operate with the Employer and advise the EPSCA office of the name, address and telephone number of members being referred for work with Lines and Stations Construction as soon as they are known.

(c) If, after a request has been made, the Union is unable to supply sufficient tradesmen and apprentices to meet the manpower requirements of the Employers, the Employers may employ tradesmen and apprentices who are resident within the geographic area. Such tradesmen and apprentices shall comply with the requirements of Article 12 of this Agreement. EPSCA shall promptly notify the Accredited Union Representative, in writing, of the names, addresses, date of hire, social insurance numbers, telephone numbers, job location and classification of the persons hired.

(d) Once the supply of suitable tradesmen and apprentices within the geographic area has been exhausted and additional tradesmen and apprentices are required,

EPSCA will contact the International Representative for the trade concerned, or his designee, in order to determine whether suitable union tradesmen and apprentices are available outside of the geographic area. EPSCA will co-operate in providing employment to such union tradesmen and apprentices on the basis that they be supplied from the nearest location where they are available.

13.7 Notwithstanding the provisions of Articles 13.5 and 13.6, re-employment as required by the Workers Compensation Board shall not be a violation of this collective agreement nor be subject to the provisions of Articles 27 and 28.

Article 14

PAY PROCEDURE

14.1 NORMAL

(a) Employees shall be paid weekly and payment for any given week will be made not later than the sixth working day after the close of the payroll period, but in any event not later than Thursday of the following week. Except as provided for in 14.1(c) employees who are at work on Thursday and are not paid will be paid on Friday. Such employees will be released one (1) hour, with pay, prior to normal quitting time on Friday to enable them to cash their cheque.

(b) Wages shall be paid by the Employers on the job site, before quitting time, in cash or by cheque, payable at par in the locality of the job site. Accompanying each payment of wages shall be a statement, in writing, which can be retained by the employee, setting forth:

(i) the period of time or the work for which the wages are being paid;
(ii) the rate of wages to which the employee is entitled;
(iii) the amount of wages to which the employee is entitled;
(iv) the amount of each deduction from the wages of the employee and the purpose for which each deduction is made;
(v) any allowance or other payment to which the employee is entitled;
(vi) the amount of vacation pay for which the employee is being credited;
(vii) the amount of statutory holiday pay for which the employee is being credited; and
(viii) the net amount of money being paid to the employee.

(c) In cases of inclement weather being declared on payday, employees will receive their pay before leaving the site provided it is available on the site.

14.2 ON TERMINATION

(a) An employee who voluntarily terminates his employment will be provided his final pay on the next regular payday.

(b) An employee who is laid off from a Generation Project will have his final pay and termination documents mailed to his last known address on file with the Employer by Priority Post within five (5) working days of termination. An employee who is laid off from a Lines and Stations construction site will have his final pay and termination documents mailed to his last known address on file with the Employer within eight (8) working days of termination. This does not preclude an employee being issued his final pay and termination documents on the job prior to the five or eight-day period. After 48 hours of notifying the Employer, the Employee will be entitled to four (4) hours at straight time for each normal workday for which there is non-compliance thereafter.

(c) An employee who is discharged shall be provided with his final pay immediately if the Employer's pay facilities are on site or as per 14.2(b) if the Employer's pay facilities are not on site.

(d) Employers will provide one hour's notice of layoff or one hour's pay in lieu of notice to employees who are to be laid off.

When possible, the Employer shall notify the Local Union three (3) days prior to layoff.

(e) When an employee is laid off, he will be paid for a reasonable amount of time by the Employer if he is required to travel or wait unduly before he receives his final pay.

(f) In established cases of long-term sickness, compensable accident or jury duty, an employee will be maintained on the Employer's payroll until his normal date of layoff.

Article 15

CALL-IN PAY

15.1 When an employee is called in to work outside of his normal hours of work, he shall receive a minimum of four (4) hours' work at the appropriate premium rate plus travel allowance where applicable.

If the employee's normal hours of work commence within this four (4) hour period, the employee will be paid premium time from the time he commences work until the start of his normal hours and will revert to his normal hourly rate at the commencement of his normal hours of work.

Article 16

REPORTING PAY

16.1 An employee who reports for work, unless directed not to report the previous day by his Employer, shall receive a minimum of four (4) hours' pay at the applicable rate when he reports for work, but is given no opportunity to work because none is available. This allowance will be paid to an employee if he is requested to report for work for any part of the first half of a shift and an additional four (4) hours on the first and second shifts or two and one-half (2-1/2) hours on the third shift will also be paid if he is requested to report for work for any part of the second half of the same shift. It is not intended by this Article that an employee receive a reporting pay allowance greater than his pay for normal daily hours.

16.2 An employee in receipt of reporting pay shall also receive travel or board allowance, if applicable.

16.3 Notwithstanding that work is available and an employee is able to commence or continue work, the Employer may shut down a job to avoid the possible loss of human life because of an emergency situation such as H_2S leaks, bomb threats, fire, etc., that could endanger the life and safety of an employee. In such cases, employees will be compensated only for the actual time worked.

Article 17

GENERATION PROJECTS DAILY TRAVEL ALLOWANCE AND ROOM AND BOARD

***Article 17* is applicable *to* work at Existing Generating Sites where work involves construction of a new facility (new function) and/or new (additional) generating unit(s) and at New Generating Sites (i.e. Greenfield Work).**

For work at Existing Generating Sites <u>excluding</u> work involving construction of a new facility (new function) and/or new (additional) generating unit(s) please refer to *Article 33 - Modified Provisions of this Construction Agreement.* (Article 33.5)

DAILY TRAVEL ALLOWANCE

17.1 **REV** The daily travel allowance will be paid by the Employers to employees who are not receiving room and board as referred to in Section 17.2, on the following basis:

(a) If an employee lives within twenty (20) radius kilometers* of the project, no travel allowance will be paid.

(b) If an employee lives within 20 to 40 radius kilometers of the project, he shall receive $14.60 per day travel allowance for each day worked or reported for.

(c) If an employee lives within 40 to 56 radius kilometers of the project, he shall receive $17.85 per day travel allowance for each day worked or reported for.

(d) If an employee lives within 56 to 80 radius kilometers of the project, he shall receive $21.10 per day travel allowance for each day worked or reported for.

(e) If an employee lives within 80 to 97 radius kilometers of the project, he shall receive $24.60 per day travel allowance for each day worked or reported for.

(f) If an employee lives greater than 97 radius kilometers from the project and does not qualify for subsistence allowance under Section 17.2 below, he will receive $28.85 per day travel allowance provided he continues to travel greater than 97 radius kilometers for each day worked or reported for.

When an employee is directed to report to a location that involves travelling around a natural barrier, the distance around the natural barrier shall be the shortest distance measured by a series of straight lines. The sum of the distances of these straight lines shall be applied to the ring concept to establish the employee's travel allowance entitlement.

A natural barrier is defined as any obstruction or impediment which creates an unreasonable relationship between the radius kilometers and actual kilometers travelled.

* ***For the purpose of this Article, "radius kilometers" shall be measured from the centre of the turbine hall on each project.***

Bruce G.S. "A", Bruce G.S. "B", and the Bruce Heavy Water Plants will be combined to form the Bruce Complex. Travel allowance for the Bruce complex will be calculated from the midpoint of a straight line joining the centres of the Bruce G.S. "A" and Bruce G.S. "B" turbine halls.

ROOM AND BOARD

17.2 **REV** The following conditions will apply for employees whose regular residence* is more than 97 radius kilometers from the project:

(a) An Employer may supply either:

(i) Room and board in camp or a good standard of board and lodging within a reasonable distance of a project; or

(ii) a subsistence allowance;

subject to Sections 17.2(b), (c) and (d) below.

(b) An employee may exercise his option not to stay in a camp or accept room and board. An employee who exercises this option and qualifies for subsistence allowance shall receive a subsistence allowance of $54.00 per day for each day worked or reported for when employed at a location south of the French River and $68.00 per day for each day worked or reported for when employed at a location north of the French River subject to Sections 17.2(c) and 17.2(d) below.

(c) To qualify for subsistence allowance an employee must maintain temporary accommodation at or near a project. Employees who travel daily to locations beyond 97 radius kilometers from the project will be entitled to $29.60 per day worked or reported for.

(d) An employee employed at the Pickering or Darlington Project who qualifies for a subsistence allowance as provided for above shall receive a subsistence allowance of $38.05 per day for each day worked or reported for.

* ***An employee's 'regular residence' is:***

1. ***The place where the employee maintains a self-contained, domestic establishment (a dwelling house, apartment or similar place of residence where a person generally eats and sleeps and for which he can show proof of financial commitment). This is in contrast to a boarding house facility which is not self-contained; and***

2. ***The employee normally resides in the residence except for those periods of time when, because of the location of the work, the employee is forced to obtain temporary accommodation at that work location.***

17.3 An employee shall not qualify for daily travel allowance or room and board allowance as provided for in Sections 17.1 and 17.2 above when such employee reports for work but does not remain at work for his scheduled daily hours unless excused by an authorized representative of his Employer.

17.4 An employee who maintained a regular residence within the geographic area for the purposes of employment and who relocates outside the geographic area will not be entitled to an increase in travel or room and board allowance entitlement as a result of this relocation.

17.5 The Council recognizes the Employer's right to charge for board and other existing services. The Employer fixes the charge for board and other existing services in camps at $25.00 per day. This will be applied on the following basis:

(a) An employee who remains in camp on a normally scheduled work day on which he does not work will be charged $25.00 per day, unless he is excused from work for a legitimate reason by the project medical attendant or an authorized representative of his Employer.

(b) An employee who is absent from work on Friday without approval and who remains in camp and who is still absent from work on the following Monday without approval will be charged for room and board for Friday, Saturday, Sunday and Monday.

(c) An employee who is absent from work without approval on Friday but who works the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

(d) An employee who works the Friday and is absent from work without approval on the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

Article 18

LINES AND STATIONS CONSTRUCTION
DAILY TRAVEL ALLOWANCE AND ROOM AND BOARD

***Article 18* is applicable *to all* work on Lines & Stations at both existing and new sites**

DAILY TRAVEL ALLOWANCE

18.1 **REV** The daily travel allowance will be paid by the Employers to their employees who are not living in camp or receiving a subsistence allowance as referred to in Section 18.3 on the following basis:

(a) Effective May 1, 1996, if an employee lives within forty (40) radius kilometers of the work location or declared assembly point, no travel allowance will be paid.

(b) If an employee lives within 40 to 56 radius kilometers of the work location or declared assembly point, he shall receive $17.60 per for each day worked or reported for.

(c) If an employee lives within 56 to 80 radius kilometers of the work location or declared assembly point, he shall receive $21.10 per day for each day worked or reported for.

(d) If an employee lives within 80 to 97 radius kilometers of the work location or declared assembly point, he shall receive $24.60 per day for each day worked or reported for.

(e) If an employee lives greater than 97 radius kilometers from the work location or declared assembly point, and does not qualify for subsistence allowance under Section 18.3 below, he shall receive $27.85 per day provided he continues to travel greater than 97 radius kilometers daily for each day worked or reported for.

When an employee is directed to report to a location that involves travelling around a natural barrier, the distance around the natural barrier shall be the shortest distance measured by a series of straight lines. The sum of the distances of these straight lines shall be applied to the ring concept to establish the employee's travel allowance entitlement. A natural barrier is defined as any obstruction or impediment which creates an unreasonable relationship between radius kilometers and actual kilometers travelled.

18.2 The Employer reserves the right to base daily travel allowance on the distance in radius kilometers from where an employee lives to either the work location or declared assembly point, depending on where the employee is directed to report.

ROOM AND BOARD

18.3 **REV** The following conditions will apply for employees whose regular residence* is more than 97 radius kilometers from the work location:

(a) An employer may supply either:

(i) room and board in camp or a good standard of board and lodging; or

(ii) a subsistence allowance;

subject to Sections 18.3(b) and (c) below.

(b) An employee may exercise his option not to stay in a camp or accept room and board. An employee who exercises this option and qualifies for subsistence allowance shall receive a subsistence allowance of $67.00 per day for each day worked or reported for subject to Section 18.3(c) below.

* ***An employee's 'regular residence' is:***

1. ***The place where the employee maintains a self-contained, domestic establishment (a dwelling house, apartment or similar place of residence where a person generally eats and sleeps and for which he can show proof of financial commitment). This is in contrast to a boarding house facility which is not self-contained; and***

2. ***The employee normally resides in the residence except for those periods of time when, because of the location of the work, the employee is forced to obtain temporary accommodation at that work location.***

3. ***For metro areas (Toronto and Hamilton) the calculation of distance shall be from the employee's regular residence.***

4. ***For all other areas, the calculation of distance shall be based on the location of the city or town hall of the municipality where an employee maintains a self-contained domestic establishment described above. In those municipalities where a city or town hall does not exist, then the post office serving his regular residence will apply.***

(c) To qualify for subsistence allowance an employee must maintain temporary accommodation at or near the work location. Employees who travel daily to locations beyond 97 radius kilometers from the project will be entitled to $27.85 per day for each day worked or reported for.

18.4 An employee shall not qualify for daily travel allowance or room and board allowance as provided for in Sections 18.1 and 18.3 above, when such employee reports for work but does not remain at work for his scheduled daily hours unless excused by an authorized representative of his Employer. Such permission shall not be unreasonably denied.

18.5 An employee who maintained a regular residence within the geographic area for the purposes of employment and who relocates outside the geographic area will not be entitled to an increase in travel or room and board allowance entitlement as a result of this relocation.

18.6 The Council recognizes the Employer's right to charge for board and other existing services. The Employer fixes the charge for board and other existing services in camps at $25.00 per day. This will be applied on the following basis:

(a) An employee who remains in camp on a normally scheduled workday on which he does not work will be charged $25.00 per day unless he is excused from work by an authorized representative of his Employer.

(b) An employee who is absent from work on Friday without approval and who remains in camp and who is still absent from work on the following Monday without approval will be charged for room and board for Friday, Saturday, Sunday and Monday.

(c) An employee who is absent from work without approval on Friday but who works the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

(d) An employee who works the Friday and is absent from work without approval on the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

Article 19

LINES AND STATIONS CONSTRUCTION DAILY TRAVEL TIME

19.1 All travel time will be outside of normal working hours.

19.2 (a) An employee will be paid his straight-time rate for all time spent travelling from his assembly point to his work location on normal working days.

An employee will be paid premium time for all time spent travelling from his assembly point to his work location on days other than normal working days.

(b) An employee will travel up to a maximum of one hour on his own time when returning from his work location to his assembly point. An employee will be paid his straight-time rate for all time spent travelling in excess of one hour.

19.3 All time in excess of one hour spent travelling from the work location to the assembly point on non-working days shall be compensated for at the appropriate premium rates of pay.

19.4 The Employer will supply transportation between the assembly points and work locations.

Article 20

STANDOFF

REV
20.1 When unable to proceed with his work, an Employer may elect to Standoff part or all of his crew. The parties agree Standoff is not intended to circumvent the layoff procedure.

The Employer reserves the right to Standoff its employees without pay up to a maximum of ten (10) consecutive working days. Notification of Standoff will be made by the Employer during normal working hours. A Record of Employment will be issued upon the commencement of the Standoff. No travel allowance will be paid to an employee for the Standoff period.

20.2 An employee who qualifies for subsistence allowance and who is placed on Standoff will be paid subsistence allowance up to a maximum of ten (10) consecutive working days.

20.3 If Standoff continues beyond ten (10) consecutive working days, an employee, at his option, may elect to remain on Standoff for an additional twenty (20) consecutive working days or be removed from Standoff. The Employer retains recall rights on employees electing to continue on Standoff. Subsistence allowance will cease after ten (10) consecutive working days on Standoff.

20.4 If an employee elects layoff beyond the tenth (10th) consecutive working day, it shall be carried out in accordance with the terms of the Layoff/Seniority provisions of the appropriate Trade Appendix of this Agreement. An employee laid off will be issued a Record of Employment form on his date of layoff indicating "Layoff – Shortage of Work". The Employer does not retain recall rights if the employee elects Layoff.

20.5 Standoff shall only continue beyond thirty (30) consecutive working days with the mutual consent of the Employer and the Union, in writing.

- For the purpose of this Article, when working on a 4 x 10 hour shift arrangement, the following will apply:

- eight (8) scheduled working days will be considered the equivalent of ten (10) consecutive working days.

- sixteen (16) scheduled working days will be considered the equivalent of twenty (20) consecutive working days.

- twenty-four (24) scheduled working days will be considered the equivalent of thirty (30) consecutive working days.

Article 21

REST PERIOD

21.1 For employees working normal hours, a fifteen (15) minute rest period will be allotted, at the time and in a reasonable location as directed by the Employer, for each half shift worked. Where a half shift is less than four (4) hours, there shall be no rest period.

21.2 For employees required to work overtime, a ten (10) minute rest period will be allotted prior to the end of the normal shift before commencing overtime work.

21.3 For employees working overtime, a fifteen (15) minute rest period will be allotted, at the time directed by the Employer, after each two hours of overtime worked.

Article 22

LUNCHROOM FACILITIES

22.1 Adequately heated accommodation separate from changerooms and washrooms shall be provided by the Employer on each project when necessary and where such accommodation can be reasonably provided for. Such accommodation shall be weatherproof and shall be kept reasonably clean. A table and sufficient benches or seats for the employees on the job shall be provided in the accommodation. Trailerized or portable accommodation shall include tables, benches, light, heat maintained at a minimum sixty-eight (68) degrees Fahrenheit, proper access and egress, and shall not be used for material storage.

Article 23

MEALS ON OVERTIME

23.1 If an employee is notified during the time he is working that he will be required to continue working for more than two (2) hours past the normal quitting time of the first or second shifts or for more than three and one-half (3-1/2) hours beyond the normal quitting time of the third shift, the Employer will provide a free meal to the employee after approximately two (2) hours of overtime worked (first or second shifts) or three and one-half (3-1/2) hours of overtime worked (third shift) and for each four (4) hours of overtime worked thereafter. The employee will be allowed thirty (30) minutes paid at the straight time rate to eat each meal at the time directed by the Employer. When a paid meal period overlaps a rest period, the paid meal period will supplant the rest period. The Employer will supply a hot meal when possible. When a free meal is not provided, the Employer will pay the employee one-half (1/2) hour at his appropriate rate.

To qualify for the above-noted on a Friday for work on the first and second shifts, an employee will be required to work for more than four (4) hours beyond the normal quitting time of his shift.

The above-noted is not applicable to the first eight (8) hours worked on Saturdays, Sundays or Statutory Holidays for employees who normally work the first or second shifts, nor is it applicable to the first six and one-half (6-1/2) hours worked on Sundays or recognized holidays for employees who normally work the third shift.

23.2 Where an employee has been notified the previous day, no meal will be provided but the employee will be allowed thirty (30) minutes paid at the straight time rate to eat each meal at the time directed by the Employer.

Article 24

TOOLS AND CLOTHING

24.1 An employee shall be required to provide himself with the ordinary hand tools of his trade, based on established trade union practices at the time of signing of this Agreement. EPSCA and the Council shall establish an appropriate tool list for each trade. Each Employer will provide, insofar as is practical, separate facilities for storing the tools of each trade, but shall not be held responsible for losses, except as noted hereunder:

(a) When personal tools valued in excess of $15.00 are lost due to fire, the Employer will consider the full estimated value on the merit of each case in determining replacement or payment. This will include only personal tools that a tradesman is required to have to perform his normal duties with his Employer.

(b) Each Employer will compensate his employees for ordinary hand tools and clothing lost by theft from locked storage provided by him for his employees. Claims must be submitted, in writing, and must provide substantiating evidence of forcible entry to locked storage. Payment or replacement for personal clothing lost by theft on the work site shall be limited to clothing that a tradesman is required to have to perform his normal duties with his Employer.

(c) In the event of loss by fire at an Employer's camp or on the work site in an Employer designated storage area, replacement or payment of the full estimated value in excess of $15.00 but not exceeding $500.00 for the loss of personal clothing will be made by the Employer. Payment or replacement for personal clothing lost by fire on the work site shall be limited to clothing that a tradesman is required to have to perform his normal duties with his Employer.

24.2 An employee who has obtained tools from his Employer shall be allowed sufficient time, in the opinion of Management, to return such tools to his Employer during working hours. An employee receiving tools from his Employer shall be held responsible for the return of such tools in good condition, subject to normal wear and tear. On layoff, an employee will be allowed reasonable time to return tools to his Employer.

24.3 Gang tools as described in the appendices shall be the responsibility of the Employer.

24.4 Employees working in a radiation area, in plastic suits or replacement material of the fully enveloping type with an independent air supply, will receive $8.00 per day. A day for the purposes of this item shall be defined as any period up to twelve (12) hours.

Article 25

APPRENTICESHIP AND TRADES TRAINING

25.1 Apprenticeship and other training programs should be instituted as required to maintain an adequate skilled and competent work force to perform work within the electrical power systems sector by apprenticeship training programs, upgrading programs and retraining programs.

25.2 Where a ratio of apprentices to journeymen employed has been established in a trade appendix, this ratio shall be maintained.

Article 26

HOURS OF WORK

Article 26 is applicable _to_ work at Existing Generating Sites where work involves construction of a new facility (new function) and/or new (additional) generating unit(s) and at New Generating Sites (i.e. Greenfield Work).

For work at Existing and New Lines & Stations Sites and at Existing Generating Sites excluding work involving construction of a new facility (new function) and/or new (additional) generating unit(s) please refer to _Article 33 - Modified Provisions of this Construction Agreement._ (Article 33.6)

26.1 The normal weekly hours of work for all employees of Employers covered by this Agreement shall be thirty-eight (38), except as described in Sections 26.2, 26.3, 26.4, 26.5, 26.6 and 26.7.

The weekly hours shall be worked in four (4) eight (8) hour days, Monday to Thursday inclusive, with the remaining six (6) hours to be worked on Friday.

26.2 The hours of work for such work as driveway and parking lot construction, railroad construction, landscaping, tunnelling, precast concrete erection, fencing or demolition, shall be as established in applicable local agreements for the class and character of work.

An applicable local agreement shall be an agreement between a local of any union signatory to this Agreement and a builders' exchange, contractors' association or contractor applicable in the locality of the project for the class and character of the work.

26.3 The weekly hours of work for structural steel erection shall be forty (40) hours made up of five (5) days of eight (8) hours each, Monday to Friday inclusive.

26.4 The weekly hours of work for site preparation and earth dams shall be 45 hours made up of five (5) days of nine (9) hours each, Monday to Friday inclusive.

26.5 The weekly hours of work for Watchmen shall be as set forth in the Laborers' International Union of North America Appendix, attached hereto.

26.6 The weekly hours of work for Operating Engineers engaged in tunnel work shall be as set forth in the International Union of Operating Engineers' Appendix attached hereto.

26.7 The normal weekly hours of work for employees working the third shift shall be thirty-two and one-half (32-1/2), made up of five (5) days of six and one-half (6-1/2) hours each.

The hours of work at all Lines and Stations Construction locations and Miscellaneous Projects (excluding Lakeview and R.L. Hearn Generating Stations), except those set forth in Sections 26.2 and 26.4, shall be 40 hours per week made up of five (5) days of eight (8) hours each, Monday to Friday inclusive. The normal daily hours are to be worked between 7:30 am and 5:00 pm.

A Miscellaneous Project is any work undertaken by Ontario Hydro's Generation Projects Division which will require less than one year to complete and comprise a total project work force of not more than one hundred men at one time.

26.8 PROJECT DAILY HOURS

(a) Day Work Only

The normal starting time for day work hours shall be 8:00 a.m. By mutual agreement between EPSCA and the Council, the starting time may be varied by one-half hour either way. This variance will be established at the prejob conference or while the job is in progress.

(b) Shift Work

(i) Shift work will be deemed to be established providing there are at least four consecutive days of shifts to be worked excluding Saturdays, Sundays and Statutory Holidays.

(ii) The normal starting time for day shift hours shall be the same as the day work hours described in Section 26.8(a).

(iii) Where shift work is established, the normal shift hours for the first (day) and second shifts shall be the same as the day hours. The third shift normal hours shall be six and one-half (6-1/2) hours' work, to be worked between 1:00 a.m. and 8:00 a.m., with an unpaid one-half (1/2) hour lunch period.

(iv) On Monday to Thursday inclusive, the second shift hours shall start at 4:30 p.m. or a variance of one-half hour either way, to coincide with the end of the day shift. On Friday, the second shift hours may start at 4:30 p.m. or at the end of the day shift.

(v) The third shift to start at 1:00 a.m. Monday.

(vi) Where the third shift is established as starting at 1:00 a.m. Monday, it shall be worked between 1:00 a.m. and 8:00 a.m. Monday, Tuesday, Wednesday, Thursday and Friday.

(c) Hours of Work - Special Circumstances

It may be necessary from time to time to vary the hours of work established in Sections 26.8(a) and (b). Any amendments to the hours of work will be established by mutual agreement between EPSCA and the Council at the prejob conference or while the job is in progress.

26.9 The shift rate will be based on the day in which the shift begins.

26.10 LUNCH PERIODS FOR MAJOR PROJECTS, AND CONSTRUCTION AND SERVICES DIVISION

A lunch period will be given no earlier than four (4) hours and no more than five (5) hours after the start of the shift and will be one-half (1/2) hour in duration.

A lunch period will be given no earlier than three and one-half (3-1/2) hours and no more than five (5) hours after the start of the third shift and will be one-half (1/2) hour in duration.

26.11 When an employee is required to return to work without an eight (8) hour break, all work performed shall be at the premium rate until such time as the employee receives an eight (8) hour break. This provision does not apply when a change in an employee's normal shift (as defined in this Article) occurs or to call-in situations.

Article 27

GRIEVANCE PROCEDURE

27.1 Grievances within the meaning of the grievance and arbitration procedure shall consist only of disputes about the interpretation or application of particular clauses of this Agreement and about alleged violations of this Agreement. In the event of any dispute concerning the meaning or application of any provision of this Agreement or a dispute concerning an alleged violation of this Agreement, there shall be no suspension or disruption of work, but such dispute shall be treated as a grievance and shall be settled, if possible, by EPSCA and the appropriate Union. In the interests of expediting the procedure, the parties shall process grievances in the following manner:

The grievance procedure and arbitration procedure in Article 27 do not apply to jurisdictional disputes.

27.2 PRELIMINARY DISCUSSION

Disputes arising out of the interpretation or alleged violation of this Agreement should, if possible, be settled by discussion between the employee and/or his steward and the employee's supervisor. If the employee affected is a foreman, the preliminary discussion will be between the Accredited Union Representative and the foreman's supervisor.

27.3 FIRST STEP

If a dispute cannot be resolved by this method, the Accredited Union Representative for the trade concerned may file a formal grievance on the prescribed form with the Manager of Construction or the Field Construction Manager within fifteen (15) working days of the alleged grievous act.

Within ten (10) working days of the filing of the grievance, the Manager of Construction or Field Construction Manager shall investigate the grievance and convene a First Step meeting which he or the Accredited Union Representative considers necessary to resolve it.

The Management Committee shall be comprised of the Manager of Construction or the Field Construction Manager or their designate plus at least one representative of the Employer named in the grievance. The Union Committee shall include at least two persons, one of whom shall be the Accredited Union Representative for the grievor.

The Manager of Construction or Field Construction Manager shall give his reply on the prescribed form to the Accredited Union Representative within five (5) working days from the date of the First Step meeting.

Copies of completed grievance forms signed by the appropriate parties shall be filed by the Manager of Construction or the Field Construction Manager with the General Manager of EPSCA. The Accredited Union Representative for the grievor will file a copy with the Council.

The EPSCA Representative will send a copy of any signed first step grievance settlement between the Accredited Union Representative and EPSCA to the OACTC and EPSCA office.

27.4 SECOND STEP

Within ten (10) working days after the disposition has been issued under the First Step of this procedure, the Accredited Union Representative may refer the grievance on the prescribed form to EPSCA's Grievance Officer. A copy of the grievance form shall be forwarded by the Accredited Union Representative to the International Representative of the Union.

The EPSCA Grievance Officer shall investigate the grievance and convene a meeting which he or the International Representative considers necessary to resolve it and give his reply on the prescribed form to the International Representative of the Union within five (5) working days from the receipt of the grievance form which was completed at First Step.

The Management Committee shall comprise the EPSCA Grievance Officer plus two other Management Representatives, one of whom shall be a representative of the Employer named in the grievance. The Union Committee shall be comprised of at least the International Representative or his designate for the grievor. If the International Representative elects to appoint a designate, he shall inform EPSCA, in writing, of the name of the designate and the duration of appointment.

27.5 EPSCA OR COUNCIL GRIEVANCES

The processing of EPSCA or Council grievances will begin at the Second Step. EPSCA or the Council may submit either policy or specific grievances. Such policy or specific grievances shall be submitted within thirty (30) days of the alleged grievous act.

27.6 TIME LIMITS

The time limits as to both documents and procedures set out in the above sections shall be complied with by the parties to this Agreement provided, however, that the parties may mutually agree, in writing, in respect to an extension or waiver of any of the time limits imposed. Where no answer is given within the time limits specified in the grievance procedure, the employee concerned, the Union, the Council or EPSCA shall be entitled to submit the grievance to the next step of the grievance procedure. Any grievance not processed within the time limits specified in the grievance procedure shall be deemed to have been settled and ineligible for arbitration.

27.7 Alleged unjustified termination, discharge, suspension or disciplinary action may be grieved beginning at First Step.

27.8 GRIEVANCE FACILITIES

EPSCA shall provide the necessary facilities for all grievance meetings.

Article 28

ARBITRATION

28.1 If any dispute about the interpretation or application of particular clauses of this Agreement or about an alleged violation of this Agreement cannot be settled through the grievance procedure outlined in Article 27, the matter may be submitted within thirty (30) days of its failure of settlement by grievance procedure by either EPSCA or the Council to a Board of Arbitration for adjudication.

The party desiring to submit the dispute to arbitration shall notify the other party, in writing, of its desire and the notice shall contain the name of the first party's nominee to an arbitration board. The recipient of the notice shall, within five (5) working days, inform the other party of the name of its nominee to the arbitration board. The two nominees so selected shall, within ten (10) working days of the appointment of the second of them, appoint a third person who shall be the Chairman. If the recipient of the notice fails to appoint a nominee, or if the nominees fail to agree upon a Chairman, the appointment shall be made by the Minister of Labour for Ontario upon the request of either party. The arbitration board, when selected or appointed, will proceed as soon as practicable to hear and determine the dispute and it shall issue a decision which is final and binding upon the parties and upon their respective members. The decision of a majority is the decision of the arbitration board, but if there is no majority, the decision of the Chairman governs.

28.2 The arbitration board shall have no power to add to or subtract from or modify any of the terms of this Agreement. The arbitration board shall not substitute its discretion for that of the parties except where the board determines that an employee has been discharged or otherwise disciplined for cause when this Agreement does not contain a specific penalty for the infraction that is the subject matter of the arbitration. In such cases, the arbitration board may substitute such other penalty for the discharge or discipline as to the arbitration board seems just and reasonable in all circumstances. The arbitration board shall not exercise any responsibility or function of the parties. The arbitration board shall not deal with any matter not contained in the original statement of grievance filed by the party referring the matter to arbitration.

28.3 In arbitration proceedings, each party shall pay the fees and expenses of its nominee, whether appointed by the party or by the Minister of Labour for Ontario, and the fees and expenses of the Chairman shall be shared equally by the parties.

28.4 The time limits as to both documents and procedure set out in the above sections shall be observed by the parties to this Agreement provided, however, that the parties may mutually agree, in writing, in respect to an extension or waiver of any of the time limits imposed.

Article 29

NO STRIKE - NO LOCKOUT

29.1 There shall be no strikes or lockouts so long as this Agreement continues to operate.

Article 30

ASSOCIATION FUND

30.1 Each Employer bound by this agreement shall contribute to the Electrical Power Systems Construction Association Fund, the amount specified on the wage schedules attached hereto for each hour worked by each employee covered by this agreement.

The Employer shall remit such contribution together with the supporting information as required on the reporting forms.

EPSCA shall indemnify the Council and member Unions for any liability arising from an Employer's failure to remit such contributions.

Article 31

RADIATION WORK

31.1 (a) Local Union to be provided with a copy of Ontario Hydro Radiation Protection Regulations and any revisions.

(b) Local Union to be provided with a copy of Ontario Hydro Radiation Protection Procedures and any revisions.

(c) Each employee will have access to his personal radiation exposure record.

(d) Long-term employees who reach their exposure limit will be given alternate employment until they can resume radiation work.

(e) Short-term employees will be given a guaranteed period of employment at their time of hire.

Article 32

ABORIGINAL CONTENT COMMITMENT

Where an aboriginal commitment has been established on a project, the Union will co-operate in meeting the content commitments.

For a project, or jobs within a project, that are less than $100,000 field labour, and have aboriginal content commitments, the terms of the collective agreement will not apply to those aboriginal content commitments.

Article 33

MODIFIED PROVISIONS OF THIS CONSTRUCTION AGREEMENT

33.1 These provisions will apply to:

(a) all work on Lines and Stations, and

(b) all work on existing generating sites except the construction of:

- a new facility which provides a new function
- a new (i.e. additional) generating unit

33.2 Definitions:

Facility	Something that is built composed of multi-systems which serves a specific function
Function	Examples - Generation, Administration, Warehousing, Heavy Water Production, Flue Gas Desulphurization, Tritium Removal, Site Services (e.g. Shops)

33.3 Dispute Resolution Process

A dispute as to whether the 'Modified Provisions of this Construction Agreement' apply to the construction of a new facility will be referred to the Executive Committee for resolution and the Executive Committee will meet within 5 (five) working days. If the Executive Committee is unable to resolve the dispute, the dispute will be referred to a single arbitrator within 10 (ten) working days for a final and binding resolution. The arbitrator shall give an oral decision within 5 (five) working days, and a written decision, if requested, within 20 (twenty) working days.

33.4 All terms of this collective agreement shall apply to work covered by this Article, with the exception of Article 17 - Generation Projects Daily Travel Allowance and Room and Board and Article 26 - Hours of Work.

33.5 GENERATION PROJECTS DAILY TRAVEL ALLOWANCE AND ROOM AND BOARD

DAILY TRAVEL ALLOWANCE

33.5.1 **REV** The daily travel allowance will be paid by the Employers to employees who are not receiving room and board as referred to in Article 33.5.2, on the following basis:

(a) Effective May 1, 1996, if an employee lives within forty (40) radius kilometers* of the project, no travel allowance will be paid.

(b) If an employee lives within 40 to 56 radius kilometers of the project, he shall receive $17.85 per day travel allowance for each day worked or reported for.

(c) If an employee lives within 56 to 80 radius kilometers of the project, he shall receive $21.10 per day travel allowance for each day worked or reported for.

(d) If an employee lives within 80 to 97 radius kilometers of the project, he shall receive $24.60 per day travel allowance for each day worked or reported for.

(e) If an employee lives greater than 97 radius kilometers from the project and does not qualify for subsistence allowance under Section 33.5.2 below, he will receive $28.85 per day travel allowance provided he continues to travel greater than 97 radius kilometers for each day worked or reported for.

When an employee is directed to report to a location that involves travelling around a natural barrier, the distance around the natural barrier shall be the shortest distance measured by a series of straight lines. The sum of the distances of these straight lines shall be applied to the ring concept to establish the employee's travel allowance entitlement.

A natural barrier is defined as any obstruction or impediment which creates an unreasonable relationship between the radius kilometers and actual kilometers travelled.

* ***For the purpose of this Article, "radius kilometers" shall be measured from the centre of the turbine hall on each project.***

Bruce G.S. "A", Bruce G.S. "B", and the Bruce Heavy Water Plants will be combined to form the Bruce Complex. Travel allowance for the Bruce complex will be calculated from the midpoint of a straight line joining the centres of the Bruce G.S. "A" and Bruce G.S. "B" turbine halls.

ROOM AND BOARD

33.5.2 **REV** The following conditions will apply for employees whose regular residence* is more than 97 radius kilometers from the project:

(a) An Employer may supply either:

(i) Room and board in camp or a good standard of board and lodging within a reasonable distance of a project; or

(ii) a subsistence allowance;

subject to Sections 33.5.2(b), (c) and (d) below.

(b) An employee may exercise his option not to stay in a camp or accept room and board. An employee who exercises this option and qualifies for subsistence allowance shall receive a subsistence allowance of $54.00 per day for each day worked or reported for when employed at a location south of the French River and $68.00 per day for each day worked or reported for when employed at a location north of the French River subject to Sections 33.5.2(c) and 33.5.2(d) below.

(c) To qualify for subsistence allowance an employee must maintain temporary accommodation at or near a project. Employees who travel daily to locations beyond 97 radius kilometers from the project will be entitled to $29.60 per day worked or reported for.

(d) An employee employed at the Pickering or Darlington Project who qualifies for a subsistence allowance as provided for above shall receive a subsistence allowance of $38.05 per day for each day worked or reported for.

* ***An employee's 'regular residence' is:***

1. ***The place where the employee maintains a self-contained, domestic establishment (a dwelling house, apartment or similar place of residence where a person generally eats and sleeps and for which he can show proof of financial commitment). This is in contrast to a boarding house facility which is not self-contained; and***

2. ***The employee normally resides in the residence except for those periods of time when, because of the location of the work, the employee is forced to obtain temporary accommodation at that work location.***

33.5.3 An employee shall not qualify for daily travel allowance or room and board allowance as provided for in Sections 33.5.1 and 33.5.2 above when such employee reports for work but does not remain at work for his scheduled daily hours unless excused by an authorized representative of his Employer.

33.5.4 An employee who maintained a regular residence within the geographic area for the purposes of employment and who relocates outside the geographic area will not be entitled to an increase in travel or room and board allowance entitlement as a result of this relocation.

33.5.5 The Council recognizes the Employer's right to charge for board and other existing services. The Employer fixes the charge for board and other existing services in camps at $25.00 per day. This will be applied on the following basis:

(a) An employee who remains in camp on a normally scheduled work day on which he does not work will be charged $25.00 per day, unless he is excused from work for a legitimate reason by the project medical attendant or an authorized representative of his Employer.

(b) An employee who is absent from work on Friday without approval and who remains in camp and who is still absent from work on the following Monday without approval will be charged for room and board for Friday, Saturday, Sunday and Monday.

(c) An employee who is absent from work without approval on Friday but who works the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

(d) An employee who works the Friday and is absent from work without approval on the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

33.6 HOURS OF WORK

The effective date of this Article is to be determined by the Employer. The Employer agrees to notify the Council prior to implementing this Hours of Work Article.

33.6.1 <u>One (1) or Two (2) Shift Operation</u>
REV

The weekly hours of work shall consist of forty (40) hours, worked between Monday and Friday, for all employees of Employers covered by this agreement and working on a one (1) or two (2) shift operation except as described in Sections 33.6.2, 33.6.3, 33.6.4, 33.6.5 and 33.6.6.

The weekly hours of work for all employees may be arrived at by having the employees work four (4) consecutive ten-hour shifts, either Monday-Thursday or Tuesday-Friday but not concurrently on the same project, or by having the employees work five (5) consecutive eight-hour shifts. On ratification of this agreement, each project site will notify the Local Union of the weekly hours of work that the site has elected to work (4 days x 10 hours per day or 5 days x 8 hours per day). Weekly hours of work will be established for a minimum period of thirty (30) days. If a project site intends to change the weekly hours of work, a minimum of fifteen (15) days written notice shall be sent to the Local Union.

The start time for the day shift shall be 8:00 AM with a possible one (1) hour variance either way. The start time for the afternoon shift shall be immediately following the day shift or within one-half hour either way to coincide with the end of the day shift.

The shift differential for those employees working the afternoon shift when a two shift operation has been established by the Employer will be one-seventh (1/7) for scheduled hours worked on that shift.

Three (3) Shift Operation

When a three (3) shift operation is established by the Employer, the following conditions will apply:

Those employees working on the day shift shall work eight (8) hours per shift at the straight time rate.

Those employees working on the afternoon shift shall work seven and one-half (7 1/2) hours per shift at the straight time plus the appropriate shift differential as set out in the trade appendices.

Those employees working on the night shift shall work seven (7) hours per shift plus the appropriate shift differential as set out in the trade appendices.

33.6.2 The hours of work for such work as driveway and parking lot construction, railroad construction, landscaping, tunnelling, precast concrete erection, fencing or demolition, shall be as established in applicable local agreements for the class and character of work.

An applicable local agreement shall be an agreement between a local of any union signatory to this Agreement and a builders' exchange, contractors' association or contractor applicable in the locality of the project for the class and character of the work.

33.6.3 The weekly hours of work for structural steel erection shall be forty (40) hours made up of five (5) days of eight (8) hours each, Monday to Friday inclusive.

33.6.4 The weekly hours of work for site preparation and earth dams shall be 45 hours made up of five (5) days of nine (9) hours each, Monday to Friday inclusive.

33.6.5 The weekly hours of work for Watchmen shall be as set forth in the Laborers' International Union of North America Appendix, attached hereto.

33.6.6 The weekly hours of work for Operating Engineers engaged in tunnel work shall be as set forth in the International Union of Operating Engineers' Appendix attached hereto.

33.6.7 Shift Change

A shift will be deemed to be established providing at least four (4) consecutive days of a shift are to be worked excluding Saturdays, Sundays and recognized holidays. If an employee is removed from their scheduled shift prior to completing four (4) consecutive shifts, the employee will be paid shift differential for the balance of the four (4) consecutive shifts that would have been worked had the employee not been reassigned.

33.6.8 It may be necessary from time to time to vary the hours of work established in this Article. Any amendments to the hours of work will be established by mutual agreement between EPSCA and the Council.

33.6.9 LUNCH PERIODS FOR MAJOR PROJECTS, AND CONSTRUCTION AND SERVICES DIVISION

A lunch period will be given no earlier than four (4) hours and no more than five (5) hours after the start of the shift and will be one-half (1/2) hour in duration.

A lunch period will be given no earlier than three and one-half (3-1/2) hours and no more than five (5) hours after the start of the third shift and will be one-half (1/2) hour in duration.

33.6.10 When an employee is required to return to work without an eight (8) hour break, all work performed shall be at the premium rate until such time as the employee receives an eight (8) hour break. This provision does not apply when a change in an employee's normal shift (as defined in this Article) occurs or to call-in situations.

Article 34

TERM OF AGREEMENT

34.1 REV Subject to the contract reopener provision of this Article, this Agreement shall continue in full force and effect for a term of twenty-six (26) years, from the first day of May, 1974 to the thirtieth day of April, 2000, inclusive, and thereafter it shall be considered automatically renewed for successive periods of two (2) years unless, at least sixty (60) days prior to the end of any two (2) year period, either party serves written notice upon the other that it desires termination, revision or modification of any provision or provisions of this Agreement.

The provisions of the contract reopener will not apply for the term beginning May 1, 1998 until April 30, 2000.

34.2 IN-TERM MEETINGS

This Agreement may be re-opened at the request of EPSCA or the Union to discuss appendix items only commencing the second year of operation of the Agreement.

The parties will meet for negotiations when written notice of the amendment or amendments requested has been submitted at least thirty (30) days prior to an eligible date for a negotiating meeting. Proposed amendments received less than thirty (30) days before an eligible date for a negotiating meeting will be dealt with at the next eligible date for a negotiating meeting.

34.3 Proposed amendments to the master portion of this Agreement shall be negotiated by the Senior Bargaining Committees which are the executive officers of EPSCA and the Council respectively.

34.4 Proposed amendments to the Appendices to this Agreement shall be considered by the Trade Bargaining Committees named by the Board of Directors of EPSCA and the Officers of the Council. Amendments agreed upon through Trade Appendix negotiations are subject to approval by the EPSCA Board of Directors and the Officers of the Council.

34.5 The proposed amendment or amendments agreed upon, in writing, at the bargaining sessions provided above will be incorporated as a revision on the date agreed to by the EPSCA Board of Directors and the Officers of the Council.

34.6 CONTRACT REOPENER

If the parties fail to reach settlement through the process of negotiation described above, the proposed amendment or amendments may be submitted by either party to the other sixty (60) days prior to the second or each succeeding anniversary date of the Agreement. When such a request is submitted by either party, the agreement will automatically become open at such anniversary date for negotiation of the submitted amendment or amendments. If agreement cannot be reached, the parties may refer the matter to conciliation and the provisions of The Labour Relations Act shall apply as it would on the final anniversary date. All provisions of this Agreement will continue to operate until:

(a) agreement is reached on the disputed provision or provisions, or

(b) until conciliation procedures have been concluded and either party may, under The Labour Relations Act of Ontario, resort to the sanctions provided under the Act. If settlement is not reached by the time the conciliation procedures have been concluded, this Agreement will be conclusively deemed to have been terminated.

34.7 Any changes to this Agreement or any renewal or successor Collective Agreement will be confined to the specific amendments in respect of which submissions were made under Article 34.6.

IN WITNESS WHEREOF the parties through their duly authorized officers have executed this Agreement, this ***28th*** day of ***August***, 1974.

For:

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION

President

Director

Director

Director

Director

General Manager

Secretary-Treasurer

For:

ONTARIO ALLIED CONSTRUCTION TRADES COUNCIL

President

Vice-President

Secretary-Treasurer

For the Member Unions

International Association of Heat and Frost Insulators and Asbestos Workers

International Brotherhood of Boilermakers, Iron Ship Builders, Blacksmiths, Forgers and Helpers

International Brotherhood of
Painters and Allied Trades

International Brotherhood of
Teamsters, Chauffeurs,
Warehousemen and Helpers of
America

International Union of
Operating Engineers

Labourers' International Union
of North America

United Brotherhood of
Carpenters and Joiners of
America

ADDENDUM

to the
STATEMENT OF SETTLEMENT

between

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION

and

THE ONTARIO ALLIED CONSTRUCTION TRADES COUNCIL

All of the amendments in the Statement of Settlement dated January 28, 1999 are approved for incorporation into the Collective Agreement effective May 1, 1998.

DATED at Toronto, Ontario, this *16th* day of *August*, 1999.

For:

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION

Joe Dotchin

Barry Roberts

For:

THE ONTARIO ALLIED CONSTRUCTION TRADES COUNCIL

Matthew Elliot

Bryon Black

APPENDIX A

MOOSE RIVER BASIN: NORTHERN ONTARIO

Where the Employer elects to establish a camp, the following conditions will apply for employees working in the Moose River Basin:

Camp Conditions

(a) An Employer may elect to provide free room and board in camp at no cost to the employee. Where the Employer elects to provide a camp such employees will not be entitled to receive a daily travel or room & board allowance.

(b) When an Employer does not elect to provide free room and board in camp, the employee will be entitled to receive a daily travel or room and board allowance as set out in Articles 17.1 and 17.2.

(c) An employee who remains in camp on a normally scheduled work day on which he does not work will be charged $25.00 per day unless he is excused from work for a legitimate reason by the project medical attendant or an authorized representative of his Employer.

(d) An employee who is absent from work without approval and who remains in camp and is still absent from work the following day without approval will be charged $25.00 for the day of absence and each successive day of unapproved absence.

Hours of Work

(1) The hours of work will consist of a 21 day cycle of fourteen (14) consecutive work days followed by seven (7) consecutive days off.

(2) Regularly scheduled hours of work of ten (10) hours per day shall be paid at straight time hourly rates.

(3) Regularly scheduled hours of work on Saturday, Sunday, Recognized Holidays, and the fifth (5th) consecutive weekday shall be paid at two times the straight time hourly rate.

Wrap Around

An employee shall qualify for a return trip from the project every second twenty-one (21) day cycle he is on the project on the following basis:

(a) If an employee lives within 161 radius kilometres from the project, the Employer shall pay forty dollars ($40.00).

(b) If an employee lives greater than 161 radius kilometres from the project, the Employer shall pay as an allowance, forty dollars ($40.00) plus travel time based on the equivalent of one (1) hour's base rate of pay for each eighty (80) kilometres from where the employee lives or place of recruitment, whichever is closer to the project.

APPENDIX B

7-DAY COVERAGE

NUCLEAR SITES

NEW

When working under the provisions of this 7-day shift schedule, all conditions listed below will supersede those in the other Articles/Sections of this Collective Agreement. Where this shift schedule is silent, the appropriate Article/Section in the Collective Agreement applies.

These provisions would only apply to work performed on a Nuclear facility.

This shift schedule is intended for work of at least five (5) weeks in duration; however, it is recognized that unforeseen circumstances may require the cancellation of this schedule.

If in the transition onto or off this 7-day shift schedule an employee would receive less than 40 paid hours in a pay period, the employee shall receive the difference between the total paid hours for that pay period and 40 hours' pay. This does not apply to those employees who are laid off during or at the end of the schedule.

The employee(s) shift schedule consists of four consecutive shifts (day, afternoon, or night) followed by four scheduled days off. Shift overlap may be required.

Shift work may be established by the Employer to provide seven days per week work coverage, on a two or three ten (10) hour per day shift basis. When this occurs, a specific shift arrangement will be established by the Employer detailing the shift schedule to be worked.

Notice Provision

If this shift schedule is to be used for work on a "planned outage", the Employer will provide the Union with two (2) weeks' notice prior to the implementation of these shift provisions.

Shift Provisions

Day Shift

Regularly scheduled hours of work per shift, Monday to Friday inclusive, shall be paid at straight time hourly rates.

Afternoon Shift

Regularly scheduled hours of work per shift, Monday to Friday inclusive, shall be paid at straight time hourly rates, plus a shift differential which shall be equal to the Shift Differential as found in the appropriate trade appendix for this shift.

Night Shift

Regularly scheduled hours of work per shift, Monday to Friday inclusive, shall be paid at straight time hourly rates, plus a shift differential which shall be equal to the Shift Differential as found in the appropriate trade appendix for this shift.

All Shifts

Regularly scheduled hours of work on Saturday, Sunday, Statutory and Recognized Holidays shall be paid at the appropriate overtime rate for that trade. Recognized Holidays will be observed on the actual day on which the holiday occurs or as declared by legislation.

The rate for the shift will be based on the day in which the shift begins.

An unpaid lunch period of one-half hour shall be allowed to be taken no later than five hours after the commencement of a shift.

For employees working regularly scheduled hours, two fifteen (15) minute rest periods will be allotted at a time and location directed by the Employer for employees to rest.

It may be necessary, from time to time, to vary the established shift arrangements. When this occurs, a revised shift arrangement will be established.

APPENDIX C

7-DAY COVERAGE

ONTARIO HYDRO SERVICES COMPANY (LINES AND STATIONS)

NEW

This shift schedule is intended for work greater than two (2) weeks in duration; however, it is recognized that unforeseen circumstances may require the cancellation of this schedule.

These provisions will only apply to work performed on Lines and Stations as follows:

"for emergency work until the system is restored to the pre-emergent state"

If in the transition onto or off this 7-day shift schedule an employee would receive less than 40 paid hours in a pay period, the employee shall receive the difference between the total paid hours for that pay period and 40 hours' pay. This does not apply to those employees who are laid off during or at the end of the schedule.

The employee(s) shift schedule consists of four consecutive shifts (day, afternoon, or night) followed by four scheduled days off. Shift overlap may be required.

Shift work may be established by the Employer to provide seven days per week work coverage, on a one, two, or three shift per day basis. When this occurs, a specific shift arrangement will be established by the Employer detailing the shift schedule to be worked. The Employer will provide the Union with 48 hours' notice prior to the implementation of these shift provisions.

First Shift

Regularly scheduled hours of work, Monday to Friday inclusive, shall be paid at straight time hourly rates.

Second Shift

Regularly scheduled hours of work, Monday to Friday inclusive, shall be paid at straight time hourly rates, plus a shift differential which shall be equal to the Shift Differential as found in the appropriate trade appendix for this shift.

Third Shift

Regularly scheduled hours of work, Monday to Friday inclusive, shall be paid at straight time hourly rates, plus a shift differential which shall be equal to the Shift Differential as found in the appropriate trade appendix for this shift.

All Shifts

Regularly scheduled hours of work on Saturday, Sunday, Statutory and Recognized Holidays shall be paid the appropriate overtime rate for that trade. Recognized Holidays will be observed on the actual day on which the holiday occurs or as declared by legislation.

The rate for the shift will be based on the day in which the shift begins.

An unpaid lunch period of one-half hour shall be allowed to be taken no later than five hours after the commencement of a shift.

For employees working regularly scheduled hours, two fifteen (15) minute rest periods will be allotted at a time and location directed by the Employer for employees to rest.

It may be necessary, from time to time, to vary the established shift arrangements. When this occurs, a revised shift arrangement will be established.

STATEMENT OF UNDERSTANDING NO. 1

Notwithstanding Article 1, Recognition, of the Collective Agreement between The Electrical Power Systems Construction Association and the Ontario Allied Construction Trades Council, it is recognized and agreed by The Electrical Power Systems Construction Association and the Ontario Allied Construction Trades Council that employees of Ontario Hydro, who, at April 30, 1953, possessed full regular status and who are engaged on property acquired for Ontario Hydro, are exempt from the provisions of this Agreement and that the Council or member Unions of the Council will not attempt to either negotiate for these employees, unless bargaining rights are obtained, or restrict their movements or work on such property.

Dated at Rexdale, Ontario, this 28th day of August, 1974.

For:

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION

President

Director

Director

Director

Director

General Manager

Secretary-Treasurer

For:

ONTARIO ALLIED CONSTRUCTION TRADES COUNCIL

President

Vice-President

Secretary-Treasurer

For the Member Unions

International Association of Heat and Frost Insulators and Asbestos Workers

International Brotherhood of Boilermakers, Iron Ship Builders, Blacksmiths, Forgers and Helpers

STATEMENT OF UNDERSTANDING NO. 1

International Brotherhood of
Painters and Allied Trades

International Brotherhood of
Teamsters, Chauffeurs,
Warehousemen and Helpers of
America

International Union of
Operating Engineers

Labourers' International Union
of North America

United Brotherhood of
Carpenters and Joiners of
America

STATEMENT OF UNDERSTANDING NO. 2

It is recognized and agreed by The Electrical Power Systems Construction Association and the Ontario Allied Construction Trades Council that foremen covered by the Collective Agreement between The Electrical Power Systems Construction Association and the Ontario Allied Construction Trades Council who are employed by Ontario Hydro and who possess full regular status will not be required to comply with subsection (b) section .1 of Article 12, Union Security, of the Master Portion of the Collective Agreement. However, if any of these foremen join a member Union of the Council they will be put on checkoff and will be required to maintain their membership in the Union.

Dated at Rexdale, Ontario, this 28th day of August, 1974.

For:

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION

President

Director

Director

Director

Director

General Manager

Secretary-Treasurer

For:

ONTARIO ALLIED CONSTRUCTION TRADES COUNCIL

President

Vice-President

Secretary-Treasurer

For the Member Unions

International Association of Heat and Frost Insulators and Asbestos Workers

International Brotherhood of Boilermakers, Iron Ship Builders, Blacksmiths, Forgers and Helpers

STATEMENT OF UNDERSTANDING NO. 2

International Brotherhood of Painters and Allied Trades

International Brotherhood of Teamsters, Chauffeurs, Warehousemen and Helpers of America

International Union of Operating Engineers

Laborers' International Union of North America

United Brotherhood of Carpenters and Joiners of America

LETTER OF UNDERSTANDING

between

THE ELECTRICAL POWER SYSTEMS
CONSTRUCTION ASSOCIATION

and the

ONTARIO ALLIED CONSTRUCTION
TRADES COUNCIL

It is agreed that STATEMENT OF UNDERSTANDING No. 3 which is dated August 28, 1974 and appended to the Master Portion of the EPSCA/OACTC Collective Agreement, is hereby withdrawn and cancelled effective January 28, 1999.

DATED at Toronto, Ontario, this *16th* day of *August*, 1999.

For:

THE ELECTRICAL POWER SYSTEMS
CONSTRUCTION ASSOCIATION

Joe Dotchin

_____

Barry Roberts

_____

For:

THE ONTARIO ALLIED CONSTRUCTION
TRADES COUNCIL

Matthew Elliot

_____

Bryon Black

_____

_____

_____

LETTER OF UNDERSTANDING

between

THE ELECTRICAL POWER SYSTEMS
CONSTRUCTION ASSOCIATION

and the

ONTARIO ALLIED CONSTRUCTION
TRADES COUNCIL

It is agreed that STATEMENT OF UNDERSTANDING NO. 4 which is dated August 28, 1974 and appended to the Master Portion of the EPSCA/OACTC Collective Agreement, is hereby withdrawn and cancelled effective May 31, 1984.

Dated at Toronto, Ontario, this *14th* day of *May*, 1984.

For: THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION

For: ONTARIO ALLIED CONSTRUCTION TRADES COUNCIL

STATEMENT OF UNDERSTANDING NO. 5

Nothing contained in any other Collective Agreement negotiated by EPSCA will prejudice any of the affiliates of the OACTC so far as the trade jurisdiction is concerned.

Statement of Understanding - #6

between

THE ELECTRICAL POWER SYSTEMS
CONSTRUCTION ASSOCIATION

and the

ONTARIO ALLIED CONSTRUCTION TRADES COUNCIL

Security Clearance Expense Allowance

A member who successfully passes the required security clearance and hires on with an employer shall receive on the first paycheque $50.00 in consideration of the time and cost associated with the procedure for completing the authorizing forms and submitting to the security clearance check. Only members who have successfully passed the required security clearance will be referred by the Union.

Dated at Toronto this 28th day of January, 1999.

For:
The Electrical Power Systems
Construction Association

For:
OACTC

FOREMAN APPENDIX

The amendments contained in the Statement of Settlement, effective January 28, 1999, have been incorporated into the Foreman Appendix in accordance with the "Term of Agreement" article contained in the Master Portion of this Agreement.

FOREMAN APPENDIX

to the

COLLECTIVE AGREEMENT

by and between

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION

(hereinafter called "EPSCA")

and the

ONTARIO ALLIED CONSTRUCTION TRADES COUNCIL
(hereinafter called the "Council")

As provided in the "Appendices" article of the Master Portion of the Collective Agreement, EPSCA and the Council have agreed to the following conditions to apply to foremen.

Article 1

1.1 It is understood that foremen hold a key position in the relationship between the Employers and the Unions. Both parties agree that every effort should be made to recruit and retain foremen who have a high degree of efficiency in the performance of their jobs and in the handling of their men. Recognizing the responsibilities involved in being a supervisor and a member of a Union, the Employers, the Council and the Unions will make every effort to minimize problems that may arise which concern the relationship between the foremen, the Employers and the Unions.

Article 2

2.1 Foremen are the first level of management supervision and, as such, are management representatives. In this capacity, they will exercise duties and responsibilities, as established by their Employers, and will not work with the tools of the trade, except as provided for in the individual trade appendices' articles.

The parties recognize the responsibility of foremen to discharge their managerial duties. If a Union feels that a foreman is not discharging his managerial duties in a manner that is fair, equitable and without bias, or if an Employer feels that a Union is interfering with a foreman in the performance of his managerial duties, the Employer or the Union may refer the problem to the Project Committee for resolution. If the matter cannot be resolved by the Project Committee, the grievance procedure may be invoked by either party.

Article 3

EMPLOYERS' RIGHT TO SELECT

3.1 The selection and retention of foremen will be the responsibility of the Employers. When making appointments to the foreman level, the Employers will give consideration to those journeymen they presently employ. The appointment of foremen in charge of composite or mixed crews will take into account the nature of the work to be done.

Article 4

UNION AFFILIATION

4.1 In accordance with the "Union Security" article of the Master Portion, and in accordance with Article 3, Employers' Right to Select, contained in this Appendix, the appropriate Union affiliation for foremen shall be determined, as follows:

(a) Foremen appointed by internal promotion shall retain the Union membership held prior to appointment.

(b) Foremen recruited externally shall:

(i) if a Union member, continue that Union membership; or

(ii) if not a Union member, join the appropriate Union in keeping with the nature of the work to be done.

Article 5

WAGES

5.1 (a) The rates of pay for foremen covered by this Appendix shall be the greater of:

(i) $2.75 per hour above the journeyman rate; or

(ii) the Employer's current practice; or

(iii) the rate negotiated in appropriate local agreements; except, as noted, in (b) hereunder:

(b) The rates of pay for foremen engaged in the supervision of work covered by the "exceptions" contained in the Operating Engineer, Teamster and Laborer Appendices shall be the greater of:

(i) the Employer's current practice; or

(ii) the locally negotiated rate for work of the same class and character.

Article 6

WEEKLY HOURS OF WORK

6.1 When the normal weekly hours of work are amended by the "exceptions" recognized under this Agreement, the weekly hours of work for foremen shall be the same as for the tradesmen represented by the Unions with which the foreman is affiliated.

Article 7

SHIFT DIFFERENTIAL RATE

7.1 Foremen required to work shift work other than the regular day shift shall receive the same shift differential rate as the tradesmen represented by the Union with which the foreman is affiliated.

Article 8

OVERTIME RATES

8.1 Overtime rates for work performed outside normal hours as defined in the "Hours of Work" article contained in the Master Portion of this Agreement and outside hours of work amended by the "exceptions" recognized under this Agreement, shall be the same as for tradesmen represented by the Union with which the foreman is affiliated.

Article 9

BENEFITS

9.1 The Employer agrees to pay into operative welfare, pension, and supplementary unemployment benefit plans on behalf of foremen covered by this Appendix. Payments will be made on the same basis and in the same amounts as are paid on behalf of tradesmen represented by the Unions with which the foremen are affiliated.

Article 10

MOBILITY

10.1 To maintain efficiency and productivity, an Employer shall have the right to move foremen from construction site to construction site, as determined at the pre-job conference.

Article 11

APPRENTICESHIP AND TRAINING PROGRAMS

11.1 The Employer agrees to pay into operative apprenticeship and training funds on behalf of foremen covered by this Appendix. Payments will be made on the same basis and in the same amounts as are paid on behalf of tradesmen represented by the Unions with which the foremen are affiliated.

Article 12

TOOLS AND CLOTHING

12.1 On a charge-out basis, the Employer shall supply foremen with protective clothing appropriate for the conditions under which the work is being done.

12.2 Foremen shall be accountable, but not liable, for gang tools used by their crew.

Carpenters and Joiners

UNITED BROTHERHOOD OF CARPENTERS AND JOINERS OF AMERICA APPENDIX

The amendments contained in the Statement of Settlement, dated May 10, 2000, have been incorporated into the Carpenters' Appendix in accordance with the "Term of Agreement" article contained in the Master Portion of this Agreement.

EPSCA / CARPENTERS' APPENDIX

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UNITED BROTHERHOOD OF CARPENTERS AND JOINERS OF AMERICA APPENDIX

to the

Collective Agreement

by and between

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION (hereinafter called "EPSCA")

and the

POWER COUNCIL OF UNIONS (hereinafter called the "Council")

As provided in the "Appendices" article of the Master Portion of the Collective Agreement, EPSCA and the Council have agreed to the following conditions to apply to employees in classifications listed in Article 1 of this Appendix.

Article 1

CLASSIFICATIONS

1.1 The following is a list of classifications covered by this Appendix:

Carpenter (includes Timberman, Cribman, Sawfiler, and Pile Driver)
Carpenter Welder and Burner
Diver
Diver Welder and Burner
Acoustic and Drywall Worker
Acoustic and Drywall Welder and Burner
Resilient Floor Worker and Carpet Layer
Subforeman
Apprentice
Pile Driver Welder

1.2 If additional classifications are required, they will be negotiated as appropriate for work in the electrical power systems sector.

Article 2

WAGES

2.1 The rates of pay for employees in the classifications listed in Article 1 of this Appendix shall be as set forth in the wage schedules.

2.2 Rates of pay for Acoustic and Drywall Workers and Resilient Floor Worker and Carpet Layers shall be as set out in the wage schedules attached hereto and will maintain the existing differentials between these trades and the Carpenter Journeyman rate where applicable.

2.3 **REV** The rate for subforemen covered by this Appendix shall be the appropriate journeyman rate plus $1.75 per hour.

2.4 **REV** Effective May 1, 2000 and until April 30, 2004, the rates of pay for employees listed in the classifications listed in Article 1 shall be as set forth in the wage schedules attached hereto.

2.5 EPSCA will provide the Council with the current wage schedules.

Article 3

SHIFT DIFFERENTIAL RATE

3.1 Employees required to work shift work, other than the regular day shift, shall receive a shift differential of one-seventh (1/7) for normal scheduled shift hours worked.

Employees required to work shift work on the third shift of a three shift operation shall receive a shift differential of one-fifth (1/5) for normal scheduled shift hours worked.

Article 4

OVERTIME RATES

4.1 Overtime rates are paid for work performed outside of normal hours as defined in the "Hours of Work" article of the Master Portion of this Agreement and for work performed on Saturday, Sunday and the Statutory Holidays listed in Article 17 of this Appendix. Overtime rates shall be calculated as a premium over the appropriate shift rate.

4.2 Overtime rates of pay for employees listed in Article 1 of this Appendix shall be as set forth in the wage schedules.

4.2 Overtime rates for divers as per the classifications listed in Article 1 of this Appendix shall be two times the appropriate shift rate paid for all hours worked outside of the normal hours in any one day, Monday to Friday, and for all hours worked on Saturday, Sunday and the Statutory Holidays listed in Article 17 of this Appendix.

4.4 The overtime rates for Resilient Floor Worker and Carpet Layers shall be as set forth in wage schedules attached hereto.

4.5 When overtime work is required Monday to Friday, a minimum of one-half (1/2) hour's work will be provided at the appropriate rate of pay.

4.6 **REV** Effective May 1, 2000 and until April 30, 2004, the overtime rates shall be as set forth in wage schedules attached hereto, except for Divers.

4.7 EPSCA will provide the Council with current wage schedules.

4.8 The Chief Steward will be informed of all overtime and shall be given the opportunity to work. In the event, he declines the work; he shall be responsible to designate a steward to work the overtime who is qualified to perform the available work.

Article 5

BENEFITS

5.1 The Employer agrees to pay into operative welfare, pension and supplementary unemployment benefit plans, the hourly or monthly amounts, whether in addition to the wage rates or deducted from the wage rates, for employees covered by this Appendix. The amounts will be as set out in the wage schedules attached hereto.

The Employer also agrees to follow the administrative practices associated with such plans.

5.2 In the event an Employer is more than fifteen (15) days in arrears of the requirement to forward contributions and/or deductions to the Trustees by the fifteenth of the month following, the Employer shall pay as liquidated damages and not as a penalty an amount equal to two (2%) percent (equivalent to 24% per annum) for each month or part thereof that the contributions and/or deductions are in default for greater than fifteen (15) days provided the Employer has received five (5) days' written notice to correct such default. The trustees may require a delinquent Employer to pay for the costs, legal or otherwise, of collecting the amount owing, as outlined in the operative benefit plan trust documents.

5.3 The Trustees of the Employee Benefit Plans referred to in this Collective Agreement shall promptly notify the Union of the failure by any Employer to pay any employee benefit contributions required to be made under this Collective Agreement and which are owed under the said plans in order that the program administrator of the Employee Wage Protection Plan may deem that there has been an assignment of compensation under the said program in compliance with the regulation to the *Employment Standards Act 1991*, as amended, in relation to the Employee Wage Protection Program.

5.4 The Union agrees to supply the Employer with all information regarding the welfare, pension and supplementary unemployment benefit plans and also all administrative material that is required for the implementation of them.

5.5 In any area where the rate of pay for Resilient Floor Worker and Carpet Layer has been established as 85 percent (85%) of the EPSCA Carpenter Journeyman rate for that area, the Employer will pay to the Resilient Floor Worker and Carpet Layer as a special allowance the amount of welfare, pension and supplementary unemployment benefits that has been established by EPSCA as payable on behalf of Carpenter Journeymen when employed in that area.

5.6 Any changes in welfare, pension or S.U.B. plan contributions during the term of this Agreement will be confirmed, in writing, by the Union to EPSCA before such changes are put into effect. Within three (3) weeks of receipt of an acceptable written notice, such changes will be implemented. The effective date will be the date of implementation. Any changes in contributions will reflect an adjustment of the base rate; the total package will not be changed.

Article 6

INCLEMENT WEATHER PAY

6.1 When an employee reports at the beginning of a shift but is unable to commence work because weather conditions are unsuitable, he shall receive two (2) hours' pay at the appropriate straight-time rate plus shift differential if on shift or the appropriate premium rate if on overtime, plus travel allowance where applicable. The employee shall remain at his place of work for two (2) hours unless he is permitted to leave by his Employer.

Article 7

PREMIUMS

7.1 When an employee covered by this Appendix is required to work from a bosun chair or swing stage, he will receive an additional fifty-five (55) cents per hour for each hour worked.

7.2 When an employee covered by this Appendix is required to erect or dismantle suspended or free-hanging scaffold, he shall receive an additional forty-five (45) cents per hour for each hour worked. This premium shall only apply when employees are required to perform the erection or dismantling of this scaffold above a working floor or platform.

This premium shall not apply to foremen engaged in the supervision of this work.

7.3 Notwithstanding Section 2.3 of the "Wages" article of this Appendix, when an employee is required to work as a Diver, he shall receive sixty dollars ($60.00) per day over and above the journeyman rate, provided he has carried out a diving function during that day.

Diving conditions shall be in accordance with the *"Occupational Safety Code for Diving Operations"* established by the Canadian Standards Association.

7.4 Divers and Tenders shall have complete Provincial mobility. A Diver and Tender shall register by telephone with the Local Union or District Council having jurisdiction over the area where the work is to be performed.

7.5 *Construction Radiation Protection Assistant (R.P.A.)* is a Construction Trades Person who has achieved the full radiation qualification via the approved Ontario Power Generation Inc (OPGI) Training Program. This requires successful completion of the construction R.P.A. training and checkouts and the performance of R.P.A. functions while under supervision of a fully qualified Construction R.P.A. to the satisfaction of the Construction Site Safety Officer and the Station Health Physics Unit.

R.P.A. will be paid the appropriate equivalent foreman's rate when performing an R.P.A. function and will report to the Site Safety Unit. An R.P.A. is a "qualification" and not a "trade function" irrespective of union or trade affiliation.

Article 8

KEY TRADESMEN

8.1 The Employer reserves the right to transfer two (2) key tradesmen from one location to another to effectively utilize their special skills, having regard for the special requirements of thermal, nuclear or hydraulic generation and transmission and transformation construction.

8.2 The right to transfer is subject to the proviso that the two (2) key tradesmen will not represent more than 50% of the Employer's total required work force.

Article 9

TRAVEL AND TRANSPORTATION

9.1 INITIAL EMPLOYMENT
REV

On recruitment of tradesmen who live between 97 and 162 radius kilometers from the project, the Employer shall pay $26.00 effective May 1, 2000 ($27.00 effective May 1, 2001, $28.00 effective May 1, 2002, $29.00 effective May 1, 2003) for the initial trip to the project.

9.2 **REV** On recruitment of tradesmen who live in Ontario but beyond 162 radius kilometers from the project, the Employer shall pay 27¢ per radius kilometer (28¢ effective May 1, 2001, 29¢ effective May 1, 2002, 30¢ effective May 1, 2003) plus an allowance for travel time equivalent to one hour's pay for each 81 radius kilometers of travel to a maximum of 8 hours' pay for the initial trip to the project from where the tradesman lives.

9.3 On recruitment of tradesmen who live outside Ontario and beyond 162 radius kilometers from the project, the Employer shall pay the equivalent of the cost of public transportation plus an allowance for travel time equivalent to one hour's pay for each 81 radius kilometers of travel to a maximum of 8 hours' pay for the initial trip to the project from where the tradesman lives or place of recruitment, whichever is closer to the project.

9.4 To qualify for payment in 9.1, 9.2 and 9.3, the employee must be available for work for a minimum of fifteen (15) working days or the duration of the job, whichever is lesser.

9.5 On termination of employment due to a reduction of staff, an employee entitled to payment under 9.1, 9.2, or 9.3 will be entitled to return expenses calculated in the same manner as in 9.1, 9.2, or 9.3 above, for the return trip from the project. An employee whose employment terminates for any reason other than reduction of staff will not be eligible for return payment.

9.6 TRANSFER

When transferring employees the Employer will pay the equivalent of the cost of public transportation for the initial trip to the project from the employee's most recent work location. In addition, the Employer will pay an allowance for travelling time equivalent to the straight-time rate up to a maximum of 8 hours.

Article 10

TOOLS

10.1 In accordance with the "Tools and Clothing" article of the Master Portion of this Agreement, employees shall be required to provide themselves with the ordinary hand tools of their trade as specified in the Tool List attached hereto.

10.2 Employees who report to work and are not in possession of the ordinary hand tools of the trade shall not be eligible for employment and the employer shall have the right to refuse employment or to continue to employ such employees. In the latter instance, the employer shall not be required to pay reporting pay as established in Article 16.

10.3 The employer shall supply the necessary equipment for use by an employee or outside services to keep employee's tools in good condition. If an employee is required to maintain his own tools in good condition, he shall be allowed to do so during working hours.

Article 11

PROTECTIVE CLOTHING AND EQUIPMENT

11.1 Employees must, at their own expense, provide suitable clothing for the performance of their regular duties.

11.2 Employees are required to wear protective clothing and use protective equipment, as determined by the Employer, for the work being done.

11.3 The Employer shall provide suitable rainwear when required.

11.4 The protective clothing and equipment that is provided by the Employer shall be charged out to an employee and the employee shall be responsible for the return of such clothing and equipment to his Employer.

11.5 On abnormally dirty and/or corrosive work in which employees' clothes may be permanently damaged, the Employer shall supply and maintain the appropriate protective clothing at no cost to the employee. Such protective clothing will remain the property of the Employer and will be returned by the employee upon completion of the work involved.

Article 12

WELDING TESTS

12.1 On hire, welders must possess the qualifications and class of welding ticket specified by the Employer. It will be at the Employer's discretion whether a welder who does not possess the qualifications and class of welding ticket specified will be hired.

12.2 A welder referred to the Employer by the Union who has never had a welding certificate will take the applicable test on his own time and pay for such test.

12.3 Employees required to take welding tests at time of hire or at any other time during their period of employment will be paid their normal wages for the time required to take such tests.

12.4 When an employee is required to perform welding work, the Employer where required shall supply, at no cost to the employee, welding gloves, welding helmets, welding and burning goggles, welding sleeve leathers and welding jacket.

Article 13

APPRENTICESHIP AND TRAINING PROGRAMS

13.1 The Employer agrees to pay into operative apprenticeship or training funds the amount specified for apprenticeship or training as set forth in the wage schedules attached hereto.

13.2 The Union agrees to supply EPSCA with all pertinent information regarding these funds including all administrative material that is required for their implementation.

13.3 Training programs established by the Employers to provide skills required in the electrical power systems sector shall be funded by reducing the Employer's contribution to the training fund in the specific locality where the training is taking place by an amount of money equivalent to the cost of such programs.

13.4 Both parties to this Agreement acknowledge the Employer's and the Union's responsibilities, respectively, in the training of apprentices to meet the Employer's current and future needs. To this end the Employer and the Union agree to participate in an apprenticeship program under the auspices of the Employment Training Branch, Ministry of Skills and Development. The Employer agrees to maintain a training program appropriate to his needs and class and character of work.

The number of apprentices who may be employed by an Employer shall not exceed:

(a) Where an employer is a journeyman in the trade, one apprentice plus an additional apprentice for each five journeymen employed by that Employer in the trade and with whom the apprentice is working; and

(b) Where the Employer is not a journeyman in the trade, one apprentice for the first journeyman employed by the Employer plus an additional apprentice for each five journeymen employed by that Employer in the trade and with whom the apprentice is working.

Article 14

PROJECT LAYOFF PROCEDURE

14.1 The layoff of employees covered by this Appendix shall be governed by the following:

(a) For the purpose of this Article, there shall be three (3) groups of employees:

(i) Employees working under a Union Work Permit.

(ii) Employees who are non-members of the appropriate local union.

(iii) Employees who are members of the appropriate local union.

The Union will be responsible for advising an Employer regarding the group status of individual employees.

(b) During a reduction of staff, layoff will commence with category (i) and progress through categories (ii) and (iii) respectively.

In established cases of compensable accident, or long-term sickness*, an employee will be maintained on the employer's payroll until fit to return to normal duties or until his normal date of layoff, whichever occurs first.

(c) Within category (iii) layoff will be carried out on a project seniority basis for employees having 3 months or more project service providing the remaining employees can perform the work yet to be completed.

For the purpose of this Article, project seniority shall be defined as the length of continuous service at the project in the bargaining unit classifications covered by this Appendix only.

14.2 Subject to Article 10.1 of the Foreman's Appendix to the EPSCA/Power Council of Unions Master Portion collective agreement, the employer shall have the right to move foremen from construction site to construction site.

When a requirement for foremen no longer exists, the treatment of foremen shall be as follows:

* ***A long-term sickness is that which is 30 calendar days or more in duration. In order to remain eligible, an employee on long-term sickness will provide the employer with medical evidence before this period has expired and for every subsequent 30-day period indicating the expected date of return to work.***

(i) Foremen who are transferred into, or hired as a Foreman at an Ontario Power Generation Inc or Hydro One construction site as a foreman shall be laid off as a foreman or transferred out to another Ontario Power Generation Inc or Hydro One construction site as a foreman.

(ii) An employee who has been promoted to the foreman level by the Employer during the course of his employment on an Ontario Power Generation Inc or Hydro One construction site, shall not be subject to (i) above and will be reduced to a working position at such site. For layoff purposes the employee will than be subject to Article 14.1.

Article 15

RECALL

15.1 **REV** The Employer may recall former employees who had previously been on the payroll of the Employer.

A member, at date of recall, must be in good standing in the Union and be registered as unemployed with the local union or District Council having jurisdiction where the work is to be performed. Before commencing work, the member must be given a referral slip. To qualify for recall a former employee must be requested within six (6) calendar months of termination. The former employee must have been on the payroll of the Employer for at least thirty (30) calendar days in order to be eligible for recall. In order to use this Recall Article, an Employer must have previously worked under this Collective Agreement.

15.2 **REV** In the case of a recall to work, Employers reserve the right to recall Green qualified Atomic Radiation Workers in sequence from the out of work list to the location from where they were laid off. Recalled Greenmen will perform only Greenman work and will not work with the tools as a Carpenter.

Article 16

VACATION PAY

16.1 The Vacation Pay rate shall be four (4) percent of vacationable gross earnings*. Payment shall be made weekly on the employee's regular pay cheque.

* ***"Vacationable gross earnings" means pay for regular hours, overtime, premium pay, shift differential, lines and stations daily travel time, retroactive pay adjustments, reporting pay, inclement weather pay, call-in pay, Saturday and Sunday premiums and trade training, but does not include payment for initial and return travel.***

A three (3) week leave of absence for the purpose of taking an annual vacation will be granted in the calendar year in which the employee completes one year of service*. In special circumstances, where the work schedule permits, additional time off may be granted an employee. The additional time off will not be unreasonably denied.

Article 17

STATUTORY HOLIDAYS

17.1 The Statutory Holiday pay rate shall be six (6) percent of vacationable gross earnings. Payment shall be made weekly on the employee's regular pay cheque.

The Statutory Holidays recognized under this Agreement are:

New Year's Day	Civic Holiday
Good Friday	Labour Day
Easter Monday	Thanksgiving Day
Victoria Day	Christmas Day
Canada Day	Boxing Day

EPSCA agrees to recognize Heritage Day when proclaimed by legislation.

Recognized holidays falling on a Saturday or Sunday shall be observed on the following Monday. When Christmas Day falls on a Saturday or Sunday, it shall be observed on the following Monday and Boxing Day on the following Tuesday. When New Year's Day falls on a Saturday or Sunday, it shall be observed on either the preceding Friday or the following Monday.

EPSCA reserves the right to change the day of observance of a Statutory Holiday when such a holiday falls on a Tuesday or Thursday.

Article 18

EMPLOYEE TRANSFER PROVISIONS

NEW

18.1 The parties agree an employer is allowed to transfer employees within the geographic area of the Local Union for projects covered by this collective agreement.

Employees transferred must have been on the payroll of the employer for at least fourteen (14) calendar days. The number of employees transferred under this provision shall not exceed 50%.

* ***Service will be calculated based on an employee's length of continuous service with his Employer.***

The incorporated specific Statement of Settlement amendments to the United Brotherhood of Carpenters and Joiners of America Carpenters' Appendix of the Collective Agreement between The Electrical Power Systems Construction Association and The Power Council of Unions have been agreed to by the bargaining committees of the Carpenters and The Electrical Power Systems Construction Association. These proposed amendments are herewith recommended to the EPSCA Board of Directors and the Officers of the Council in accordance with Article 33.1 of the Master Portion of the Collective Agreement for approval and incorporation into the Carpenters' Appendix of the Collective Agreement.

Dated this *10th* day of *May* , 2000.

For: The Carpenter Bargaining Committee

Bryon Black

_____

For: The EPSCA Bargaining Committee

Barry Roberts

_____

Approved for incorporation into the Carpenters' Appendix effective this *10th* day of *April* , 2001.

For: **The Electrical Power Systems Construction Association**

Jim Coathup

_____

Joe Dotchin

_____

For: **The Power Council of Unions**

Claude Cournoyer

_____

Rick Weiss

_____

Phil Bertrand

_____

_____

ADDENDUM 1

MODIFIED PROVISIONS OF THIS CONSTRUCTION APPENDIX

These provisions will apply to:

(a) all work on Lines and Stations, and

(b) all work on existing generating sites except the construction of:

- a new facility which provides a new function
- a new (i.e. additional) generating unit

Definitions:

Facility Something that is built composed of multi-systems which serves a specific function

Function Examples - Generation, Administration, Warehousing, Heavy Water Production, Flue Gas Desulphurization, Tritium Removal, Site Services (e.g. Shops)

Dispute Resolution Process

A dispute as to whether the 'Modified Provisions of this Construction Agreement' apply to the construction of a new facility will be referred to the Executive Committee for resolution and the Executive Committee will meet within five (5) working days. If the Executive Committee is unable to resolve the dispute, the dispute will be referred to a single arbitrator within ten (10) working days for a final and binding resolution. The arbitrator shall give an oral decision within five (5) working days, and a written decision, if requested, within twenty (20) working days.

All terms of this appendix shall apply to work covered by Addendum 1.

EPSCA/CARPENTER APPENDIX

ADDENDUM 1

MODIFIED PROVISIONS

OF THIS CONSTRUCTION AGREEMENT

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Section 1

WORKING FOREMEN

1.1 When the crew size is five (5) or less, including the foreman, the foreman may be required to work with the tools of the trade. The foreman if not already eligible to act as a working foreman on the shift will not be used to replace a journeyman on overtime.

Section 2

LINES AND STATIONS FOREMEN RATE

2.1 The rate of pay for Foremen working in Lines and Stations under the Modified Provisions of this construction agreement shall be $3.00 per hour above the journeyman rate. **(Article 5 – Wages – Foreman Appendix, Master Portion does not apply).**

UNITED BROTHERHOOD OF CARPENTERS` AND JOINERS OF AMERICA APPENDIX

TOOL LIST

Tools listed below must be supplied by the tradesmen as required to perform assigned tasks.

CARPENTERS

1 Tool Box with lock and key
1 Wrecking Bar
1 7/8" to 3" expansion bit
1 Ratchet Brace
1 set Wood Bits, 1/4" to 1", plus extension
1 each Wood Chisels, 1/4", 1/2", 3/4" and 1"
* 1 set Twist Drills, up to 1/4" (replaceable by company)
1 Hack Saw, 10" or adjustable
1 Claw Hammer
1 Axe, Short Handle
* 1 Spirit Level, 30" or longer
1 Chalk Line
1 Block Plane and Smooth Plane
1 Plier
1 Plumb Bob with line
* 1 Steep Tape, minimum 16'
1 Key Hole Saw
2 Cross Cut Saws
1 Utility Knife
2 Nail sets
(3 Screwdrivers, flat blade, 4", 8" and 12")) or Ratchet
(or equivalent) Screwdriver
(1 set Robertson Screwdrivers) set
(1 set Phillips Screwdrivers)
1 Tinner's Snips, 10" or equivalent
* 1 24" Carpenter's Square
1 Combination Square
1 Bevel
1 Oil Stone
* 1 100' Steel Tape
1 12" Crescent Wrench, adjustable
1 Vise Grip
1 Torpedo Level
1 Leather Apron

* See Page 2

CARPENTERS' APPENDIX
TOOL LIST (continued)

* On jobs which require metric tools, the tool list is adjusted as follows:

  1 set Twist Drills from 1.5 mm to 6.5 mm diameter in 0.5 mm steps (replaceable by company)
  1 Spirit Level, 600 mm or longer
  1 Steel Tape, minimum 3 m
  1 Carpenter's Square, 600 mm x 400 mm
  1 15 m Steel Tape

RESILIENT FLOOR WORKERS

All Mechanics shall provide themselves with the following list of tools in a suitable grip:

Hammer
Dividers
Hack Saw
Files
Snips
Hand Saw
Cold Chisel
Scribers
Trowel
Seam Rollers
Pinch Bar
Lino Knives
Sharpening Stone
Nail Sets
Chalk Line
Screwdrivers
Adhesive Spreaders
Stanley Blade Knife

CARPENTERS' APPENDIX
TOOL LIST (continued)

CARPET LAYERS

In addition, all Carpet Layers shall carry in their grip the following list of tools:

Magnetic Hammer
Carpet Kicker
Stair Tool
Carpet Knife
Pinch Bar
Shears
Trimming Scissors
Protective Goggles
Trimmer
Napping Scissors
Smooth-edge Shears

ACOUSTIC AND DRYWALL WORKERS

Measuring Tape
Wallboard Knife
Surform Tool
Drywall Saw
Aircraft Snips
Wallboard Hatchet
Crown Head Claw Hammer
Tin Snips
Plumb Bob
Chalk Box
Ball Peen Hammer
Magnetic Nail Holder
Cold Chisel
Hank Benders
Circle Cutter
Wallboard Stripper
Hack Saw
Bullnose Snippers
Wallboard Footlift
Pop Rivet Tool

July 28, 2004

MEMORANDUM OF SETTLEMENT

BETWEEN

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION

AND

CARPENTERS DISTRICT COUNCIL OF ONTARIO (CDC), UNITED BROTHERHOOD OF CARPENTERS AND JOINERS OF AMERICA

Dated this 28th day of July 2004

It is agreed that the existing agreement between the parties which expires April 30, 2004 will be renewed with the following amendments:

GENERAL

There is agreement to create a "free standing" collective agreement. Master Portion, Foreman's Appendix, Carpenters Appendix and July 28, 2004 Memorandum of Settlement to be incorporated into one collective agreement.

Amend as necessary:

Change "Power Council of Unions" (hereinafter called the "Council") to Carpenters District Council of Ontario (CDC), United Brotherhood of Carpenters and Joiners of America (hereinafter called the "Union").

Delete all references to other members of the Power Council – e.g
Delete 1.4 a) and b); Delete 1.5 a) and b); Article 2 etc…

Recognition clause to be amended as required – e.g. add Bruce Power LP

APPENDIX D — MODIFIED PROVISIONS

Modified Provisions to apply as follows:

- Modified Articles – *Hours of Work, Reporting Pay and Meals on Overtime* from Master Portion and *Working Foremen and Lines and Stations Foreman Rate* from Carpenters Appendix to replace corresponding articles in main body of agreement

ARTICLE 5 — EXECUTIVE COMMITTEES

Add NEW Article 5.2 as follows:

"In recognition of matters that may arise during the extended duration of this Collective Agreement the Executive Committee may deal with any issues brought forward by the parties that represent a significant change. Any alterations or modifications to this Agreement must be mutually agreed to by the Parties."

ARTICLE 8 UNION STEWARDS

Add new paragraph as follows:

"The Accredited Union Representative may appoint one (1) Alternate Chief Steward to perform Chief Steward duties only when the regular Chief Steward is absent from work. Provided the Alternate Chief Steward is able to perform the work required, he will not be laid off until the manpower on site is reduced to ten (10) Carpenter members or less, unless by mutual consent between the accredited Union Representative and the Accredited Association Representative."

ARTICLE 12 UNION SECURITY

Add, where appropriate:

"Wage schedule, dues and remittance changes are to be provided in writing to EPSCA and changes shall only take place during the months of April and November of each calendar year. Within three (3) weeks of receipt of an acceptable written notice, any changes will be implemented. The effective date of such changed wage schedules, dues and remittances shall be the date of implementation. In bargaining years, the April window will be extended to allow wage schedule changes to take place once bargaining has concluded"

ARTICLE 14 WAGES AND PAY PROCEDURE

Add: "The Parties agree to direct deposit for direct hire employees of O.P.G., Hydro One, and Bruce Power L.P. An employer will provide assistance to employees who require assistance obtaining a bank account. Employers other than O.P.G., Hydro One and Bruce Power L.P. may implement direct deposit upon mutual consent in writing between the parties."

ARTICLE 17/ SECTION 1 — GENERATION PROJECTS DAILY TRAVEL ALLOWANCE AND ROOM AND BOARD

Travel rings and Board and Travel to be increased (and rounded to the nearest 5 cents) as follows:

- Effective August 1, 2004 – 4%
- May 1, 2005 – 2%
- May 1, 2006 – 2%
- May 1, 2007 – 4%
- May 1, 2008 – 2%
- May 1, 2009 – 2%

ARTICLE 18 — LINES AND STATIONS CONSTRUCTION TRAVEL ALLOWANCE AND ROOM AND BOARD

Travel rings and Board to be increased as follows:

Travel:
Effective August 1, 2004 and May 1st in each subsequent year – 50 cents

Board:
Effective August 1, 2004 and May 1st in each subsequent year - $1.00

TRAVEL AND TRANSPORTATION

Increase amounts in Article 9 as follows:

$30.00	Effective May 1, 2005
$31.00	Effective May 1, 2007
$32.00	Effective May 1, 2009

31 cents	Effective May 1, 2005
32 cents	Effective May 1, 2007
33 cents	Effective May 1, 2009

ARTICLE 20 — STANDOFF

(i) Amend 2nd paragraph of Article 20 as follows:

"The Employer reserves the right to Standoff its employees without pay up to a maximum of ten (10) consecutive working days. Notification of Standoff will be made by the Employer during normal working hours. A Record of Employment will be issued upon the commencement of the Standoff. No travel or subsistence allowance will be paid to an employee for the Standoff period."

(ii) Delete 20.2

(iii) Delete last sentence of Article 20.3

ARTICLE 24 — TOOLS AND CLOTHING

Amend 24.1 (c) as follows: increase current amount to $750.00

Amend 24.4 as follows:

".... will receive $6.00 for every half shift worked or portion thereof ($7.50 effective May 1, 2007)."

SECTION 2/ ARTICLE 26 — HOURS OF WORK

Amend 2nd paragraph of Article 26/Section 2.1 as follows:

(i) The weekly hours of work Monday to Friday inclusive shall consist of forty (40) hours for all employees of Employers covered by this agreement and working on a one (1) or two (2) shift operation.

The weekly hours of work may be arrived at by having the employees work either:

- four (4) consecutive ten-hour shifts, Monday to Thursday or;
- four (4) consecutive ten-hour shifts, Tuesday to Friday or;
- five (5) consecutive eight-hour shifts

but not concurrently on the same work program.*

Employees will not be moved from work program to work program to circumvent overtime. Disputes arising from this Article are subject to the grievance procedure.

Each Employer will notify the Local Union of the weekly hours of work for each work program* at the site.

Weekly hours of work will be established for a minimum period of two (2) weeks.

If an Employer intends to change the weekly hours of work, a minimum of ten (10) days written notice shall be sent to the Local Union.

**** For the purposes of this section, a work program may be defined as work taking place on a site that could include the following:***

- ***Outages,***
- ***Specific contracted scopes of work,***
- ***Various and different modifications in an operating plant where the owner dictates the hours of work, or***
- ***Subcontracts for a prime contractor where the prime contractor dictates the hours of work.***

(ii) Amend start time in 3rd paragraph of Section 2.1 to read 7:00 am.

(iii) The start time for the afternoon shift shall be immediately following the day shift or within two (2) hours either way of the end of the day shift.

(iv) Add the following new language:

"Carpenters assigned to fire watch duties may commence work after the start of the rest of the crew. In these cases, normal scheduled hours of work beyond the quit time of the rest of the crew will not be subject to overtime premiums."

(v) Delete Articles 26.2 to 26.6 inclusive

ARTICLE 31 <u>RADIATION WORK</u>

Amend 31.1 (a) and (b) as follows:

Add: "Bruce Power LP"

ARTICLE 33 TERM OF AGREEMENT

Duration – Amend to read as follows:

> "This Agreement shall continue in full force and effect from May 1, 2004 until April 30, 2010 inclusive…"

WAGES

Increase Foreman's rate in 5.1 a) (i) and 2.1 (Lines and Stations) to $3.50 per hour effective May 1, 2007

Increase Subforeman's rate in 2.3 to $2.00 per hour effective May 1, 2007.

Wage increases as follows - for all locals <u>except</u> Toronto (Local 27):

$1.10 effective August 1, 2004
$1.10 effective May 1, 2005
$1.10 effective May 1, 2006

For Toronto - Local 27 wage increases as follows:

$1.25 effective August 1, 2004
$1.25 effective May 1, 2005
$1.25 effective May 1, 2006

ICI increase/date for years 2007, 2008 and 2009.

ARTICLE 13 – CARPENTER APPENDIX APPRENTICESHIP AND TRAINING PROGRAMS

Amend Article 13.4 to reflect the appropriate Government branch name.

Add new language: New 13.5

"The Union and the Employer agree that an apprentice who is laid off to attend Trade School shall not lose their seniority for the time spent to attend said schooling, and will retain their original placement on the site upon completion of Trade School."

Amend Article 13.4 to reflect an apprentice ratio of 1 in 4.

ARTICLE 14 – CARPENTER APPENDIX

PROJECT LAYOFF PROCEDURE

Amend 14.1 (a) to add new category (ii): Employees who are members of the Union and their Local Union is outside of the Province of Ontario

Amend corresponding articles in 14.1 to reflect the above-noted change.

MISC

Amend wage schedule for Local 18 (Zones 1 and 2) to reflect the following:

- welfare for apprentice from day one
- no pension for apprentice for 1st 450 hours

LETTER OF UNDERSTANDING

Between

THE ELECTRICAL POWER SYSTEMS
CONSTRUCTION ASSOCIATION

AND

CARPENTERS DISTRICT COUNCIL, UNITED BROTHERHOOD OF
CARPENTERS AND JOINERS OF AMERICA

RE: BOARD/TRAVEL AT NORTHERN SITES

During current negotiation discussions, the Union raised concerns about room and board/travel at certain northern sites.

The Parties agree to meet by the end of October 2004 to identify those sites where the Union has issues and discuss appropriate compensation for Room and Board/Travel at those sites.

Dated this 28th day of July, 2004.

EPSCA

Carpenters

LETTER OF UNDERSTANDING

Between

THE ELECTRICAL POWER SYSTEMS
CONSTRUCTION ASSOCIATION

AND

CARPENTERS DISTRICT COUNCIL, UNITED BROTHERHOOD OF
CARPENTERS AND JOINERS OF AMERICA

RE: GRIEVANCE PROCEDURE

During bargaining, the Union raised concerns to EPSCA regarding the grievance process and timelines in which grievances are being heard. In recognition of this, the Parties agree to meet by the end of October 2004 to discuss a suitable process that will be adopted that is mutually acceptable to the Parties.

Dated this 28th day of July, 2004.

EPSCA

Carpenters

July 28, 2004

LETTER OF UNDERSTANDING

Between

THE ELECTRICAL POWER SYSTEMS
CONSTRUCTION ASSOCIATION

AND

CARPENTERS DISTRICT COUNCIL, UNITED BROTHERHOOD OF
CARPENTERS AND JOINERS OF AMERICA

RE: DEFINITION OF THE POWER SECTOR

In the event the Minister of Labour defines the Power Sector, or there is a decision of the Ontario Labour Relations Board that impacts on the definition of the Power Sector, the parties agree to meet to investigate the impacts of the definition on this agreement and consider the possibility of applying this agreement in the context of this definition.

Dated this 28th day of July, 2004.

EPSCA

Carpenters

The parties agree to recommend this settlement for ratification.

This agreement is conditional upon ratification by EPSCA. All terms in this settlement shall form the new agreement between the Parties. All terms and conditions will be effective date of signing unless otherwise noted.

Dated this 28th day of July, 2004 at Toronto, Ontario.

For EPSCA	For the Carpenters
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

MAP CODE:
C-6

ISSUED:
NOVEMBER 17, 2004

REVISED:
NOVEMBER 26, 2004

CARPENTERS
LOCAL 18 - Zone 2
Niagara

EPSCA WAGE SCHEDULE FOR PROJECTS WITHIN THE GEOGRAPHIC AREA OF THIS LOCAL (52)

GRADE AND STEP	CLASSIFICATIONS, OCCUPATION CODES & EFFECTIVE DATES	BASE HOURLY RATE	VACATION & STAT. HOLIDAY	UNION FUNDS* (2)	TOTAL WAGE PACKAGE	EPSCA ASSOC FUND(1)
01-9	FOREMAN - 400065					
	2004-08-01	30.55	3.06	8.50	42.11	0.15
	2005-05-01	31.20	3.12	8.89	43.21	0.15
	2006-05-01	31.85	3.19	9.28	44.32	0.15
01-8	SUBFOREMAN - 400055					
	2004-08-01	29.30	2.93	8.50	40.73	0.15
	2005-05-01	29.95	3.00	8.89	41.84	0.15
	2006-05-01	30.60	3.06	9.28	42.94	0.15
01-6	JOURNEYMAN - 400035					
02-6	WELDER & BURNER - 400036					
	2004-08-01	27.55	2.76	8.50	38.81	0.15
	2005-05-01	28.20	2.82	8.89	39.91	0.15
	2006-05-01	28.85	2.88	9.28	41.01	0.15
	APPRENTICE - 400015					
01-0	1st Year- 1st Period** (0-450 hrs) - 40% of journeyman rate					
	2004-08-01	11.02	1.10	2.80	14.92	0.15
	2005-05-01	11.28	1.13	3.09	15.50	0.15
	2006-05-01	11.54	1.15	3.38	16.07	0.15
01-1	1st Year- 2nd Period (451-900 hrs) - 40% of journeyman rate					
	2004-08-01	11.02	1.10	8.50	20.62	0.15
	2005-05-01	11.28	1.13	8.89	21.30	0.15
	2006-05-01	11.54	1.15	9.28	21.97	0.15
01-2	1st Year- 3rd Period (900-1800 hrs) - 50% of journeyman rate					
	2004-08-01	13.78	1.38	8.50	23.66	0.15
	2005-05-01	14.10	1.41	8.89	24.40	0.15
	2006-05-01	14.43	1.44	9.28	25.15	0.15
01-3	2nd Year - 65% of journeyman rate					
	2004-08-01	17.91	1.79	8.50	28.20	0.15
	2005-05-01	18.33	1.83	8.89	29.05	0.15
	2006-05-01	18.75	1.88	9.28	29.91	0.15
01-4	3rd Year - 75% of journeyman rate					
	2004-08-01	20.66	2.07	8.50	31.23	0.15
	2005-05-01	21.15	2.12	8.89	32.16	0.15
	2006-05-01	21.64	2.16	9.28	33.08	0.15
01-5	4th Year - 85% of journeyman rate					
	2004-08-01	23.42	2.34	8.50	34.26	
	2005-05-01	23.97	2.40	8.89	35.26	0.15
	2006-05-01	24.52	2.45	9.28	36.25	0.15

(1) = per hour worked; (2) = per hour paid
** No Pension contribution for the 1st 450 hours of first year apprentices

CARPENTERS
LOCAL 18 - Zone 2
Niagara

EPSCA WAGE SCHEDULE FOR PROJECTS WITHIN THE GEOGRAPHIC AREA OF THIS LOCAL (52)

GRADE AND STEP	CLASSIFICATIONS, OCCUPATION CODES & EFFECTIVE DATES	BASE HOURLY RATE	VACATION & STAT. HOLIDAY	UNION FUNDS* (2)	TOTAL WAGE PACKAGE	EPSCA ASSOC FUND(1)

Overtime Rate

Mon. - Fri. = 2X
Sat. = 2X
Sun. & Hol. = 2X

Union Funds

Union Funds include the following items:

Welfare -	$2.10	per hour paid
	$2.31	per hour paid - effective May 1, 2005
	$2.52	per hour paid - effective May 1, 2006
Pension -	$5.70	per hour paid
	$5.80	per hour paid - effective May 1, 2005
	$5.90	per hour paid - effective May 1, 2006
Training & Upgrading Fund -	$0.70	per hour paid
(Includes CDCTTF & Promotion Fund)	$0.78	per hour paid - effective May 1, 2005
	$0.86	per hour paid - effective May 1, 2006

Union Dues

Union Dues Checkoff -	$1.00	per hour paid
	$1.10	per hour paid - effective May 1, 2005
	$1.20	per hour paid - effective May 1, 2006
Union Administration -	$0.50	per hour paid

Union Dues Checkoff and Union Administration are not included in above noted Union Funds.
Union Dues Checkoff and Union Administration are to be deducted from the Base Hourly Rate.

Benefits

All remittances (employer contributions, employee deductions and dues) are to be sent to:

Local 18 Administrator
c/o CIBC
305 Milnar Ave., 7th Floor
SCARBOROUGH, ON
MIB 3V4

GEOGRAPHIC AREA: In Haldimand-Norfolk (RM) those portion of the City of Nanticoke and the Town of Haldimand lying east and south of a line commencing at Lake Erie and running northerly along the County Road between Selkirk and Belmoral, thence easterly along Hwy 3 between Balmoral and Canborough, thence northeasterly along the County Road from Canborough to Caistors Corners; in Niagara (RM) that portion south and east of a line commencing at Caistor Corners and running northeasterly along the County Road to Smithville, thence across Hwy 20 and northerly along the County Road from Smithville which ends at Hwy 8 and continuing northerly to the shore of Lake Ontario (all named locations and roads as shown on Map 21 - Southern Ontario - 1974).

Millwrights

UNITED BROTHERHOOD OF
CARPENTERS AND JOINERS OF AMERICA

MILLWRIGHTS' APPENDIX

The amendments contained in the Statement of Settlement, dated May 10, 2000, have been incorporated into the Millwrights' Appendix in accordance with the "Term of Agreement" article contained in the Master Portion of this Agreement.

EPSCA / MILLWRIGHTS

GENERAL NOTE

This Appendix distinguishes between two broad categories of work; namely, work which is covered by the *"modified provisions"* of this Appendix and work that is not. *"Modified provisions"* apply to all work on Lines & Stations and most work on existing generating sites. Following is a more detailed explanation:

The *"Modified Provisions"* of this Appendix will apply to:

(a) all work on Lines and Stations, and

(b) all work on existing generating sites except the construction of:
- **a new facility which provides a new function**
- **a new (i.e. additional) generating unit**

Addendum 1 contains the *"Modified Provisions of this Construction Appendix"*. All terms of this appendix shall apply to work covered by Addendum 1, with the exception of Article 1 - Classifications and Article 4 - Overtime Rates. The above Articles 1 and 4 do not apply when working under the terms and conditions of the *"modified provisions"*, as these Articles are replaced by Sections 1 and 2 of Addendum 1.

When work does not fall within the scope of Addendum 1, all terms of this appendix, with the exception of Addendum 1, apply.

A chart to illustrate the above applications follows:

Lines & Stations - Existing and New Sites	Generating - Existing Sites - Excluding construction of new facility (new function) &/or new (additional) generating unit(s)	Generating - Existing Sites - Involving construction of new facility (new function) & /or new (additional) generating unit(s)	Generating - New Sites (i.e. Greenfield Work)
Use Addendum 1 - Modified Provisions for Classifications and Overtime Rates.	*Use Addendum 1 - Modified Provisions* for Classifications and Overtime Rates.	Use all the provisions of the appendix, *except* Addendum 1.	Use all the provisions of the appendix, *except* Addendum 1.

EPSCA / MILLWRIGHTS' APPENDIX

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UNITED BROTHERHOOD OF
CARPENTERS AND JOINERS OF AMERICA

MILLWRIGHTS' APPENDIX

to the

Collective Agreement

by and between

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION
(hereinafter called "EPSCA")

and the

POWER COUNCIL OF UNIONS
(hereinafter called the "Council")

As provided in the "Appendices" article of the Master Portion of the Collective Agreement, EPSCA and the Council have agreed to the following conditions to apply to employees in classifications listed in Article 1 of this Appendix.

Article 1

CLASSIFICATIONS

Article 1 is applicable to work at Existing Generating Sites where work involves construction of a new facility (new function) and/or new (additional) generating unit(s) and at New Generating Sites (ie: Greenfield Work).

For work at Existing Generating Sites excluding work involving construction of a new facility (new function) and/or new (additional) generating unit(s) please refer to Section 1, Addendum 1 – Modified Provisions of this Construction Appendix.

1.1 The conditions set forth in this Millwrights' Appendix shall apply to the classification of Millwright.

1.2 Reference to Millwright in Article 1.1 above shall include welders, burners, subforemen, journeymen and apprentices employed in the Millwright trade.

1.3 Working Foremen:
Where the crew size is five (5) or less, the foreman may work with the tools on mutual agreement of EPSCA and the local Business Manager.

Article 2

WAGES

2.1 REV Effective May 1, 2000 and until April 30, 2004, the rates of pay for employees in the classifications listed in Article 1 of this Appendix shall be set forth in the wage schedules, attached hereto.

EPSCA will provide the Council with the current wage schedules.

Article 3

SHIFT DIFFERENTIAL RATE

3.1 Employees required to work shift work, other than the regular day shift, will receive a shift differential of one-fifth (1/5) for normal scheduled shift hours worked.

Article 4

OVERTIME RATES

Article 4 is applicable to work at Existing Generating Sites where work involves construction of a new facility (new function) and/or new (additional) generating unit(s) and at New Generating Sites (ie: Greenfield Work).

For work at Existing Generating Sites excluding work involving construction of a new facility (new function) and/or new (additional) generating unit(s) please refer to Section 2, Addendum 1 – Modified Provisions of this Construction Appendix.

4.1 Overtime will be paid at two times the base rate for work performed outside of normal hours as defined in the "Hours of Work" article of the Master Portion of this Agreement and for work performed on Saturday, Sunday and the Statutory Holidays listed in Article 15 of this Appendix.

4.2 Overtime rates will be set out on the wage schedules, attached hereto.

4.3 The Chief Steward/and or Job Steward will be informed of all overtime and shall be given the opportunity to work. In the event he declines the work, he shall be responsible to designate a steward to work the overtime who is qualified to perform the available work. Wherever practical, overtime shall be divided as equally as possible amongst all employees.

Article 5

BENEFITS

5.1 The Employer agrees to pay into operative welfare, pension and supplementary unemployment benefit plans, whether in addition to the wage rates or deducted from the wage rates, for employees covered by this Appendix. The amounts shall be as set out in the wage schedules, attached hereto.

5.2 The Union agrees to supply the Employer with all information regarding the welfare, pension and supplementary unemployment benefit plans and also all administrative material that is required for the implementation of them.

5.3 The Trustees of the Employee Benefit Plans referred to in this Collective Agreement shall promptly notify the Union of the failure by any Employer to pay any employee benefit contributions required to be made under this Collective Agreement and which are owed under the said plans in order that the program administrator of the Employee Wage Protection Plan may deem that there has been an assignment of compensation under the said program in compliance with the regulation to the *Employment Standards Amendment Act, 1991* in relation to the Employee Wage Protection Program.

5.4 In the event an Employer is more than fifteen (15) days in arrears of the requirement to forward contributions and/or deductions to the Trustees by the fifteenth of the month following, the Employer shall pay as liquidated damages and not as a penalty an amount equal to two (2%) percent (equivalent to 24 % per annum) for each month or part thereof that the contributions and/or deductions are in default for greater than fifteen (15) days provided the Employer has received five (5) days' written notice to correct such default. The trustees may require a delinquent Employer to pay for the costs, legal or otherwise, of collecting the amount owing, as outlined in the operative benefit plan trust documents.

Article 6

INCLEMENT WEATHER PAY

6.1 An employee who reports for work at the beginning of a shift and is unable to commence work due to inclement weather, will receive two (2) hours' pay at the applicable rate. To qualify, the employee must remain on the job site for two (2) hours, unless excused earlier by an authorized representative of the Employer.

6.2 An employee who reports for and commences work but is unable to continue work due to inclement weather shall receive four (4) hours' pay at the applicable rate or pay for the actual time worked for that shift, whichever is greater.

6.3 An employee who qualifies for inclement weather pay shall also receive travel or board allowance, if applicable.

Article 7

KEY EMPLOYEES

7.1 The parties agree that an Employer shall be allowed to transfer from one project to another two (2) key employees in order to effectively utilize their special skills, having regard for the special requirements of thermal, nuclear or hydraulic generation and transmission and transformation construction.

If the Employer finds it necessary to transfer additional key employees, the number shall be mutually agreed to by the Employer and the Union.

7.2 After the work force of an Employer reaches twenty (20) Millwrights, the total number of key employees to be transferred will be based on a ratio of 1 to 10, but in no case will exceed 10.

7.3 An apprentice shall not be considered a key employee for the purposes of this Article.

7.4 *Construction Radiation Protection Assistant (R.P.A.)* is a Construction Trades Person who has achieved the full radiation qualification (Green) via the approved Health and Safety Division Training Program, plus has successfully completed the Construction R.P.A. (Green Manning) training and checkouts, also has performed R.P.A. functions while under supervision of a fully qualified Construction R.P.A. to the satisfaction of the Construction Site Safety Officer and the Station Health Physics Unit.

R.P.A. will be paid the equivalent to the appropriate foreman's rate when performing an R.P.A. function and will report to the Site Safety Unit. An R.P.A. is a "qualification" and not a "trade function" irrespective of union or trade affiliation.

7.5 In the case of a recall to work, the Employer reserves the right to recall qualified Greenmen in sequence from the out of work list to the location from which they were laid off. Recalled Greenmen will perform sufficient Greenman work to maintain their skill levels.

Article 8

TRAVEL AND TRANSPORTATION

8.1 INITIAL EMPLOYMENT

REV

On recruitment of tradesmen whose regular residence* is between 80 to 160 radius kilometers from the project, the Employer shall pay $26.00 effective May 1, 2000 ($27.00 effective May 1, 2001, $28.00 effective May 1, 2002, $29.00 effective May 1, 2003) for the initial trip to the project.

8.2 **REV** On recruitment of tradesmen whose regular residence is in Ontario but beyond 160 radius kilometers from the project, the Employer shall pay 27¢ per radius kilometer effective May 1, 2000 (28¢ effective May 1, 2001, 29¢ effective May 1, 2002, 30¢ effective May 1, 2003) plus an allowance for travel time equivalent to one hour's pay for each 80 radius kilometers of travel to a maximum of 8 hours' pay for the initial trip to the project from the tradesman's regular residence.

8.3 On recruitment of tradesmen whose regular residence is outside Ontario and beyond 160 radius kilometers from the project, the Employer shall pay the equivalent of the cost of public transportation plus an allowance for travel time equivalent to one hour's pay for each 80 radius kilometers of travel to a maximum of 8 hours' pay for the initial trip to the project from the tradesman's regular residence or place of recruitment, whichever is closer to the project.

8.4 To qualify for payment in 8.1, 8.2 or 8.3, the employee must remain at the project for a minimum of fifteen (15) working days or the duration of his job, whichever is lesser.

8.5 On termination of employment due to a reduction of staff, an employee entitled to payment under 8.1, 8.2, or 8.3 shall be entitled to return expenses calculated in the same manner as in 8.1, 8.2, or 8.3 above for the return trip from the project. An employee whose employment terminates for any reason other than reduction of staff shall not be eligible for return payment.

8.6 TRANSFER

When transferring employees the Employer shall pay the equivalent of the cost of public transportation for the initial trip to the project from the employee's most recent work location. In addition, the Employer shall pay an allowance for travelling time equivalent to the straight-time rate up to a maximum of eight (8) hours.

* ***As defined in Article 17 or Article 18 of the Master Portion of this Agreement, whichever is applicable.***

Article 9

TOOLS

9.1 In accordance with the "Tools and Clothing" article of the Master Portion of this Agreement, employees shall be required to provide themselves with the ordinary hand tools of their trade as specified in the Tool List, attached to this Appendix.

9.2 Employers may supply additional tools and equipment to employees, when required. Employees receiving such tools or equipment shall be responsible for them in accordance with the "Tools and Clothing" article of the Master Portion of this Agreement.

9.3 Employees will immediately report the loss of any Employer-supplied tools or equipment.

Article 10

PROTECTIVE CLOTHING AND EQUIPMENT

10.1 Employees are required to wear protective clothing and use protective equipment, as determined by the Employer, for the work being done.

10.2 The protective clothing and equipment covered in 10.1 of this Article that is provided by the Employer shall be charged out to an employee. Employees will not be held liable for items which are returned in reasonable condition or which are lost or damaged under conditions where no employee negligence is evident and where the loss or damage is reported immediately. Where negligence is determined, the employee will be charged for the cost of repair or replacement.

10.3 If job conditions necessitate coveralls and gloves, as determined by the Employer, the Employer shall supply and maintain the necessary protective clothing at no cost to the employee.

Article 11

WELDING TESTS

11.1 On hire, welders must possess the qualifications and class of welding ticket specified by the Employer. It will be at the Employer's discretion whether a welder who does not possess the qualifications and class of welding ticket specified will be hired.

11.2 A welder who has been referred to the Employer by the Union and who has never had a welding certificate will take an applicable test on his own time and pay for such test.

11.3 An employee who possesses a current welding ticket and is required to take a test at the time of hire shall be paid his normal wages for the time to take such a test. Any employee who fails to pass the welding test will not have benefits or other added costs paid on his behalf.

Article 12

APPRENTICESHIP AND TRAINING PROGRAMS

12.1 The Employer agrees to pay into operative apprenticeship or training funds the amounts specified for apprenticeship or training as set forth in the wage schedules, attached hereto, for employees covered by this Appendix during the time they are employed.

12.2 The Union agrees to supply EPSCA with all administrative material that is required for implementation of these funds.

12.3 Training programs established by the Employers to provide skills required in the electrical power systems sector shall be funded by reducing the Employers' contributions to the training fund in the specific locality where the training is taking place by an amount of money equivalent to the cost of such programs.

12.4 Where training programs are established, the Employer shall ensure that sufficient journeymen are available and supervision is provided so that the apprentice has ample opportunity to obtain his related training and work experience to the degree possible during the Employer's tenure on site.

12.5 Both parties acknowledge the Employer's and the Union's responsibilities, respectively, in the training of apprentices to meet the Employer's current and future needs.

Apprentices, when available, shall be employed on work covered by this agreement in the ratio of one (1) Apprentice to four (4) Journeymen. When requested, the first Apprentice shall be a fourth or third year Apprentice, if available.

12.6 Apprentices will not be required to work shift work when it interferes with attendance at classes endorsed by the Local Apprenticeship training program.

Article 13

RADIATION INFORMATION

13.1 Each employee will have access to his personal radiation exposure record.

Article 14

VACATION AND STATUTORY HOLIDAY PAY TRUST FUNDS

14.1 Each Employer shall contribute to The Millwright Benefit Plan Trust Funds, ten percent (10%) of the vacationable gross earnings* of each employee covered by this Agreement. The money is to be distributed by the Fund in the following manner: five percent (5%) Vacation Pay to be paid out in June of each calendar year and five percent (5%) Statutory Holiday Pay to be paid out in November of each calendar year.

Each Employer shall remit contributions on behalf of his employees into The Millwright Benefit Plan Trust Funds by the 15th day of the month, following the month in which the hours were earned to the Administrator. At no time will any contributions be paid directly to the employee.

Any Employer in default more than fifteen (15) days in remitting payment, shall pay to the Trustees, as liquidated damages and not as penalty, the amount equal to two percent (2%) of the arrears for each month or part thereof in which he is in default. In addition, the defaulting Employer shall be liable to pay and agrees to pay interest at the rate of 1 1/2% per month on any unpaid arrears including the liquidated damages specified herein.

A three (3) week leave of absence for the purpose of taking an annual vacation will be granted in the calendar year in which the employee completes one year of service*. In special circumstances, where the work schedule permits, additional time off may be granted an employee. The additional time off will not be unreasonably denied.

Article 15

STATUTORY HOLIDAYS

15.1 The Statutory Holidays recognized under this Agreement are:

New Year's Day	Civic Holiday
Good Friday	Labour Day
Easter Monday	Thanksgiving Day
Victoria Day	Christmas Day
Canada Day	Boxing Day

EPSCA agrees to recognize Heritage Day when proclaimed by legislation.

* ***"Vacationable gross earnings" means pay for regular hours, overtime, premium pay, shift differential, lines and stations daily travel time, retroactive pay adjustments, reporting pay, inclement weather pay, call-in pay, Saturday and Sunday premiums and trade training, but does not include payment for initial and return travel.***

* ***Service will be calculated based on an employee's length of continuous service with his Employer.***

Recognized holidays falling on a Saturday or Sunday shall be observed on the following Monday. When Christmas Day falls on a Saturday or Sunday, it shall be observed on the following Monday and Boxing Day on the following Tuesday. When New Year's Day falls on a Saturday or Sunday, it shall be observed on either the preceding Friday or the following Monday.

EPSCA reserves the right to change the day of observance of a Statutory Holiday when such a holiday falls on a Tuesday or Thursday.

Article 16

EMPLOYEE TRANSFERS

NEW

16.1 The parties agree an employer is allowed to transfer employees within the geographic area of the Local Union for projects covered by this collective agreement.

The incorporated specific Statement of Settlement amendments to the United Brotherhood of Carpenters and Joiners of America Millwrights' Appendix of the Collective Agreement between The Electrical Power Systems Construction Association and The Power Council of Unions have been agreed to by the bargaining committees of the Millwrights and The Electrical Power Systems Construction Association. These proposed amendments are herewith recommended to the EPSCA Board of Directors and the Officers of the Council in accordance with Article 33.1 of the Master Portion of the Collective Agreement for approval and incorporation into the Millwrights' Appendix of the Collective Agreement.

Dated this *10th* day of *May* , 2000.

For: The Millwright Bargaining Committee

Claude Cournoyer

_____

For: The EPSCA Bargaining Committee

Barry Roberts

_____

Approved for incorporation into the Millwrights' Appendix effective this *10th* day of *April* , 2001.

For: **The Electrical Power Systems Construction Association**

Jim Coathup

_____

Joe Dotchin

_____

For: **The Power Council of Unions**

Claude Cournoyer

_____

Rick Weiss

_____

Phil Bertrand

_____

_____

ADDENDUM 1

MODIFIED PROVISIONS OF THIS CONSTRUCTION APPENDIX

These provisions will apply to:

(a) all work on Lines and Stations, and

(b) all work on existing generating sites except the construction of:

- a new facility which provides a new function
- a new (i.e. additional) generating unit

Definitions:

Facility Something that is built composed of multi-systems which serves a specific function

Function Examples - Generation, Administration, Warehousing, Heavy Water Production, Flue Gas Desulphurization, Tritium Removal, Site Services (e.g. Shops)

Dispute Resolution Process

A dispute as to whether the 'Modified Provisions of this Construction Agreement' apply to the construction of a new facility will be referred to the Executive Committee for resolution and the Executive Committee will meet within five (5) working days. If the Executive Committee is unable to resolve the dispute, the dispute will be referred to a single arbitrator within ten (10) working days for a final and binding resolution. The arbitrator shall give an oral decision within five (5) working days, and a written decision, if requested, within twenty (20) working days.

All terms of this appendix shall apply to work covered by Addendum 1, with the exception of Article 1 - Classifications and Article 4 - Overtime Rates.

EPSCA/MILLWRIGHTS' APPENDIX

ADDENDUM 1

MODIFIED PROVISIONS

OF THIS CONSTRUCTION APPENDIX

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Section 1

CLASSIFICATIONS

1.1 The conditions set forth in this Millwrights' Appendix shall apply to the classification of Millwright.

1.2 Reference to Millwright in section 1.1 above shall include welders, burners, subforemen, journeymen and apprentices employed in the Millwright trade.

1.3 Working Foremen:
Where the crew size is five (5) or less, including the foreman, the foreman may be required to work with the tools of the trade.

Section 2

OVERTIME RATES

2.1 When working on an eight (8) hour day and five (5) day per week work schedule (Monday to Friday inclusive), overtime work shall be paid at one and one-half (1-1/2) times the basic hourly rate for all hours worked beyond the normal daily scheduled number of hours up to a maximum of two (2) hours per day. All hours in excess of ten (10) hours per day shall be paid at two (2) times the basic hourly rate.

When working on a ten (10) hour day and four (4) day per week work schedule (Monday to Friday inclusive) overtime work shall be paid at one and one-half (1-1/2) times the basic hourly rate for all hours worked beyond the normal daily scheduled number of hours up to a maximum of two (2) hours per day. All hours in excess of twelve (12) hours per day shall be paid at two (2) times the basic hourly rate.

2.2 Overtime work performed on Saturday, Sunday, non-shift days, and the Statutory Holidays listed in Article 15 of this Appendix shall be paid at two (2) times the basic hourly rate.

2.3 The Chief Steward/and or Job Steward will be informed of all overtime and shall be given the opportunity to work. In the event he declines the work he shall be responsible to designate a steward to work the overtime who is qualified to perform the available work. Wherever practical, overtime shall be divided as equally as possible amongst all employees.

Section 3

EMPLOYMENT REQUESTS

3.1 **REV** The Employer shall have the right to request Union members from that Local having jurisdiction for the geographic area by name, in writing, who shall be issued a referral slip by the Local Union. The number of employees so requested shall not exceed twenty-five percent (25%) of the employees supplied to the job by the Local Union. Upon layoff, the ratio of name hires to those members referred off the list (excluding foremen and key tradespersons) shall be maintained.

UNITED BROTHERHOOD OF CARPENTERS AND JOINERS OF AMERICA

MILLWRIGHTS' APPENDIX

TOOL LIST

The Millwright will supply, on reasonable notice, the following list of ordinary hand tools of the trade when required in the performance of his normal duties.

1 carry-type tool box with lock and key
1 set feeler gauges, .0015 to .035 inches
1 outside micrometer 0 to 1 inch
1 6-inch calipers (inside and outside)
1 6-inch or 9-inch machinist's level
1 combination square with protractor
2 scribers
1 set centre punches
1 set 1/2-inch drive sockets, 3/8-inch to 1-1/4 inch, consisting of:
10-inch reversible ratchet
5-inch extension
10-inch extension
universal joint
flex handle
extra-deep sockets, 3/16-inch,
7/8-inch, 15/16-inch
1 set combination wrenches 3/8-inch to 1-1/4-inch or 1 set box-end and 1 set open-end
1 set regular screwdrivers (3)
1 offset screwdriver
1 set Phillips screwdrivers
1 set Robertson screwdrivers
1 set Allen wrenches 1/8-inch to 1/2-inch
1 set taper punches
1 set pin punches
1 set chisels
1 vise grip pliers
1 6-inch diagonal cutting pliers
1 10-inch rib joints pliers
1 needle nose pliers
1 8-inch adjustable wrench
1 12-inch adjustable wrench
2 ball peen hammers

Millwrights' Appendix Tool List (continued)

1	pry bar
1	hack saw
1	tin snips
1	hole magnet
1	rawhide hammer
1	pocket knife
1	flat scraper
1	bearing scraper
1	chalk line
1	vernier calipers 6-inch
1	set thread gauges
1	set depth gauges
1	flashlight
1	inspection mirror
1	adjustable steel tape, 8-foot minimum
1	oil stone
1	50-foot steel tape
1	set dividers
1	plumb bob with line

LETTER OF UNDERSTANDING

between

THE ELECTRICAL POWER SYSTEMS
CONSTRUCTION ASSOCIATION

and the

MILLWRIGHT DISTRICT COUNCIL OF ONTARIO,
UNITED BROTHERHOOD OF CARPENTERS AND JOINERS OF AMERICA

It is agreed by the parties that if an Employer under this agreement assigns layout/survey type work to the Millwright District Council of Ontario, United Brotherhood of Carpenters and Joiners of America, the Employer will pay those Millwrights in accordance with the Journeyman rates listed in the appropriate EPSCA wage schedules. EPSCA Vacation and Statutory Holiday Pay entitlement shall be calculated in the amount of ten percent (10%) of the base hourly rate. Welfare, Pension and Training Fund amounts shall be as set out in the appropriate EPSCA wage schedule. All other conditions contained the the EPSCA Collective Agreement apply.

DATED AT Toronto THIS 5th DAY OF Nov 1990.

FOR: EPSCA BARGAINING COMMITTEE:

FOR: MILLWRIGHT DISTRICT COUNCIL OF ONTARIO BARGAINING COMMITTEE:

FOR: THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION:

FOR: THE ONTARIO ALLIED CONSTRUCTION TRADES COUNCIL:

MAP CODE: N/A

ISSUED: OCTOBER 14, 2004

REVISED: APRIL 29, 2005

MILLWRIGHTS
LOCALS 1007, 1151, 1244, 1410, 1425, 1592, 1916 & 2309
Province of Ontario

EPSCA WAGE SCHEDULE FOR PROJECTS WITHIN THE GEOGRAPHIC AREA OF THESE LOCALS (52), (57), (62), (66), (70), (82)

GRADE AND STEP	CLASSIFICATIONS, OCCUPATION CODES & EFFECTIVE DATES	BASE HOURLY RATE	VACATION & STAT. HOLIDAY	WELFARE (2)**	PENSION (2)	UNION FUNDS (2)	TOTAL WAGE PACKAGE	EPSCA ASSOC FUND(1)
05-9	FOREMAN - 436365							
	2004-07-01	35.09	3.51	2.20	5.10	0.65	46.55	0.15
	2005-05-01	36.00	3.60	2.70	5.10	0.65	48.05	0.15
	2006-05-01	36.86	3.69	2.90	5.10	0.65	49.20	0.15
05-8	SUBFOREMAN - 436355							
	2004-07-01	33.24	3.32	2.20	5.10	0.65	44.51	0.15
	2005-05-01	34.15	3.42	2.70	5.10	0.65	46.02	0.15
	2006-05-01	35.01	3.50	2.90	5.10	0.65	47.16	0.15
05-6	JOURNEYMAN - 436335							
	2004-07-01	30.99	3.10	2.20	5.10	0.65	42.04	0.15
	2005-05-01	31.90	3.19	2.70	5.10	0.65	43.54	0.15
	2006-05-01	32.76	3.28	2.90	5.10	0.65	44.69	0.15
05-0	APPRENTICE - 436315 (0 - 1999 hrs)							
	2004-07-01	18.59	1.86	2.20	5.10	0.65	28.40	0.15
	2005-05-01	19.14	1.91	2.70	5.10	0.65	29.50	0.15
	2006-05-01	19.66	1.97	2.90	5.10	0.65	30.28	0.15
05-1	(2000 - 3999 hrs)							
	2004-07-01	21.69	2.17	2.20	5.10	0.65	31.81	0.15
	2005-05-01	22.33	2.23	2.70	5.10	0.65	33.01	0.15
	2006-05-01	22.93	2.29	2.90	5.10	0.65	33.87	0.15
05-2	(4000 - 5999 hrs)							
	2004-07-01	24.79	2.48	2.20	5.10	0.65	35.22	0.15
	2005-05-01	25.52	2.55	2.70	5.10	0.65	36.52	0.15
	2006-05-01	26.21	2.62	2.90	5.10	0.65	37.48	0.15
05-3	(6000 - 8000 hrs)							
	2004-07-01	27.89	2.79	2.20	5.10	0.65	38.63	0.15
	2005-05-01	28.71	2.87	2.70	5.10	0.65	40.03	0.15
	2006-05-01	29.48	2.95	2.90	5.10	0.65	41.08	0.15

(1) = per hour worked; (2) = per hour paid

MILLWRIGHTS
LOCALS 1007, 1151, 1244, 1410, 1425, 1592, 1916 & 2309
Province of Ontario

EPSCA WAGE SCHEDULE FOR PROJECTS WITHIN THE GEOGRAPHIC AREA OF THESE LOCALS (52), (57), (62), (66), (70), (82)

GRADE AND STEP	CLASSIFICATIONS, OCCUPATION CODES & EFFECTIVE DATES	BASE HOURLY RATE	VACATION & STAT. HOLIDAY	WELFARE (2)**	PENSION (2)	UNION FUNDS (2)	TOTAL WAGE PACKAGE	EPSCA ASSOC FUND(1)

OVERTIME

Mon-Fri: Scheduled Work Days - 1 1/2 times for up to and including 2 hours beyond the normal daily scheduled number of hours. This applies for both 4 day x 10 hours per day schedule and 5 day by 8 hour per day schedule.
Non-Scheduled Work Days - 2 times for all hours worked.

Sat: 2 times for all hours worked.

Sun & Holidays: 2 times for all hours worked.

UNION FUNDS:

Union Funds include the following items:

Millwright Training -	$0.10	per hour paid
Legal Defense -	$0.05	per hour paid
SUB -	$0.20	per hour paid
District Council -	$0.20	per hour paid
Apprenticeship Assistance -	$0.05	per hour paid
Bill 162 -	$0.05	per hour paid

DeNovo - $0.02 per hour paid (includes $0.01 per hour (paid) Employer Contribution and $0.01 per hour (paid) Employee Deduction) as noted below in Union Dues.

Notes:
** Welfare includes welfare amount of $2.18 and 2 cents for WSIB Bill 162 benefits.
** Welfare includes welfare amount of $2.68 and 2 cents for WSIB Bill 162 benefits - eff. May 1 2005.
** Welfare includes welfare amount of $2.88 and 2 cents for WSIB Bill 162 benefits - eff. May 1 2006.
** RST is payable on full Welfare amount.

UNION DUES

Union dues are to be deducted as follows:

July 1, 2004 -	$0.94	per hour paid (inclusive of DeNovo employee contribution)
May 1, 2005 -	$0.96	per hour paid (inclusive of DeNovo employee contribution)
May 1, 2006 -	$0.99	per hour paid (inclusive of DeNovo employee contribution)

Union dues deductions are NOT included in the above-noted UNION FUNDS.
Union Dues are to be deducted from the Base Hourly Rate.

BENEFITS

All remittances (deductions, contributions and dues) excluding vacation pay are to be sent to:

Millwright Benefit Plan Trust Fund
c/o Manion Wilkins & Associates Ltd.
230 Norseman Street
ETOBICOKE, ON
M8Z 6A2

Vacation Pay are to be sent to:

Millwright Vacation Pay Trust Fund
c/o Manion Wilkins & Associates Ltd.
230 Norseman Street
ETOBICOKE, ON
M8Z 6A2

GEOGRAPHIC AREA: Province of Ontario

Labourers

COLLECTIVE AGREEMENT

BETWEEN:

THE HEAVY CONSTRUCTION ASSOCIATION OF TORONTO

-and-

UNIVERSAL WORKERS UNION, L.I.U.N.A. LOCAL 183

MAY 1, 2001 TO APRIL 30, 2004

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THIS AGREEMENT made and entered into this 1st day of May, **2001**.

B E T W E E N :

THE HEAVY CONSTRUCTION ASSOCIATION OF TORONTO

(hereinafter called the **"Association"**)

OF THE FIRST PART

- and -

UNIVERSAL WORKERS UNION, L.I.U.N.A. LOCAL 183

(hereinafter called the **"Union"**)

OF THE SECOND PART

WHEREAS the Association has been accredited by the Ontario Labour Relations Board;

NOW THEREFORE, the parties hereto agree as follows:

ARTICLE 1 - GENERAL PURPOSE

The general purpose of this agreement is to establish mutually satisfactory relations between the Employers and their employees, and to provide a means for a prompt and equitable disposition of grievances, and to establish and maintain satisfactory working conditions, hours of work and wages within the geographical area hereinafter set out for all construction employees performing work under the classifications listed in the Schedules forming part of the agreement, in the employ of the Employers while **employed** in the Heavy Engineering Sector **or engaged in such other work as has traditionally been performed under this Collective Agreement,** as described in Article 3 hereafter, save and except construction employees covered by collective agreements respecting road building, sewer and watermain construction, and save and except non-working foremen

and persons above the rank of non-working foreman.

The geographic area covered by this agreement is defined as **Board** Areas **#8, 9, 10, 11 & 18**, set out by the Ontario Labour Relations Board, subject to any existing bargaining rights held by any other trade union.

The terms and conditions for Simcoe County are in Schedule "F"; the terms and conditions for construction labourers in Board Areas #9, 10, 11 and the District of Muskoka are as negotiated by Local 183 and the Oshawa Signatory Contractors and are attached as Appendix 1 which also forms part of this Agreement.

ARTICLE 2 - TERM OF AGREEMENT

(a) This agreement shall be effective and operative from **May 1st, 2001** and shall remain in full force and effect until the **30th day of April, 2004.**

(b) Should the Union or the Association desire to change, add to, amend or terminate this agreement, written notice to that effect will be given not more than one hundred and twenty (120) days and not less than sixty (60) days prior to the termination of this agreement. On receipt of such notice, the parties to the agreement shall convene a meeting within fifteen (15) days and bargain in good faith to endeavour to reach an agreement. If no such notice is given, this agreement shall **continue in force thereafter for a further three (3) year period unless either party shall furnish the other with desire to change, add to, amend or terminate this Agreement within any like period of that set out above, in any third year thereafter.**

ARTICLE 3 - RECOGNITION AND SCOPE

(a) **The Association recognizes the Universal Workers Union, L.I.U.N.A., Local 183 as the sole and exclusive bargaining agent for all construction employees coming within the jurisdiction of this Agreement while working in the Heavy Engineering Sector, as defined by Article 1 of this Agreement and as further defined by Section (b) of this Article, or while engaged in any other work which has been traditionally performed under the terms and conditions of this Collective Agreement and such other construction employees covered by the collective agreements set out in Article 3(c); save and except non-working foremen, persons above the rank of non-working foreman, office and clerical staff, shop and yard employees, engineering staff and security guards. The Union recognizes the Association as the bargaining representative for all Employers for whom it has authority to bargain by virtue of it being the accredited bargaining representative for the Heavy Engineering Sector, or otherwise, but recognizes such representation is without liability against the Association for violations of the Agreement by individual Employers.**

(b) **It is agreed that this Collective Agreement applies to all work falling within the Heavy Engineering Sector (which, for the purposes of this Agreement includes all work traditionally performed under the terms and provisions of this Collective Agreement) in Ontario Labour Relations Board Geographic Areas #8, 9, 10, 11 & 18, subject to any existing bargaining rights held by any other trade union, performed by members of the bargaining unit including, but not limited to, the construction, reconstruction, demolition, construction maintenance, rehabilitation, repair and, except as specifically excluded below, all associated work traditionally related thereto, of the following:**

1. Bridges, including pedestrian bridges, underpasses and overpasses.

2. Retaining walls (all types), slurry walls and abutments associated with bridges, underpasses and overpasses.

3. All structures in connection with dams, docks, wharves and breakwaters.

4. Gabion work carried out on heavy construction work.

5. Precast rip-rap installations and all slopes retaining work directly associated with bridge construction.

6. Tunnels, save and except cable conduits (utilities), pipelines and sewer and watermain tunnels.

7. Structural work on reservoirs and pumping stations, and sewage and water treatment plants.

8. Installation and/or removal of piles, shoring, anchors, caissons and underpinning, including all welding related thereto.

9. Structures on transit systems (heavy rail or light rail) and on express-ways, including all welding related thereto.

10. Structures involved in river channelization and flood control projects, except structural work traditionally carried out by the roads or sewers industry.

11. Box culverts over 15 feet in overall surface span (the calculation of the span excludes intermediate piers or supports).

12. All T.T.C. projects including structural work on stations and sewer and

watermain work on these projects, save and except work carried out according to past practices on stations by architectural and finishing trades and on roadways by road builders.

13. Field precast manufacturing operations as defined in Schedule "C" of this agreement.

14. Erection, installation and finishing of precast concrete products directly associated with heavy construction work.

15. Cement lining of watermains.

16. All work involved in or related to the erection or dismantling of scaffolding including high load shoring systems or any of the above-noted works, projects or undertakings.

17. All work involved in or related to the installation, removal and operation of glycol circulated ground heating systems on any of the above noted works, projects or undertakings.

(c) **If an Employer covered by this Agreement engages in work other than that falling within the Heavy Engineering Sector and/or work which has traditionally been performed under the terms of this Collective Agreement and such other work comes within the purview of any of the collective agreements set out in Schedule "E", then all terms and conditions of the applicable collective agreements shall apply.**

ARTICLE 4 - UNION SECURITY

(a) The Employers agree to employ only members in good standing of the Union for work covered by this agreement.

(b) As a condition of continued employment, all employees shall maintain in good standing their membership in the Union.

(c) The Union agrees that no discrimination shall be shown against any non-working foreman who elects to retain Union membership while functioning in this management capacity.

(d) **Except as provided for hereafter, the Employers agree to sublet all work covered by this agreement to companies which are bound to the terms and provisions of this Collective Agreement, and such work will be performed under the terms and provisions of this Collective Agreement by such subcontractors.**

(e) (i) **Except as provided in (e) (ii) the Employers agree to sublet all sewer and watermain work and all road construction work and**
all work falling under the Railroad Agreement (i.e. "Violin"), on the project within the jurisdiction of Universal Workers Union, Local 183, only to subcontractors who are in contractual relationship with the Union or other Locals of the Labourers' International Union of North America which have jurisdiction over the work.

(ii) The Employers agree to sublet work falling within the scope of this agreement in the erection, installation and finishing of precast products, sound wall and fencing of all types only to such contractors who are party to or bound by a collective agreement binding upon the Union and who employ only members of Local 183 to perform such work.

(iii) The Employers agree to subcontract utility construction work (as described by the collective agreement binding upon The Utility Contractors' Association of Ontario, Inc. and the Union) in connection with the construction of any structure or bridge only to contractors who are party to or bound by a collective agreement with or binding upon the Union and who shall perform such work under such collective agreement.

(iv) The Employers agree to sublet all landscaping work only to contractors who are party to or bound by a collective agreement binding upon the Union.

(f) Each employee shall, when working in a position within the bargaining unit described in Article 3 above, be required as a condition of employment to have his regular monthly union dues and any required working dues checked off and the Union agrees to duly inform the Employer of the amounts of such union dues and working dues and any changes in the amounts. The Employer agrees to make such deductions from the first pay issued to the employees each calendar month and remit the same to the Union not later than the fifteenth (15th) day of the following month to the Secretary-Treasurer of the Union. The Employers shall, when remitting such dues, name the employees and their social insurance numbers from whose pay such deductions have been made. It is further agreed and understood that the Employers will receive at least 30 days notice of any changes in the amounts of working dues. It is also agreed and understood that this clause shall apply to all Schedules of this Collective Agreement.

(g) The Employers further agree that off-duty policemen will be used only where necessary or stipulated by contract specifications.

ARTICLE 5 - HIRING OF EMPLOYEES

(a) For T.T.C. projects and for mixed projects where fifty percent (50%) or more of the work falls within the Heavy Engineering Sector, the Employer agrees to call the Union Hall by 1:00 p.m. for his needed supply of men for the following day. All employees hired through the Union Hall shall present to the Employer a referral slip from the Union prior to commencing employment. It is understood that if the Union, having been requested by 1:00 p.m. to supply men, is unable to confirm by 4:30 p.m. of the same day that the required men will report at the job site ready for work at the starting time the following work day, the Employer is free to hire such local labour as is available without payment of any travel allowance. Any local labour so hired shall apply to the Union for membership within fifteen (15) calendar days of hiring, and as a condition of continued employment shall maintain membership in good standing in the Union.

(b) For mixed projects where less than fifty percent (50%) of the work falls within the Heavy Engineering Sector:

(i) The Employers shall have the right to hire up to fifty percent (50%) of the required work force on the project from any available source, provided however, that any **employee** so hired will be required to apply for a clearance slip from the Union before starting work. It is further agreed that when a new employee is hired, he will be required to apply for a clearance slip from the Union before starting work, except in emergency circumstances where the Employer requires the employee to start work immediately, in which event the employee must apply for clearance at the Union Hall not later than the Saturday following commencement of employment. The Employer shall supply a letter to the employee confirming he has been hired.

(ii) The balance of the required work force shall be hired through the Union Hall in accordance with Section (a) above.

(iii) The sequence and order of hiring employees under the provisions of sub-sections (i) and (ii) above shall be as mutually agreed from time to time between the Employer and the Union.

(c) It is further agreed that any employee hired under the provisions of Section (a) or (b) above can be transferred to any project of the Employer and assigned to work on any aspect of the said project, except that only employees who have been hired with a referral slip from the Union {Section (a) above} may be transferred to a T.T.C. project. It is further agreed that on a project where fifty percent (50%) or more of the work falls within

the Heavy Engineering Sector, no more than twenty-five percent (25%) of the total number of employees engaged on that project and covered by this agreement shall be key employees of the Employer who have been transferred from other projects of the Employer where such employees were originally hired by clearance slip from the Union.

(d) **It is agreed that should an Employer violate any of the terms and provisions set out above with respect to the hiring of employees, then, without prejudice to any other claim for damages which the Union may have, the Employer will pay to the Union general damages in an amount equal to all amounts which would have been paid to employees (whether members of the Union or not) and/or the Union and/or others on behalf of the Union and such employees had the Employer not violated the hiring provisions of this Agreement.**

ARTICLE 6 - MANAGEMENT RIGHTS

The Union agrees that it is the exclusive function of the Employer:

(a) To conduct its business in all respects in accordance with its commitments and responsibilities, including the right to manage the jobs, locate, extend, curtail or cease operations, to determine the number of men required at any and all operations, to determine the kinds and locations of equipment to be used and the schedules of production, to judge the qualifications of the employees and to maintain order, discipline and efficiency.

(b) To hire, discharge, classify, transfer, promote, demote, layoff, suspend or otherwise discipline employees, provided that a claim by an employee that he has been discharged, suspended disciplined or disciplinarily demoted without reasonable cause, shall be subject to the provisions of the Grievance Procedure.

(c) To make, alter from time to time, and enforce reasonable rules of conduct and procedure to be observed by the employees.

(d) **It is agreed that these functions shall not be exercised in a manner which is inconsistent with the express provisions of this Agreement or which is arbitrary, discriminatory or in bad faith.**

ARTICLE 7 - CO-OPERATION

(a) The Employers agree to advise the Union when any major change is being made to working systems or working rules on the project and will discuss the intended changes with the Union

(b) In the event new classifications are introduced under the scope of this agreement, the parties shall meet and negotiate the applicable wage rates which shall bear a proper ranking relationship to the wage rates set up in the Schedules of this agreement.

(c) A pre-job conference may be called at the option of either party on all T.T.C. projects and mixed projects.

ARTICLE 8 - WORK JURISDICTION, HOURS OF WORK, OVERTIME AND WAGE RATES

Attached hereto are Schedules of hours of work, overtime, wage rates and classifications, which are hereby made a part of this agreement.

ARTICLE 9 - JURISDICTIONAL DISPUTES

When a work claim dispute arises between the Union which is a party to this agreement and any other union, person or organization, which cannot be settled to the satisfaction of all parties concerned, such dispute shall immediately be processed as a complaint to the Ontario Labour Relations Board requesting an order from that Board as outlined in Section 99 of the Labour Relations Act, R.S.O. 1995, Chapter 228, as amended, and in the meantime, work will continue as assigned by the Employer until otherwise directed by the Ontario Labour Relations Board.

ARTICLE 10 - HOLIDAYS

All work performed on Sundays, and the following holidays:

New Year's Day	Labour Day
Good Friday	Thanksgiving Day
Victoria Day	Christmas Day
Civic Holiday	Boxing Day
Canada Day	

Or any other statutory holidays legally declared by the Provincial or Federal Government, shall be deemed overtime work and paid for at the rate of double the regular day shift rate.

ARTICLE 11 - VACATION PAY AND STATUTORY HOLIDAY PAY

(a) Vacation and statutory holiday credits shall be paid to employees covered by this collective agreement at the rate of ten percent (10%) of the gross wages earned. It

is understood and agreed that five percent (5%) is to be considered in lieu of statutory holiday pay.

(b) During the term of any one year, by mutual arrangement between an Employer and employee only two (2) weeks' vacation without pay will be taken by an employee, exclusive of statutory holidays. Vacation may be taken at any time during the calendar year at such time as may be most convenient to the Employer, but every effort shall be made to schedule vacation at times suitable to the employee.

(c) Vacation and statutory holiday pay as aforesaid shall be paid into Local 183 Civil Engineering Vacation Pay Trust Fund, jointly administered by an equal number of Employer and Union trustees, which Employer trustees shall be appointed by the **Greater** Toronto Sewer and Watermain Contractors' Association, the Utility Contractors' Association of Ontario and the Heavy Construction Association of Toronto. One of the said Employer trustees shall be appointed by the Association. Payments into the Fund shall be made monthly and the interest earned by the investment of the monies in such fund shall be firstly applied against the administration costs of the Fund and secondly, against any deficit caused by the delinquency of a contributing Employer and the balance shall be paid to the Association pro-rated on the basis of contributions into the Fund made by all Employers covered by this agreement, on account of the Association's costs of negotiating and administering this agreement. Payments into the Fund shall be made by the fifteenth (15th) day of the month following the month for which payment is due. The Chairmanship of the Trust Fund shall alternate annually between the Union and the Employer trustees.

Vacation with Pay Trust Fund surplus to be distributed as follows:

(i) Administration costs;

(ii) Deficits;

(iii) A reserve fund shall be established and maintained based on the past history of deficiencies as agreed by the trustees.

(iv) The surplus, if any, to be distributed equally to the Association and the Union on an annual basis.

ARTICLE 12 - MERGER OF VACATION PAY FUNDS

The **Universal Workers Union**, Local 183 and the Association agree to merge the Local 183 Members' Vacation Pay Trust Fund and the Local 183 Civil Engineering Vacation with Pay Trust Fund, subject to acceptance and adoption by the Trustees thereof, in accordance with Section 6.03 of the Trust Agreements establishing

both Funds.

ARTICLE 13 - PAYMENT OF WAGES

(a) All time books are to be closed weekly.

(b) Employees shall be paid weekly. In the event that payment is by cheque, pay day shall not be later than Thursday. Payment shall be accompanied by a slip outlining all hours of work, overtime hours, hourly rate, deduction for income tax, unemployment insurance, pension, etc. where applicable.

(c) In the case of layoff or dismissal, all employees will receive one hour's notice in advance. When an employee quits a job, he shall give the Employer one hour's notice.

(d) Whenever an Employment Insurance Separation Certificate and pay cheque is not given to employees at the time of termination, they shall be sent by the Employer to the employee by registered mail to his last known address within **seventy-two (72) hours** from the time of termination.

ARTICLE 14 - SAFETY, SANITATION AND SHELTER

(a) Every Employer shall provide a proper and adequate place of shelter sufficiently heated and securely locked in which the employees may eat their lunch and store their clothing. It is further agreed that the lunch room facilities shall be separated by a partition from the area in which the clothing is stored. Water, towels and soap shall be available at all times. It is clearly understood that the place of shelter shall not be used for any other purpose, such as storage of tools, etc. Sanitary toilets shall be provided in accordance with the regulations of the Occupational Health and Safety Act, as amended, and if located near the lunch room, shall be separated by a partition. The Employers agree to provide the above facilities before production work commences on the project. It is agreed that these facilities shall be on or in the vicinity of the working area.

Without in anyway limiting the generality of the above, in the case of welders, employed by the Employer, the special clothing and protective equipment which the Employer is required to supply shall include the following:

- **Suitable gloves for welding**
- **Leather sleeved or welding jackets**
- **Safety helmets and welding masks**
- **Cutting goggles**
- **All equipment required for normal welding duties**

(b) In co-operation with the Employer's overall program of Accident Control and Prevention, the Job Steward and Health and Safety Representative may report to the Foreman for immediate corrective action of any unsafe conditions, unsafe acts or violation of safety regulations. Safe working conditions are primarily the responsibility of Management; therefore all supervisory personnel shall be made aware of all safety regulations and see that they are carried out.

(c) Every employee shall, as a condition of employment, be required to wear a Safety Helmet of an approved type. The Employers agree said helmets will be supplied by them at no cost to the employee. If an employee at termination of employment does not return said helmet, he shall be charged at cost.

(d) Every employee shall, as a condition of employment, own and wear suitable protective footwear. The Employer shall supply protective equipment required in the normal course of the employee's duties including special clothing such as suitable gloves, at no cost to the employee. The Employer shall provide leather safety boots to the employees covered by this agreement at cost, which will be deducted from the employee's pay. It is further agreed that the Employer shall provide free of cost, rubber safety boots when necessary. The Union recognizes the right of Employers to economically supervise the distribution of the clothing provided and will co-operate with the Employers to prevent wasteful practices.

(e) A Safety Committee is to be established. This Committee will be composed of two members of **Universal Workers Union,** Local 183, and two representatives from the Association. Safety meetings, not to exceed one per month, will be held and may be called by either party. A Safety Committee may be established by the Union on projects with twenty (20) employees or more coming within the jurisdiction of this agreement, provided that there is no more than one committee per project.

(f) The Employer shall, at his own expense, furnish to any workman injured in his employment who is in need of it, immediate conveyance and transportation to a hospital or to a physician. It is further agreed that an ambulance shall be used where necessary and possible.

(g) An employee who is injured during working hours and who is required to leave for treatment, or is sent home for such injury, shall receive payment for the remainder of the shift at his regular rate of pay.

(h) Locktenders' shift reports will be kept in ink.

(i) The trucks to be used to transport employees will be enclosed and tools will be secured in tool boxes. No materials will be carried in the trucks in a manner endangering the safety of the employees being transported.

(j) No employee will be discharged by his Employer because he fails to work in unsafe conditions as set out in government safety regulations. Any refusal by an employee to abide by such regulations after being duly warned, will be sufficient cause for dismissal.

(k) On projects where the Company is required under Article 13 (a) to provide locked up facilities for employees to store their tools and clothing the Company will reimburse an employee up to three hundred **and fifty** dollars (**$350.00**) for loss due to fire, or theft resulting from a break-in to such locked up facilities. In all cases the employee must provide a written and signed statement substantiating the amount of the loss.

ARTICLE 15 - ERGONOMICS TRAINING

(a) As a condition of employment, newly hired employees shall be required to attend and complete the ergonomics training course offered by the Labourers' Local 183 Members Training Fund.

(b) On site supervisory personnel of any Employer shall be required to attend and complete the ergonomics training course offered by the Labourers' Local 183 Members Training Fund.

(c) Union Stewards shall be required to attend and complete the ergonomics training course offered by the Labourers' Local 183 Members' Training Fund.

(d) The Union shall ensure that in issuing a referral slip under Article 3, the employee has taken the ergonomics training course or that arrangements have been made to comply with (a) hereof.

(e) All of the above training shall not be performed on company time.

ARTICLE 16 - THE OCCUPATIONAL AND REHABILITATION HEALTH CLINIC FUND

The Employer agrees to co-operate with the programs established by the Soft Tissue Rehabilitation Clinic and the Occupational Health Clinic, and, in particular, to require his employees to attend at the Occupational Health Clinic for the requisite testing at least once every three (3) years and further, to notify the Soft Tissue Clinic of any Soft Tissue injury sustained by any of his employees, including the address and telephone number of such employee, within three (3) days of the Employer being advised that said employee sought medical attention.

ARTICLE 17 - BUSINESS AGENT AND SHOP STEWARD

The business agent of the Union shall have access to all jobs during working hours, but in no case shall his visits interfere with the progress of the work. When visiting a job, he will first advise the superintendent or other supervisory personnel of the Employer.

No discrimination shall be shown against any Shop Steward for carrying out his duties but in no case shall his duties interfere with the progress of the work. It is agreed that a Shop Steward may be appointed on all jobs of an Employer by a business agent of the Union on the basis of one (1) Shop Steward to twenty (20) employees or major fraction thereafter [on tunnel projects one (1) Shop Steward for up to two (2) mining crews per shift will be recognized] and shall notify the job Superintendent at once (or the Foreman on the job if there is no job Superintendent) before he can be recognized. Such appointment shall be confirmed by the Union in writing to the Employer within seven (7) working days thereafter. By mutual agreement of the parties, where conditions require it, additional Stewards may be appointed. The Shop Steward, all other things being equal, shall be one of the last two men retained by the Employer on the shift if competent to perform the available work remaining. The Shop Steward on each job will be responsible for reporting any disputes to the Employer and Union Representative, so that these can be taken up in the proper manner without delay.

It is agreed that the Shop Steward will not be excluded from a gang for overtime work, provided he is able to do the work required. It is further agreed that there will be at least one (1) Shop Steward (or Acting Shop Steward) on the project at all times while work is in progress provided that the Steward (or Acting Steward) is able to do the work required. The Union will be notified when a Shop Steward is to be laid off or discharged.

ARTICLE 18 - NO STRIKES, NO LOCKOUTS

18.01 In view of the Grievance and Arbitration Procedures provided in this agreement, there shall be no strikes or lockouts so long as this agreement continues to operate.

ARTICLE 19 - GRIEVANCE PROCEDURE

19.01 The parties to this agreement agreed that it is of the utmost importance to adjust complaints and grievances as quickly as possible.

19.02 Grievances properly arising under this agreement shall be adjusted and settled as follows:

STEP NO. 1

Within twenty (20) working days after the circumstances giving rise to the grievance occurred or originated, [save and except grievances arising out of discharge cases in which case the grievance shall be brought forward within ten (10) working days of the employee being notified of his discharge, and save and except monetary and benefit grievances as defined in Section 19.03 (a) and administered under Section 19.03 (b) and 19.03 (c) below], the aggrieved employee, with his business representative, may present his grievance, which shall be reduced to writing, to the Employer. Should no settlement satisfactory to the employee be reached within ten (10) full working days, the next step in the grievance procedure may be taken at any time within ten (10) working days thereafter.

STEP NO. 2

The Union Grievance Committee, if it considers it a valid grievance, may submit the grievance to a committee of the Association and the respective committees shall meet within five (5) working days thereafter in an endeavour to settle the grievance. If a satisfactory settlement is not reached within five (5) working days from this meeting, the grievance may be submitted to arbitration as provided in Article 20 below at any time within twenty (20) working days thereafter or referred to the Ontario Labour Relations Board for arbitration pursuant to Section 133 of the Labour Relations Act within reasonable time which shall not be more than twenty (20) working days thereafter.

19.03 (a) Monetary grievances are defined as those arising under this Agreement involving payment for hours of work, rates of pay, overtime, shift premiums, travelling expenses, room and board allowances and reporting allowances, but do not include grievances arising out of classification assignment. Benefit grievances are defined as those arising under this Agreement involving payment of pension and welfare contributions, union dues, working dues, industry and training fund, and vacation and statutory holiday pay.

(b) Monetary grievances shall be brought forward at Step 1 within three (3) months after the circumstances giving rise to the grievance became known or ought reasonably to have become known to the Union. It is further understood that the adjustment of any such grievance shall be retroactive to the first day of the alleged violation within the three (3) month period.

(c) Benefit grievances shall be brought forward at Step 1 within twelve (12) months after the circumstances giving rise to the grievance became known or ought reasonably to have become known to the Union. It is further understood that the adjustment of any such grievance shall be retroactive to the first day of the alleged violation within the twelve (12) month period.

ARTICLE 20 - ARBITRATION

20.01 The parties to this agreement agree that any grievance concerning the interpretation or alleged violation of this agreement, which has been properly carried through all the steps of the grievance procedure outlined in Article 19 above which has not been settled, will be referred to a Board of Arbitration at the request of either of the parties hereto.

20.02 The Board of Arbitration will be composed of one person appointed by the Association, one person appointed by the Union and a third person to act as Chairman chosen by the other two members of the Board.

20.03 The party requesting arbitration shall name its appointee at the time of requesting arbitration, and the other party shall name its appointee within two (2) working days thereafter.

20.04 Should the person chosen by the Association to act on the Board and the person chosen by the Union fail to agree on a third member as Chairman within five (5) days of the notification mentioned above, the Minister of Labour of the Province of Ontario will be asked to nominate an impartial person to act as Chairman.

The decisions of the Board of Arbitration or a majority of such Board constituted in the above manner shall be binding on the employee, the Union, the Association and the Employers.

The Board of Arbitration shall not have any power to alter or change any of the provisions of this agreement or to substitute any new provisions for any existing provisions, nor to give any decision inconsistent with the terms and provisions of this agreement.

Each of the parties to this agreement will bear the expense of the arbitrator appointed by it, and the parties will jointly bear the expense, if any, of the Chairman.

(a) The nature of the grievance, the remedy sought and the section or sections of the agreement which are alleged to have been violated, shall be set out in the written record of the grievance and not be subject to change in later steps;

(b) In determining the time which is allowed in the various steps, Sunday and Statutory Holidays shall be excluded, and any time limits may be extended by agreement in writing;

(c) If advantage of the provisions of Article 19 and 20 hereof is not taken within the time limits specified therein or as extended in writing as set out above, the grievance shall be deemed to have been abandoned and may not be reopened.

ARTICLE 21 - MANAGEMENT GRIEVANCES AND UNION GRIEVANCES

(a) It is understood that an Employer and/or the Association may file a grievance with the Union, and that if such complaint is not settled to the satisfaction of the parties concerned, it may be treated as a grievance and referred to arbitration in the same way as a grievance of any employee. Such grievance shall be processed at Step No. 2 of the Grievance Procedure set out in Article 19 hereto.

(b) A Union grievance which is defined as an alleged violation of this agreement involving all or a number of employees in the bargaining unit in regard to which a number of employees have signified an intention to grieve, or a grievance involving the Union itself, including the application or interpretation of this agreement, may be brought forward in writing in the same manner and within the same time limits as in the case of an employee grievance. Such grievance shall be processed at Step No. 1 of the Grievance Procedure as set out in Article 19 hereof. If it is not settled, it may go to a Board of Arbitration in the same manner as a grievance of an employee.

ARTICLE 22 - GOVERNMENT LEGISLATION

In the event that any of the provisions of this agreement are found to be in conflict with any valid and applicable Federal or Provincial law now existing or hereinafter enacted, it is agreed that such law shall supersede the conflicting provision without in any way affecting the remainder of the agreement.

ARTICLE 23 - PRODUCTIVITY

The Union and the Association recognize the mutual value of improving by all proper and reasonable means the productivity of the individual workman, and both will undertake individually and jointly to promote such increased productivity.

ARTICLE 24 - REPORTING ALLOWANCE

24.01 (a) An employee who reports for work at an Employer's job site or shop, unless directed not to report the previous day by his Employer, and for whom no work is available due to reasons other than inclement weather, shall receive a minimum of four (4) hours reporting time and shall remain at other work if requested to do so by the Foreman.

(b) Two (2) hour's pay shall be paid by the Employer when an employee covered by this agreement reports for work at the Employer's shop or job site but work is not available due to inclement weather, provided the employee remains on the job for two (2) hours after 7:00 a.m. or remains on the job for two (2) hours after his designated starting

time. However, no reporting pay shall be allowed where an employee has been informed not to report for work and such information has been given to him before quitting time on the previous day. When work starts late but within two (2) hours of the normal starting time, employees shall be paid from the normal starting time. If work starts later than two (2) hours after the normal starting time, employees shall be paid from the actual time work started, plus two (2) hour's reporting time.

In the event the employee commences work and work cannot proceed for any reason then the employee shall receive four (4) hours' pay.

(c) An employee directed to work after the noon lunch period and who commences to work shall receive four (4) hours' pay at the applicable hourly rate and shall also remain at other work if requested by the foreman. This provision does not apply when lack of work results from inclement weather. *

*Note: See Letter of Understanding No. 11

(d) An employee directed to wait on the job site by his Employer will be paid for such waiting time.

ARTICLE 25 - COFFEE AND LUNCH BREAKS

(a) An employee will be allowed to have one coffee break of ten (10) minutes during each half of his working shift. An employee will be allowed a ten (10) minutes' rest period if required to work more than two hours beyond the end of his shift.

(b) Regular day shift employees shall be allowed one half-hour lunch break between 12:00 noon and 1:00 p.m., except where different hours are being worked on a two or three shift operation. It is understood that no employee shall be required to work more than five (5) consecutive hours without a meal break.

An employee required to work more than two (2) hours beyond the end of his shift shall be allowed to have one additional break of ten (10) minutes.

ARTICLE 26 - WELFARE AND PENSION

(a) Employers agree to pay for each hour worked, into Local 183 Members' Benefit Fund jointly administered by an equal number of Employer and union trustees, for the purpose of purchasing weekly indemnity, life insurance, dental, medical and similar benefits, for the employees covered by this agreement, represented by Local 183, Labourers' International Union of North America.

(i) Effective **Jan. 1st, 2001**, an amount of one dollar and **sixty** cents **($1.60)** per hour for each hour worked by each employee represented by the Union shall be paid by the Employers to the Local 183 Members Benefit Fund.

(ii) Effective **Nov. 1st, 2001**, an amount of one dollar and **eighty** cents **($1.80)** per hour for each hour worked by each employee represented by the Union shall be paid by the Employers to the Local 183 Members' Benefit Fund.

(iii) Effective **May 1st, 2002**, the amount shall be increased to **two dollars ($2.00) per** hour.

(iv) Effective **Jan. 1st, 2004,** the amount shall be further increased to **two dollars and twenty-five cents ($2.25)** per hour.

(v) It is understood that the above-mentioned amount in Article 26 (a) (i) includes five cents (5¢) per hour into the Tri-Fund.

(vi) It is understood that the above-mentioned amount in Article 26 (a) (i) includes ten cents (10¢) per hour into the Seniors Fund.

(vii) **It is understood that the above-mentioned amounts in Article 26 (a) (ii) (iii) and (iv) includes (10¢) per hour in each year into the Long Term Care Fund.**

(viii) It is understood that the above-mentioned amount in Article 26 (a) (iv) includes (5¢) per hour into the Camping Ground Fund.

(b) Effective **Jan. 1st, 2001**, the Employers agree to pay the sum of **three** dollars and **thirty** cents **($3.30)** for each hour worked by employees represented in the Collective Agreement by **Universal Workers Union,** Local 183 into a Central and Eastern Canada Labourers' International Union Pension Fund, jointly administered by an equal number of employee and union trustees. Effective from **July 3rd, 2001**, the Employer's contribution shall be increased to **three dollars and eight cents ($3.80)** for each hour worked and effective from **May 1st, 2002,** the amount shall be further increased to **four dollars and thirty cents ($4.30)** for each hour worked. Effective **May 1st, 2003**, the amount shall be increased to **four dollars and eighty cents ($4.80)** for each hour worked.

(c) Payments into the Welfare Fund and Pension Fund are to be made by the 15th day of the month following the month for which payment is due.

(d) The Employers shall inform the trustees of the Welfare Fund and the Pension Fund of any worker who is absent from work because of injury and who is entitled to receive benefits under the " Workplace Safety & Insurance Act 1997" as a result of an

accident by including the following information on the next monthly contribution reports filed with the administrators of the said Fund following the accident, namely:

(i) the name, social insurance number and last known address of such worker;

(ii) the date when and the location where the accident occurred;

(iii) the Workplace Safety & Insurance Board claim number for such worker and proof from the said Board that the worker is entitled to receive benefits under the Workers' Compensation Amendment Act, 1989.

(e) It is agreed that by joint agreement the Trustees of the Benefit Fund shall be empowered to charge interest at the rate of two percent (2%) per month on failure of an Employer to make payment due to the Benefit Fund in accordance with Article 26 (a). It is further agreed that by joint agreement of the Union and the Association, interest at the rate of two percent (2%) per month may be charged on failure of an Employer to make payments due to the Pension Fund in accordance with Article 26 (b). Interest charged shall not exceed twenty-four percent (24%) per annum.

ARTICLE 27 - PREPAID LEGAL PLAN

(a) The Employer agrees to pay the sum of ten cents (10¢) for each hour worked by each employee represented by Local 183 to the Local 183 Prepaid Legal Benefits Fund, jointly administered by an equal number of Employer and union Trustees, for the purpose of providing legal benefits to such employees and their beneficiaries.

(b) The Employer shall remit contributions to the Local 183 Prepaid Legal Benefit Fund monthly, together with a duly completed employer's report form, by the 15th day of the month following the month for which the payment is due.

ARTICLE 28 - PROVINCIAL SALES TAX

28.01 The Employer agrees to pay provincial retail sales tax on contributions to the Local 183 Members' Benefit Fund and remit such taxes to the said Fund together with the contributions on which such tax is paid.

ARTICLE 29 - TRANSFER OF FUNDS

29.01 During the lifetime of this Agreement, the Union shall have the right, subject to the

approval of the Trustees, at any time to require the Employer to change the amounts of the contributions to any Trust Funds other than the Vacation with Pay Trust Fund by transferring any portion of the contribution required to be made to any particular Trust Fund to any other Trust Fund provided that there shall be no increase in the total monetary contributions required to be made under this Agreement and also provided that the Trust Fund to which contribution is redirected to, is part of this Collective Agreement.

ARTICLE 30 - AMENDMENT PROVISIONS OF TRUST AGREEMENTS

30.01 The **Universal Workers Union**, Local 183 and the Association agree to amend the following sections of the following Trust Funds:

(a) Section 8.01 of the Agreement of Declaration and Trust made as of October 1, 1980, as amended, establishing the Local 183 Members' Benefit Fund.

(b) Section 8.01 of the Agreement and Declaration of Trust made as of the 1st day of May, 1977 establishing the Local 183 Members' Training and Rehabilitation Fund, as amended.

(c) Local Union 183 Civil Engineering Vacation with Pay Trust Fund (the "Fund"), that Section 4.03 (h) of the Agreement and Declaration of Trust made as of the 1st day of July 1976, as amended, establishing the said Fund.

30.02 To provide that, with respect to the amendment of the Trust Agreement by the Union and the Party Associations, the Trust Agreement may be amended by the mutual agreement of the Union and at least sixty percent (60%) of the Party Associations provided that if the Trust Agreement is so amended by agreement involving at least sixty percent (60%) but less than one hundred percent (100%) of the Party Associations, any Association which claims it will suffer hardship as a result of such amendment may refer within fifteen (15) days the issue to an arbitrator appointed by mutual agreement, in which case the arbitrator shall have the authority to rescind the amendment if the grieving Association can substantiate its claim. If the parties cannot agree upon an arbitrator, the Office of Arbitration will be asked to appoint an arbitrator for them within fifteen (15) days hereafter.

ARTICLE 31 - REINSTATEMENT OF EMPLOYEES UPON RETURN FROM INDUSTRIAL ACCIDENT

(a) An employee injured in the performance of his duties will resume his regular work when medically fit to do so if work is available and he applies. The job of an injured worker shall be deemed to be available if upon his return any work within his classification on any project under this agreement, is being performed by an employee who, subsequent

to the time of injury was hired by the Employer or transferred or otherwise assigned to perform any work within the said classification on any project covered by this agreement. An employee who claims he has been denied employment contrary to this provision may have recourse to the Grievance and Arbitration procedures as set out in Articles 19 and 20 of this agreement.

The above shall not apply if the injury is attributable solely to the wilful misconduct of the employee.

(b) The parties agree to the establishment within three (3) months of the signing of this agreement, of a joint committee of equal representatives of the Toronto **and Area** Road Builders' Association, The **Greater** Toronto Sewer and Watermain Contractors' Association, The Heavy Construction Association of Toronto and The Utility Contractors' Association of Ontario and the Union, for the purpose of exploring the possibilities of finding light work within the industry for injured workers. Any decisions reached by the said joint committee and approved by the Association and the Union shall be binding upon all Employers bound by this or a similar or like collective agreement.

ARTICLE 32 - INDUSTRY AND TRAINING

32.01 Each Employer bound by this agreement or a like agreement adopting in substance but not necessarily in form, the terms and conditions herein, shall contribute the sum of thirty-five cents (35¢) per hour for each hour worked by each employee covered by this agreement or such like agreement, and remit monthly to the Local 183 Members Training and Rehabilitation Fund such contributions together with a duly completed Employer's report form, by the 15th day of the month following the month for which the payments are due.

(a) The sum of ten cents (10¢) per hour for each hour worked by each employee covered by this agreement or such like agreement to the Local 183 Members Training and Rehabilitation Fund. Such amounts shall be immediately paid to the Association by the Trustees of the Local 183 Members Training and Rehabilitation Fund as such Employer's contribution to the cost of negotiating and administering this agreement.

(b) The sum of twenty-five cents (25¢) for each hour worked by each employee covered by this agreement or such like agreement, into the Local 183 Members Training and Rehabilitation Fund, jointly administered by an equal number of management and union trustees one of which management trustees shall be appointed by the Association.

(c) The parties agreed that a joint committee shall be struck to initiate an apprenticeship programme in conjunction with the Ministry of Education and Training which shall include an appropriate training procedure with hours and rates of pay within ninety (90) days of the signing of this Collective Agreement.

ARTICLE 33 - INDUSTRY GRADING

33.01 The parties agree to continue with the joint committee of equal representatives of the Association and the Union for the purpose of issuing recognized identification cards noting the employee's classification. The issuance of such cards will be based upon the certifications given by Employers in the Heavy Engineering Sector and/or such criteria or such standards as the Committee may adopt from time to time. The Committee shall continue to determine which classifications contained in the groups in Schedule "A" and "B" hereto shall be subject to this procedure. See letter attached to this agreement.

ARTICLE 34 - TRAVEL ALLOWANCE

34.01 The geographic area of this agreement will be divided into the following zones:

(a) Zone 1 - The area bounded on the east by the west boundary of Markham Road, on the west by the west boundary of the Highway 427, and on the north by the south boundary of Steeles Avenue. No travel expenses will be paid for work done within Zone 1.

(b) Zone 2 - In regard to travelling expense for work outside Zone 1, but within a 50-kilometre radius including the Town of Newmarket, employees will be granted $10.00 per day travelling allowance when company transportation is not supplied. No travelling expenses will be paid to employees whose normal place of residence is in the same township as that in which the job is located.

(c) Zone 3 - In regard to travelling expense in the fringe area, outside the 50-kilometre radius including the Town of Newmarket and up to 100 kilometres, the employee will be paid at the rate of thirty-five cents (35¢) per road kilometre one way, from the Toronto City Hall to the job site. Such payment is in lieu of room and board and is not paid when company transportation to the job is supplied and straight time is paid to the employee.

(d) Room and Board - It is understood that if the Employer requires an employee to be out of town overnight, the Employer will provide suitable room and board for the employee up to maximum of **seventy ($70.00)** per day with no limit.

(e) **It is understood and agreed that when an employee works in a Board Area (including Board Areas not otherwise referred to herein), in which he does not regularly work, all terms and conditions set out in this Collective Agreement will be maintained and the employee will continue to receive his wage rate, hours of work and fringe benefits, as provided for in this Collective Agreement and that are applicable in the Board Area in which he regularly works, unless the employee is working in a Board Area where such terms and conditions are specifically governed**

by a Schedule forming part of this Collective Agreement and which provides for more beneficial terms and conditions for the employee, in which case the more beneficial terms and conditions shall apply.

(f) Where the Employer supplies transportation and where an employee is required by his Employer to report to a yard or assembly point within Toronto before going to a job outside of Toronto, the employee will be paid at straight time while travelling to and from the job in excess of fifteen (15) minutes each way.

34.02 Downtown Parking: Employees required to work on projects within the downtown area of Toronto, (defined as that area bounded by Dufferin Street on the West, Bloor Street on the North and Don Valley Parkway on the East,) and for whom no transportation is provided, the Employer shall provide parking or refund to the employee upon presentation of a valid receipt for parking expenses paid by the employee the amount of the receipt to a maximum of **seven dollars and fifty cents ($7.50)** per day.

ARTICLE 35 - DEEMED ASSIGNMENT OF COMPENSATION UNDER THE *EMPLOYMENT STANDARDS AMENDMENT ACT, 1991*

35.01 The Trustees of the employee benefit plans referred to in this Collective Agreement shall promptly notify the Association of the failure by any Employer to pay any employee benefit contributions required to be made under this Collective Agreement and which are owed under the said plans in order that the Program Administrator of the Employee Wage Protection Program may deem that there has been an assignment of compensation under the said Program in compliance with the Regulation to the ***Employment Standards Amendment Act, 1991*** in relation to the Employee Wage Protection Program.

ARTICLE 36 - DELINQUENCIES

(a) In the event an Employer fails to remit any contributions or deductions for the Benefit Plan, Pension Plan, Prepaid Legal, dues, fees, Training Fund, Working Dues Check-Off, or Industry Fund, the Employer shall pay to the appropriate fund as liquidated damages and not as a penalty an amount equal to two percent (2%) [twenty-four percent (24%) per annum] per month compounded monthly for any delinquent contributions, deductions or remittances fifteen (15) days in arrears calculated from the date due, provided the Employer has received five (5) days prior written notice to correct such delinquency and has not done so.

(b) With reasonable cause, the Trustees may request an Employer to submit to them within a stipulated period a certified audited statement of payroll contributions to these funds for a period not to exceed the period from the effective date of this Agreement until the date the audit takes place. Such statements shall reply to the questions submitted

to the Employer by the Trustees.

(c) If the Employer does not submit the certified audited statement as per Section 36 (b), the Trustees may appoint an independent chartered accountant or other qualified person to enter upon the Employer's premises during regular business hours to perform an audit of the Employer's records only with respect to the Employer's contributions or deductions to the required Employee Benefit Plan, Pension Plan, dues, fees, Working Dues Check-Off, and Industry Fund.

(d) Where the Trustees appoint an auditor, the cost shall be borne by the appropriate plan. In the event that the audit reveals discrepancies between the Employer's records and the contributions or deductions submitted, the cost shall be borne by the Employer.

(e) In the event such audit reveals that the Employer has failed to remit contributions in accordance with the provisions of this Agreement, the Employer shall, within five (5) days of receipt of written notice from the Trustees, remit all outstanding contributions together with any liquidated damages required under the terms of Section 36 (a) above and completed supporting contribution report forms as required by the Plan.

(f) When an Employer fails to remit all delinquent contributions, the provisions of Section 36 (e) shall apply to the Union, on instructions from the Trustees, shall immediately institute proceedings against the delinquent Employers under Section 126 of the *Labour Relations Act* of Ontario. All cost of such actions shall be borne by the appropriate plan or fund unless otherwise recoverable.

(g) Where the Union has taken prior proceedings and obtained a decision against an Employer for delinquent contributions, deductions or remittances, the Union may require the said Employer to post a cash bond or certified cheque not to exceed twenty thousand dollars ($20,000.00) to be held in trust by the Trustees for a period to be determined by the Trustees. In the event that the said Employer again becomes delinquent for contributions, deductions or remittances, the Union and/or the Trustees may apply the cash bond or certified cheque, or any portion thereof, to satisfy the delinquency and require the Employer to replenish the cash bond or certified cheque in a higher amount. In the event that the cash bond or certified cheque does not satisfy the full amount of the delinquency, the Union may take other proceedings to recover the balance.

(h) If an Employer does not have any employees in his employ, he shall submit a nil report in accordance with the provisions of Section 36 (e).

ARTICLE 37 - CONSTRUCTION CRAFT WORKER APPRENTICESHIP

37.01 The purpose of this Article is to provide a program to train skilled tradesmen by making provisions for Apprentices in the Heavy Construction sector as per Article 4 A, B & F of this Agreement.

37.02 Apprentice(s) means an employee(s) within the Local 183 classifications considered to be in the training stage of his (their) careers by Local 183. Except as allowed for in Article 37.07 and 37.08 below, all Apprentices shall be registered as such with Local 183 prior to being employed as Apprentices by any Employer.

37.03 When the Employer wishes to employ an Apprentice, the Employer shall make a request to the Local 183 Training Centre. The Training Centre shall make immediate efforts to dispatch an Apprentice within five (5) days of receipt of the request. Any person not dispatched in accordance with this Article shall not be considered to be an Apprentice for the purpose of this Agreement except as provided for in Article 37.06 and 37.07.

37.04 The said Apprentices shall be obliged to attend all relevant Health and Safety Training Programme offered at Local 183 Training Centre on their own time at no cost to the Employer.

37.05 Training Requirements:

	Rate	**Hours**
Phase 1	60% of full rate	0 -800 hours
Phase 2	75% of full rate	800 - 1600 hours
Phase 3	85% of full rate	1600 - 2400 hours

Above 2400 hours and successful completion of the exam, the full rate will apply.

37.06 If the Union cannot supply such Apprentices to the Employer under Article 37.03, the Employer has the right to employ Apprentices from other sources. Such persons shall, as a condition of employment, and continued employment, be required to apply for membership in Local 183 and become registered as Apprentices within ten (10) working days of hiring.

37.07 If Local 183 cannot supply such Apprentices resident in Simcoe County for work in Simcoe County to the Employer under Article 37.03, the Employer has the right to employ Apprentices from other sources. Such persons shall, as a condition of employment, and continued employment, be required to apply for membership in Local 183 and become registered as Apprentices within ten (1) working days of hiring.

37.08 The Employer has the right to hire one (1) Apprentice per five (5) employees in the Local 183 portion of the bargaining unit.

37.09 Any person who is not registered as an Apprentice in accordance with the provisions of Articles 37.02, 37.07 or 37.08 (whichever is applicable) shall receive the full rate for the relevant period of employment.

37.10 If the ratio set out in Article 37.08 is not complied with, then all Apprentices shall receive the full rate for the relevant period employment.

37.11 It is agreed that prior to laying off any full rate employees, all Apprentices will be laid off. It is further agreed that a full rated employees who have been laid off by the Company within two (2) months of the date of recalling or employing any Apprentice will be offered recall prior to recalling or employing an Apprentice. It is further agreed that prior to requesting or employing any new Apprentices, the Company will offer recall to any apprentices which it has laid off within two (2) months, providing that such apprentices are capable of performing the available work.

IN WITNESS WHEREOF the parties hereto have caused their duly authorized representatives to affix their signatures this day of , 2001.

THE HEAVY CONSTRUCTION ASSOCIATION OF TORONTO	**UNIVERSAL WORKERS UNION LOCAL 183**
_____	_____
_____	_____
Print Name	**Print Name**
_____	_____
_____	_____
Print Name	**Print Name**
_____	_____
_____	_____
Print Name	**Print Name**

SCHEDULE "A"

Applying to Heavy Construction work as defined in Article 3 of the agreement but excluding all tunnel work covered under Schedule "B" and Field Precast manufacturing work covered by Schedule "C" of this agreement attached hereto.

ARTICLE 1 - WORK WEEK, WORK DAY

The regular working day shall be eight and one half (8½) hours per day and subject to variation by mutual consent of the parties, shall be between 7:00 a.m. and 5:00 p.m., from Monday to Friday, inclusive. Any work done outside these hours shall be overtime or shift work. The maximum number of working hours per week shall be forty-two and one half (42½) hours and work outside these hours shall be overtime work, save and except the provisions of this agreement relating to shift work.

With regard to heaters and pumps being operated on a three shift basis, it is agreed that the first six shifts in each week (Monday to Saturday inclusive) will be paid at straight time. Sundays will be paid for at double time.

ARTICLE 2 - OVERTIME

All work performed in excess of the regular working day of eight and one-half (8½) hours from Monday to Friday inclusive, shall be deemed overtime work. The rate of wages shall be time and one half the regular day shift rate.

All work on Saturdays shall be paid for at double the regular day shift rate.

Where three shifts are working involving payment of Saturday or Sunday overtime under the provisions of this agreement, it is agreed that shift premium where applicable, will be paid in addition to overtime. It is further agreed and understood that on a two or three shift operation or shifts starting after 6:00 p.m., the tenth (10th) or fifteenth (15th) shift as the case may be, may be worked at straight time on Saturday until 7:00 a.m. provided, however, that the applicable shift premium shall be paid.

ARTICLE 3 - SHIFT WORK

All second (2nd) shift work to be paid at time and one-eighth (1⅛) the regular day shift rate, and all third (3rd) shift work and shifts starting after 6:00 p.m. to be paid at time and one seventh (1 1/7) the regular day shift rate.

ARTICLE 4 - WAGES

Applying to heavy construction work as defined in Article 3 of the agreement, but excluding all tunnel work covered under Schedule "B" and Field Precast Manufacturing Work covered by Schedule "C" of this agreement attached hereto.

The rates of wages during regular day shift working period shall be:

Wage Classification	July 3rd, 2001	May 1st, 2002	May 1st, 2003
Group 1 - Labourers, including labourers on stripping on all form work, erecting and dismantling of all tubular scaffolding, and wire mesh installers, carpenter's labourers, epoxy injector, group-pointer-painter, mortar-man, dinky motorman, small mixers (under 1 yard), concrete workers (screedman, puddler, floatman) farm tractor driver, mixer man and grout pumpman including non-self propelled slurry pumps, mini skid steer loaders and mini backhoes of 50 h.p. and under and similar small equipment, pitbottom man, signalman, all machinery-driven tools by gas, electric and air, in open cut work, pipelayer's helper pumps - 3" and under, heater man (under 500,000 BTU and in groups of 4 or less); forklift operator; grout plant operator on surface	$27.91	$28.23	$28.68
Group 2 - Scootcrete, sheeting and shoring man, timberman in trench, labourers on well-points, pipelayers, manhole constructor and valve chamber constructor.	$28.16	$28.48	$28.93
Group 3 - Reinforced concrete workers, and form setters jackhammerman, concrete vibrator man, hydro demolisher man; carpenter improver.	$28.21	$28.53	$28.98
Group 4 - Pile Installation - all types, steel strut installer and dismantler, concrete-cement finisher, precast installer, erector and finisher including post tensioning, rigging of components and sandblasting, rigger burner, pit miner, drillers of all types, wagon drillers in caissons, underpinning or shaft sinking, lead man - pile driving, grout man, gunite and shotcrete man, sandblaster, mixermen and grout pumpman including non-self propelled slurry pumps, shear-stud installer.	$28.31	$28.63	$29.08
Group 5 - Carpenter, welder (certified), (Rod or Semi-Automatic)	$29.91	$30.23	$30.68
Group 6 - Welder with own rig (Rod or Semi-automatic)	$49.39	$49.71	$50.16
Group 7 - Flagperson	$15.00	$15.32	$15.77
Group 8 - Watch Person (for 6 nights duty, 50 hours per week)	$670.00	$686.00	$708.50

All working foremen will receive a minimum of one dollar ($1.00) per hour above the trade rate of the majority of the employees in the group supervised.

If an employee works more than fifty percent (50%) of his shift on a higher rated job than his regular classification, he will be paid the higher rate for the whole shift.

A qualified employee shall be paid the rate for the work to which he is assigned.

SCHEDULE "B"

Applying to Heavy Construction Tunnels
and T.T.C. Subway Tunnel Work

ARTICLE 1 - WORK WEEK

The regular work week will start not earlier than 7:00 a.m. on Monday, and the regular working day, subject to variation by mutual consent of the parties, shall be between 7:00 a.m. and 5:00 p.m. from Monday to Friday, inclusive. Any work done outside these hours shall be overtime or shift work. The maximum number of working hours per week shall be forty (40), and work outside these hours shall be overtime work, save and except the provisions of this agreement relating to shift work.

ARTICLE 2 - OVERTIME

All work performed in excess of the regular working day of eight (8) hours from Monday to Friday inclusive, shall be deemed overtime work. The rate of wages shall be time and one-half (1½) the regular day shift rate.

All work on Saturday shall be paid for at double (2) the regular day shift rate, except where shift work is in operation. Time worked after midnight Friday night shall be paid for at the rate of time and one-half (1½) in respect of a shift commencing Friday evening and terminating not later than 7:00 a.m. on Saturday morning. All work on Sundays and Statutory Holidays shall be paid for at double (2) the regular day shift rate.

ARTICLE 3 - SHIFT WORK

Where three shifts are worked, the shift times shall be as follows, subject to variation by agreement of the Union and an Employer:

1st shift	-	7:00 a.m. - 3:00 p.m.
2nd shift	-	3:00 p.m. - 11:00 p.m.
3rd shift	-	11:00 p.m. - 7:00 a.m.

On such three shift tunnelling operations, it is agreed the meal break will be paid.

Where three (3) shifts are working involving payment of Saturday or Sunday overtime under the provisions of this agreement, it is agreed that shift premium, where applicable, will be paid in addition to the overtime.

All second (2nd) shift work to be paid at time and one-eighth (1 1/8) the regular day shift rate, and all third (3rd) shift work to be paid at time and one-seventh (1 1/7) the regular day shift rate. On tunnel work all hours worked on a second (2nd) shift after 11:00 p.m. will be paid at third (3rd) shift premium rate (time and one-seventh) [1 1/7], but this does not apply when the regular quitting time for the second (2nd) shif is 12:00 midnight.

ARTICLE 4 - WAGES - TUNNEL WORK

The rates of wages during regular day shift working periods on tunnel work shall be:

Wage Classification	July 3rd, 2001	May 1st, 2002	May 1st, 2003
Group 1 - Labourers (on surface) including labourers on stripping and tabular scaffolding, erectors, carpenter's helpers (on surface), classified labourers: (on surface) Dinky motorman, small mixers (under 1 yard) sheeting and shoring man, pipelayers helper, mortarman, concrete workers (screedman - puddler - floatman) form setters, farm tractor driver (no excavating attachment), mixer man and grout pumpman including non-propelled slurry pumps, mini skid steer loaders and mini backhoes of 50 h.p. and under and similar small equipment, signalman, deckman, pumps - 3" and under, hopperman (when needed) heater man (under 500,000 B.T.U. and in groups of 4 or less); carpenter improver; fork lift operator.	$30.21	$30.53	$30.98
Group 2 -Pitbottom man, caulkers, cage-signalman, plain and reinforced concrete workman, scootcrete, underground labourers, muckers, loco-driver, labourers on well - points in tunnel, concrete vibrator man, pipelayer in tunnel, manhole constructor and valve chamber constructor in tunnel, rigger burner, chucktender, concrete smoother.	$30.76	$31.08	$31.53
Group 3 - Operators of Jackhammers and air-spades in tunnel, miners including jack-leg and stopper man, drillers - all types, locktenders, trackman, yard and materials man, diamond-driller, wagon driller, pit miner on caisson, underpinning or shaft sinking, sandblaster gunite man, shotcrete man, powder man, lead concrete man, lead caulker (where 4 or more caulkers are employed on one contract).	$31.06	$31.38	$31.83
Group 4 - Slush driver, muck-machine driver, grout machine man and driver of concrete placing machine in tunnel, Scoop-Tram.	$31.36	$31.68	$32.13
Group 5 - Lead miner, T.B.M. and micro tunnel operators, tunnel shield driver, tunnel mole driver, carpenter form builder-fabricator-erector, welder (certified) in tunnel (rod or semi-automatic).	$33.46	$33.78	$34.23
Group 6 - Welder (certified) with own rig (rod or semi-automatic).	$51.49	$51.81	$52.26
Group 7 - Flagperson	$15.00	$15.32	$15.77
Group 8 - Watch Person (for 6 nights duty, 50 hours per week)	$670.00	$686.00	$708.50

All working foremen will receive a minimum of one dollar ($1.00) per hour above the trade rate of the majority of the employees in the group supervised.

If an employee works more than fifty percent (50%) of his shift on a higher rated job than his regular classification, he will be paid the higher rate for the whole shift.

A qualified employee shall be paid the rate for the work to which he is assigned.

When new types of equipment for which rates of pay are not established by this Agreement are put into operation and such similar equipment is being operated by members of the Union, the rates covering such operations shall be subject to negotiations between the parties and if such negotiations do not result in agreement, the dispute will be settled as if it were a grievance arising under the provisions of the agreement.

ARTICLE 5 - PREMIUM RATES AND CONDITIONS IN COMPRESSED AIR

(a) The following sliding scale of premium rates shall apply to workers in compressed air. These rates are non-cumulative.

Air pressure	Premium per Shift
1 - 14 lbs.	$16.00
15 - 20 lbs.	$19.50
21 lbs.	$23.50

For air pressure over twenty-one (21) pounds, the Employer agrees to pay two dollars ($2.00) per pound compressed air premium for each pound over twenty-one (21) pounds, in addition to the twenty-one (21) pound rate.

(b) Where employees are required to work in compressed air they shall receive a minimum nine (9) hours per day or shift; it being understood and agreed that the ninth (9th) hour shall be paid at straight time.

(c) Rest periods when working under air pressure are to be paid as specified by law, and no deduction will be made for a meal break falling in the rest period between the two working periods.

(d) Where employees are required to have their lunch break underground in compressed air, the Employer agrees that a proper sanitary lunchroom facility shall be provided, heated when necessary, and separate from the work area. Potable water shall be provided at all times. Sanitary toilets shall be provided and shall not be located in or near the lunchroom area.

(e) Hot beverages:

(i) The Employers shall, at their own expense, supply sugar and hot beverages for employees working in compressed air during rest periods;

(ii) Containers and cups for the beverages required as outlined above shall be maintained in a clean and sanitary condition and kept stored in a closed container.

ARTICLE 6 - PRODUCTIVITY PREMIUM

(a) The Employer agrees to negotiate with the Union any incentive bonus system before implementing it, provided that the Union's Negotiating committee will consist of, but not limited to, lead miners.

(b) It is further understood that any incentive bonus premium schedule is part of the collective agreement and therefore subject to the same provisions, such as grievance procedure, etc.

(c) Incentive bonus premium shall be paid over and above the employees' hourly rate, overtime premium, shift premium, compressed air premium, vacation with pay, travelling expense, welfare and pension contributions.

ARTICLE 7 - DECKMAN

It is agreed by the parties hereto, that on all tunnel projects there shall be a member of the Union at the top of the shaft employed as a deckman when work is in progress.

SCHEDULE "C"

A schedule applying to Field Precast Manufacturing Operations, which shall include work pertaining to: site preparation, site restoration, erection and dismantling of temporary facilities, and all operations pertaining to field manufacturing, yard storage and handling of precast concrete products and components for heavy construction. This schedule does not apply when precast units are supplied or purchased, provided such precast units are manufactured off site.

ARTICLE 1 - HIRING OF EMPLOYEES

As provided for in Article 5, Section (b) of the agreement.

ARTICLE 2 - WORK WEEK, WORK DAY

The regular working day shall be nine (9) hours per day and subject to variation by mutual consent of the parties, shall be between 7:00 a.m. and 7:00 p.m., from Monday to Friday, inclusive. Any work done outside these hours shall be overtime or shift work. The maximum number of working hours per week shall be forty-five (45) hours and work outside these hours shall be overtime work, save and except the provisions of this agreement relating to shift work. It is agreed and understood that the 10th shift of a two-shift operation and the 15th shift of a three-shift operation may be worked at straight time on Saturday until 7:00 a.m. provided, however, that the applicable shift premium shall be paid.

ARTICLE 3 - OVERTIME

All work performed in excess of the regular working day of nine (9) hours from Monday to Friday, inclusive, and all work performed on Saturday, shall be deemed overtime work. The rate of wages for overtime work shall be time and one-half (1½) the regular day shift rate.

Watchmen

Watchmen shall receive overtime payment at the rate of time and one-half (1½) the employee's current hourly rate for all work performed on such employee's seventh (7th) consecutive shift.

ARTICLE 4 - SHIFT WORK

Any shift or shifts falling between the hours of 7:00 a.m. and 7:00 p.m. shall be considered to be day shifts and shall attract no shift premium. Any shift or shifts commencing after twelve noon shall be considered to be an afternoon shift and a shift

premium of fifty cents (50¢) per hour shall be paid for all hours worked during such afternoon shifts. Any shift or shifts commencing after 10:00 p.m. shall be considered to be a night shift and a shift premium of fifty cents (50¢) per hour shall be paid for all hours worked during such night shifts.

Wage Classification	**July 3rd, 2001**
Group 1 - General labourer; yardman and mini skid steer loaders and mini backhoes of 50 h.p. and under and similar small equipment; fork lift operator	$24.35
Group 2 - Concrete worker; rigger and burner signalman.	$24.60
Group 3 - Carpenter, reinforced concrete worker; concrete cement finisher, welder (certified) rod or semi-automatic.	$24.95
Group 4 - Watch Person (for 6 nights duty, 10 hours per day, 50 hours per week).	$560.50

All working foremen will receive a minimum of one dollar ($1.00) per hour above the trade rate of the majority of the employees in the group supervised.

SCHEDULE "D"

This Schedule applies to employees in the classifications shown below assigned to the clean-up and removal of hazardous contaminated soil on sites as designated by the appropriate governmental authority.

The classifications and rates are as follows:

Wage Classification	July 3rd, 2001
Group 1 - Labourers, operating all machine-driven tools by gas, air or electricity, including plate-tampers, operators of self-propelled hand compactors, burners, fence erectors - all types, sod layers, traffic control person.	$19.61
Group 2 - Labourers, operating high pressure water equipment, welders, fork lifts, farm-tractors, small trenchers, mini-skid steer loaders, and all other similar small equipment using attachments such as "sweepers", york rakes, "earth augers", "pallet or utility forks", "angle brooms", blade-backhoe or hydraulic breakers, sod or vibrator rollers, etc.	$20.36

Benefits for employees so assigned shall be as set out in Schedule "A" save that overtime work shall be paid only after fifty (50) hours worked with makeup time permitted on Saturdays. Employees working for his Employer under classifications and rates under Schedule "A" shall not have his rate of pay reduced, when assigned to work under this Schedule "D".

The Union agrees to train employees for this work in its recognized training school to standards established by the appropriate ministerial authority for the safety and health of employees.

SCHEDULE "E"

(a) **"The Sewer and Watermain Agreement"**, being a collective agreement between the Greater Toronto Sewer and Watermain Contractors' Association and A Council of Trade Unions acting as the representative and agent of Teamsters' Local 230 and the Union;

(b) **"The Roads Agreement"**, being a collective agreement between the Toronto and Area Road Builders' Association and the Union;

(c) **"The Forming Agreement"**, being a collective agreement between the Ontario Formwork Association and the Formwork Council of Ontario;

(d) **"The House Basements Agreement"**, being a collective agreement between the Residential Low Rise Forming Contractors' Association of Metropolitan Toronto and Vicinity and the Union;

(e) **The Apartment Builders Agreement"**, being a collective agreement between the Metropolitan Toronto Apartment Builders Association and the Union;

(f) **"The House Builders Agreement"**, being a collective agreement between the Toronto Residential Construction Labour Bureau and the Union;

(g) **"The Concrete and Drain Agreement"**, being a collective agreement between the Ontario Concrete and Drain Contractors' Association and the Union;

(h) **"The Utilities Agreement"**, being a collective agreement between the Utility Contractors' Association of Ontario and Labourers' International Union of North America, Ontario Provincial District Council and its affiliated Local Unions;

(i) **"The Carpentry Agreement"**, being a collective agreement between The Residential Framing Contractors' Association of Metropolitan Toronto and Vicinity and the Union;

(j) **"The Landscaping Agreement"**, being a collective agreement between the Landscaping Contractors in Ontario Labour Relations Board Area No. 8 and 18 and the Union;

(k) **"The Agreement Covering Building Restorations and Associated Work"**, being a collective agreement between the Building Restorations and Associated Work Contractors in Ontario Labour Relations Board Area No. 8 and the Union;

(l) **"The Bricklaying and Masonry Residential Sector Agreement"**, being a collective agreement between various independent bricklaying and masonry contractors and the Union;

(m) **"The Marble, Tile, Terrazzo & Cement Masons Agreement"**, being a collective agreement between various independent marble, tile, terrazzo and cement masons contractors and the Union;

(n) **"The Residential Plumbing Agreement"**, being a collective agreement between various independent plumbing contractors and the Union;

(o) **"The Fencing Agreement"**, being a collective agreement between various independent fencing contractors and the Union;

SCHEDULE "F"

ARTICLE 1 - WAGES - SIMCOE COUNTY

The rates of wages for all work performed in Simcoe County shall be:

Wage Classification	July 3rd, 2001	May 1st, 2002	May 1st, 2003
Group 1 - Labourers, including labourers on stripping on all form work, erecting and dismantling of all tubular scaffolding, and wire mesh installers, carpenter's labourers, epoxy injector, group-pointer-painter, mortar-man, dinky motorman, small mixers (under 1 yard), concrete workers (screedman, puddler, floatman) farm tractor driver, mixer man and grout pumpman including non-self propelled slurry pumps, mini skid steer loaders and mini backhoes of 50 h.p. and under and similar small equipment, pitbottom man, signalman, all machinery-driven tools by gas, electric and air, in open cut work, pipelayer's helper pumps - 3" and under, heater man (under 500,000 BTU and in groups of 4 or less); forklift operator; grout plant operator on surface	$17.70	$18.12	$18.54
Group 2 - Scootcrete, sheeting and shoring man, timberman in trench, labourers on well-points, pipelayers, manhole constructor and valve chamber constructor.	$18.71	$19.12	$19.54
Group 3 - Reinforced concrete workers, and form setters jackhammerman, concrete vibrator man, hydro demolisher man; carpenter improver.	$18.71	$19.12	$19.54
Group 4 - Pile Installation - all types; steel strut installer and dismantler, concrete-cement finisher, precast installer, erector and finisher including post tensioning, rigging of components and sandblasting, rigger burner, pit miner, drillers of all types, wagon drillers in caissons, underpinning or shaft sinking, lead man - pile driving, grout man, gunite and shotcrete man, sandblaster, mixermen and grout pumpman including non-self propelled slurry pumps, shear-stud installer.	$18.71	$19.12	$19.54
Group 5 - Carpenter, welder (certified), (Rod or Semi-Automatic)	$19.70	$20.12	$20.54
Group 6 - Welder with own rig (Rod or Semi-automatic)	$39.25	$39.57	$40.02
Group 7 - Flagperson	$14.92	$15.33	$15.75
Group 8 - Watch Person (for 6 nights duty, 50 hours per week)	$670.00	$686.00	$708.50

All working foremen will receive a minimum of one dollar ($1.00) per hour above the trade rate of the majority of the employees in the group supervised.

LETTER OF UNDERSTANDING NO. 1

LETTER TO : The Heavy Construction Association of Toronto

FROM : **Universal Workers Union,** Local 183

RE : COLLECTIVE AGREEMENT, MAY 1ST, 2001

Further to the signing of the collective agreement between us, this letter will serve to confirm certain understandings which were reached in connection with the classifications of Reinforced Concrete Worker, Carpenter Improver and Pipelayer. It is understood that the classification of "Reinforced Concrete Worker" applies to those employees engaged within the jurisdiction of the agreement in laying reinforcing rod or mesh; similarly, the classification Carpenter Improver applies to those employees engaged within the jurisdiction of this agreement in the setting of travelling steel forms and wood forms. Further, the "Pipe Layer" classification is intended to apply to not more than one man per crew.

Dated at Toronto, this day of , **2001.**

Signed on behalf of The Heavy Construction Association of Toronto

_____

_____

_____

Signed on behalf of The Universal Workers Union, Local 183

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_____

_____

LETTER OF UNDERSTANDING NO. 2

RE : COLLECTIVE AGREEMENT, MAY 1ST, 2001

Further to the signing of the collective agreement between us, this letter will serve to confirm certain understandings which were reached regarding the items falling within the Heavy Engineering Sector.

The parties agree that a Joint Committee shall be established between the Association and the Union to review any dispute arising out of the interpretation and meaning of any of the agreed-upon definitions and to decide upon the application of the same to any given project or part thereof. The Joint Committee shall consist of two members each from the Association and the Union. A majority decision of the Committee shall be binding upon the parties. Failing settlement of any dispute concerning interpretation of definitions, then the matter shall be referred to arbitration.

Dated at Toronto this day of , **2001.**

Signed on behalf of The Heavy Construction Association of Toronto	**Signed on behalf of the Universal Workers Union, Local 183**
_____	_____
_____	_____
_____	_____

LETTER OF UNDERSTANDING NO. 3

RE : Collective Agreement, May 1st, 2001

The parties to this collective agreement agree that notwithstanding the provisions of the collective agreement the hours of work on bridge repairs shall be nine (9) hours per day and forty-five (45) hours per week.

If the project is the replacement of the total deck, the hours will be eight and one half (8½) hours per day as per Schedule "A".

Dated at Toronto this day of , 2001.

Signed on behalf of The Heavy Construction Association of Toronto	Signed on behalf of the Universal Workers Union, Local 183
_____	_____
_____	_____
_____	_____

LETTER OF UNDERSTANDING NO. 4

RE : Collective Agreement, May 1st, 2001

Further to the signing of the collective agreement between us, letter will serve to confirm certain understandings between the parties:

1. The parties agree to establish a Joint Committee to meet with representatives of the T.T.C. to explain to them the amendments made to the former collective agreement which have been incorporated into the new collective agreement effective from **May 1st, 2001 to April 30th, 2004 (the "collective agreement").**

Dated at Toronto, this day of , **2001**

Signed on behalf of The Heavy Construction Association of Toronto	**Signed on behalf of the Universal Workers Union, Local 183**
_____	_____
_____	_____
_____	_____

LETTER OF UNDERSTANDING NO. 5
RE : Classification Recognition Committee

(A) A Recognition Committee for classification purposes of two representatives of each party be established to accept Company certification cards of proficiency for the following classifications:

1. Miner
2. Lead Miner
3. Mucker
4. Tunnel Machine Operator

(B) Card must be clearly identifiable and contain member's name, Social Security Number, date of birth, etc.

(C) Card to be used for Union Registration purpose only. Card will not be used in any grievance procedures, nor will it be used to increase any hourly rate of pay, (i.e. a certified pipelayer is hired as a Labourer, he shall receive Labourer's rate of pay).

(D) Should there be any question of the Card holder's capabilities or proficiency, any employee or Employer can make a request to the Committee for a review. The employee in question shall be sent to the Training Centre for a proficiency test.

Dated at Toronto, this day of , **2001.**

Signed on behalf of The Heavy Construction Association of Toronto	**Signed on behalf of the Universal Workers Union, Local 183**
_____	_____
_____	_____
_____	_____

LETTER OF UNDERSTANDING NO. 6

Re : Occupational and Rehabilitation Health Clinic

It will not be a violation of Article 16 if, notwithstanding the Employer's best efforts, an employee refuses to attend at the Occupational Health Clinic for testing at least once every three (3) years.

Dated at Toronto, this day of , **2001.**

Signed on behalf of The Heavy Construction Association of Toronto	**Signed on behalf of the Universal Workers Union, Local 183**
_____	_____
_____	_____
_____	_____

LETTER OF UNDERSTANDING NO. 7

RE : SCHEDULE "A"

The Association agrees that equipment historically operated by **Universal Workers Union,** Local 183 shall continue to be operated by **Universal Workers Union**, Local 183.

Dated at Toronto, this day of , **2001.**

Signed on behalf of The Heavy Construction Association of Toronto

_____

_____

_____

Signed on behalf of the Universal Workers Union Local 183

_____

_____

_____

LETTER OF UNDERSTANDING NO. 8

RE: SCHEDULE "A"

The Association will incorporate classifications and rates of Cement Lining of Watermains as agreed to by specialty contractors into this Collective Agreement.

Dated at Toronto, this day of , **2001.**

Signed on behalf of The Heavy Construction Association of Toronto

_____

_____

_____

Signed on behalf of the Universal Workers Union, Local 183

_____

_____

_____

LETTER OF UNDERSTANDING NO. 9

RE : SCHEDULE "B"

The Parties agreed that T.B.M. and Micro Tunnelling Operators are **Universal Workers Union,** Local 183 jurisdiction and to be included in Group 5 of Schedule "B" subject to the Employer's agreement on the selection of the operators for same.

Dated at Toronto, this day of , **2001.**

Signed on behalf of The Heavy Construction Association of Toronto	**Signed on behalf of the Universal Workers Union, Local 183**
_____	_____
_____	_____
_____	_____

LETTER OF UNDERSTANDING NO.10

The parties hereto agree that the last sentence of Article 24 (c) does not apply in the shoring, piling and lagging operations.

Dated at Toronto, this day of , **2001.**

Signed on behalf of The Heavy Construction Association of Toronto

Signed on behalf of the Universal Workers Union, Local 183

LETTER OF UNDERSTANDING NO. 11

FORKLIFT LETTER

Local 183 claims jurisdiction over the operation of forklifts and will take all necessary action to defend its jurisdictional claims

Local 183 understands that other Unions may also claim jurisdiction over the operation of forklifts.

Therefore, Local 183 undertakes that should it be necessary to file a grievance with respect to this issue, it will not seek damages against an Employer unless there has been a previous decision award or agreement in relation to the specific Employer for the operation of forklift by members of Local 183.

Dated at Toronto, this day of , **2001.**

Signed on behalf of The Heavy Construction Association of Toronto

_____

_____

_____

Signed on behalf of the Universal Workers Union, Local 183

_____

_____

_____

LETTER OF UNDERSTANDING NO. 12

SURFACE GROUTING EQUIPMENT

With respect to the fixed grout plant on surface (Area 4 McNally-PCL-Foundation JV, Sheppard Subway) the present practice will continue as agreed upon but such continuation shall be without prejudice to any future position of Local 183.

With respect to all other grouting equipment of all types, including mobile equipment, the parties agree that the operation of such equipment is, and shall remain, within the jurisdiction of Local 183.

Dated at Toronto, this day of , **2001.**

Signed on behalf of The Heavy Construction Association of Toronto	**Signed on behalf of the Universal Workers Union, Local 183**
_____	_____
_____	_____
_____	_____

LETTER OF UNDERSTANDING #13

BETWEEN:

The Heavy Construction Association of Toronto
(the "Association")

-and-

Universal Workers Union, L.I.U.N.A. Local 183
(the "Union")

Hiring

In order to ensure that the Employers bound to the terms and conditions of the Collective Agreement binding upon the Union and the Association continue to have access to an efficient and skilled work force in an expeditious manner, which the parties agree will benefit the unionized portion of this industry, and will thereby benefit all members of the Union, the parties hereby agree as follows:

a) Notwithstanding the provisions of Article 5 of the Collective Agreement requiring the Employer to obtain all, or some, of its work force from the Union's Hiring Hall, the Employer may make a request of the Union to hire specific Union members, who have previously been employed by the Employer, under the provisions of this Collective Agreement, within a six (6) month period prior to the date of any such request. Should it receive such a request, the Union may, at its sole and exclusive discretion, allow some or all of the requested individuals to be hired by the employer notwithstanding the Hiring Hall provisions set out in the Collective Agreement depending upon all of the circumstances which the Union considers relevant, including, but not necessary limited to, the general state of the Heavy Engineering sector of the construction industry in the various areas covered by the Collective Agreement ; the levels of employment amongst members of the Union; the particular skill levels of the requested employees; the Employer's general compliance with the hiring and other provisions of the Collective Agreement whether or not any instances of non-compliance have resulted in grievances; and any other circumstances which the Union considers relevant;

b) Should the Union agree that the employer may hire some or all of the requested individuals, all other provisions set out in this Collective Agreement concerning hiring or otherwise. will apply and therefore, without limiting the generality of the foregoing, such individuals must be Union members in good standing and must have obtained referral slips from the Union prior to commencing work;

c) The parties agree that this Letter of Understanding forms part of the Collective Agreement binding upon them and is enforceable as such.

Signed at _____, this _____ day of _____, 2001.

_____	_____
For the Union	**For the Association**
_____	_____
Print Name	**Print Name**

LETTER OF UNDERSTANDING #14

BETWEEN:

Universal Workers Union, L.I.U.N.A. Local 183
(the "Union")

-and-

The Heavy Construction Association of Toronto
(the "Association")

Remittances and Contributions

THE PARTIES agree that during the lifetime of the Agreement, the Union shall have the right, at any time, to require an Employer to change the amount of contributions to any of the employee benefit funds including, but not limited to, the Pension Fund, Welfare Fund and Pre-Paid Legal fund, set out in this Collective Agreement, or which may be established hereafter by the Union, by transferring any portion of the contributions required to be made to any particular employee benefit fund (now existing or existing in the future), other than the Vacation Pay Fund and the Industry Fund, to any other employee benefit fund (now existing or existing in the future) provided that there should be no increase in the total monetary contributions required to be made under this Agreement.

THE PARTIES agree that this Letter of Understanding forms part of the Collective Agreement binding upon them and may be enforced as such.

Signed at _____, this _____ day of _____, 2001.

_____
For the Union

_____
For the Association

_____
Print Name

_____
Print Name

LETTER OF UNDERSTANDING #15

BETWEEN:

Universal Workers Union, L.I.U.N.A. Local 183
(the "Union")

-and-

The Heavy Construction Association of Toronto
(the "Assocition")

OLRB Area No. 12

This will confirm that, notwithstanding the references thereto in Appendix "A", the Union and the Association have not agreed to include that portion of OLRB Area No. 12 west of the Trent Severn Waterway within the geographic areas covered by the Agreement.

THE PARTIES agree that this Letter of Understanding forms part of the Collective Agreement binding upon them and may be enforced as such.

Signed at _____, this _____ day of _____, 2001.

_____
For the Union

_____
For the Association

_____
Print Name

_____
Print Name

APPENDIX "A"

Applicable to the District of Muskoka and in

OLRB Areas No. 9, 10, 11, and

that portion of No. 12 west of the Trent-Severn Waterway

THIS AGREEMENT made as of the day of , 2002.

BETWEEN:

(hereinafter called the "Employer")

OF THE FIRST PART

and

Universal Workers Union, Labourers' International Union of North America Local 183

(hereinafter called the "Union")

OF THE SECOND PART

WHEREAS the Contractor and the Union wish to make a common collective agreement with respect to certain employees of the Contractor engaged in road and parking lot construction, paving, sewers and watermains construction and heavy construction etc., and all work incidental thereto, and to provide for and ensure uniform interpretation and application in the administration of the Collective Bargaining Agreement;

NOW THEREFORE it is agreed as follows:

ARTICLE 1 - RECOGNITION

1.01 The Contractor recognizes the Union as the collective bargaining agent for all employees working in the District of Muskoka and in Ontario Labour Relations Board Geographic Areas No. 9, 10 and 11, and that portion of No. 12 west of the Trent-Severn Waterway, save and except foremen, non-working foremen, those above the rank of foreperson, office and clerical staff, temporary shop employees, engineering staff and security guards.

1.02 Anywhere in this Agreement, all references to the masculine gender shall be deemed to be references to the feminine gender as well, and similarly in the reverse.

ARTICLE 2 - UNION SECURITY

2.01 All employees hired by the Contractor after the date of signing of this Agreement shall when working in a position within the bargaining unit described in Article 2 hereof as a condition of employment, become or remain a member of the Union within fifteen (15) days of such employment and shall be required to maintain such membership while working within the bargaining unit for the duration of this Agreement.

2.02 It is expressly understood and agreed that no Contractor shall be required to discharge any employee for violation of the provisions of this Article for Union Security for any reason other than non-payment of regular monthly Union dues, and initiation fees where applicable, notwithstanding anything to the contrary herein contained.

2.03 All employees working in the bargaining unit described in Article 2 hereof shall be required as a condition of employment to have his regular monthly union dues and any required working dues checked off and the Union agrees to duly inform the Contractor of the amounts of such Union dues and working dues and any changes in the amounts. The Contractor agrees to make such deductions from the first pay issued to the employees each calendar month and remit the same to the Union not later than the fifteenth (15th) day of the following month to the Secretary/Treasurer of the Union. When remitting such dues, the Contractor shall name the employees and their Social Insurance Numbers from whose pay such deductions have been made, as well as the names and Social Insurance Numbers of employees who have left employment of the Contractor since the last payment.

2.04 The Employer shall show on the T-4 slips the amount of Union dues deducted from each employee.

ARTICLE 3 - MANAGEMENT RIGHTS

3.01 The Union agrees that it is the exclusive function of the Contractor:

a) to conduct its business in all respects in accordance with its commitments and responsibilities including the right to manage the jobs, locate, extend curtail or cease operations, to determine the number of men required at any or all operations, to determine the kinds and locations of machines, tools and equipment to be used and the schedules of production, to judge the qualifications of the employees, and to maintain order, discipline and efficiency;

b) to hire, discharge, classify, transfer, promote, demote lay off, suspend or otherwise discipline employees provided that a claim by an employee that he/she has been discharged without reasonable cause or subjected to disciplinary suspension or disciplinary demotion without reasonable cause shall be subject to the provisions of the grievance procedure;

c) to make, alter from time to time and enforce reasonable rules of conduct and procedure to be observed by the employees;

d) it is agreed that these functions shall not be exercised in a manner inconsistent with the express provisions of this Agreement.

ARTICLE 4 - GRIEVANCE PROCEDURE

4.01 The parties to this Agreement are agreed that it is of the utmost importance to adjust complaints and grievances as quickly as possible.

4.02 It is understood and agreed that an employee does not have a grievance until he/she has discussed the matter with his/her foreperson and given him/her an opportunity of dealing with the complaint. The employee may have his/her steward or business representative present if he/she so desires.

4.03 Grievances properly arising under this Agreement shall be adjusted and settled as follows:

STEP NO. 1

Within ten (10) working days after the circumstance giving rise to the grievance occurred or originated (save and except grievances arising out of discharge cases in which case the grievance shall be brought forward within five (5) days of the employee being notified of his/her discharge, and save and except grievances involving monetary items as defined in Section 4.04 below) the aggrieved employee with his/her business representative may present his/her grievance, which shall be reduced to writing, to the official of the Company named by the Company to handle grievances at this step. Should no settlement satisfactory to the employee be reached within five (5) full working days, the next step in the grievance procedure may be taken at anytime within five (5) full working days thereafter.

STEP NO. 2

The Union and the Contractor shall meet as promptly as possible thereafter in an endeavour to settle the grievance. If a satisfactory settlement is not reached within five (5) working days from this meeting and if the grievance is one which concerns the interpretation or alleged violation of the Agreement, the grievance may be submitted to arbitration as provided in Article 5 below at any time within ten (10) working days thereafter but not later.

4.04 Monetary grievances are defined as those involving payment for hours of work, rates of pay, overtime, vacation and statutory holiday pay, bonuses as referred to in Schedule "A", premiums (shift and compressed air), travelling expenses, room and board allowances, pension and welfare contributions, reporting allowances and dues, but not

including grievances arising out of classification assignments. Such grievances shall be brought forward at Step No. 1 within three (3) months after the circumstances giving rise to the grievance occurred or originated.

ARTICLE 5 - ARBITRATION

5.01 Both parties to this Agreement agree that any grievance concerning the interpretation or alleged violation of this Agreement which has been properly carried through all the steps of the grievance procedure outlined in Article 4 above and which has not been settled, will be referred to a board of arbitration at the request of either of the parties hereto.

5.02 The board of arbitration will be composed of one (1) person appointed by the Contractor, one (1) person appointed by the Union and a third person to act as Chairman chosen by the other two (2) members of the Board.

5.03 Within two (2) working days of the request by either party for a board, each party shall notify the other of the name of its appointee.

5.04 Should the person chosen by the Contractor to act on the board and the person chosen by the Union fail to agree on a third member as chairman within five (5) days of the notification mentioned in 4.03 above, the Minister of Labour of the Province of Ontario will be asked to nominate a member of the judiciary of the Province of Ontario to act as chairman.

5.05 The decisions of the board of arbitration or a majority of such board constituted in the above manner or if there is no majority, the decision of the chairman shall be binding upon the employees, the Union and the Contractor.

5.06 The board of arbitration shall not have any power to alter or change any of the provisions of this Agreement or to substitute any new provisions for any existing provisions nor to give any decision inconsistent with the terms and provisions of the Agreement.

5.07 Each of the parties to this Agreement shall bear the expense of the arbitrator appointed by it and the parties will jointly bear the expenses, if any, of the chairman.

5.08 a) The nature of the grievance, the remedy sought and the section or sections of the Agreement which are alleged to have been violated shall be set out in the written record of the grievance and may not be subject to change in later steps.

b) In determining the time which is allowed in the various steps, Sundays and Statutory Holidays shall be excluded, and any time limits may be extended by agreement in writing.

c) If advantage of the provisions of Articles 4 and 5 hereof is not taken within the time limits specified therein or as extended in writing as set out above, the grievance shall be deemed to have been abandoned and may not be re-opened.

ARTICLE 6 - MANAGEMENT GRIEVANCES AND UNION GRIEVANCES

6.01 It is understood that the Contractor on its own behalf may file a grievance with the Union and that if such complaint is not settled to the satisfaction of the parties concerned, it may be treated as a grievance and referred to arbitration in the same way as a grievance of an employee. Such grievance shall be processed at Step No. 2 of the grievance procedure set out in Article 4 hereof.

6.02 A Union policy grievance which is defined as an alleged violation of this Agreement involving all or a substantial number of employees in the bargaining unit in regard to which a substantial number of employees have signified an intention to grieve or a grievance involving the union itself, including the application or interpretation of this Agreement, may be brought forward in writing in the same manner and within the same time limits as in the case of an employee grievance. Such grievance shall be processed at Step No. I of the Grievance procedure as set out in Article 4 hereof. If it is not settled, it may go to a board of arbitration in the same manner as a grievance of an employee.

ARTICLE 7 - STATUTORY HOLIDAYS, VACATION ALLOWANCES, HOURS OF WORK, WAGE RATES, ETC.

7.01 Attached hereto are Schedules "A", "B" and "C" respecting Statutory Holidays, Vacation Allowances, Hours of Work, Wage Rates, etc which are hereby made a part of this Agreement.

7.02 No employee shall receive a reduction in wages or benefits as a result of the signing of this Agreement.

ARTICLE 8 - UNION REPRESENTATION

8.01 The Business Representative of the Union shall have access to all working areas during working hours as necessary for the administration of this Agreement but in no case shall his/her visits interfere with the progress of the work. When visiting a job, he/she will first advise the superintendent or other supervisory personnel as designated by the Employer. Where clearance is required from the owner it is the responsibility of the Union to obtain such clearance. The Union agrees to give such assistance as is required of it by the Employer to secure competent and qualified men.

8.02 The Contractor agrees to recognize such reasonable number of stewards as may from time to time be appointed by the Union, but shall not be obliged to recognize such stewards until informed in writing of the names of all stewards as they are appointed.

It is further agreed that all things being equal, a steward shall be one of the last four (4) men retained in employment if competent to perform the work available.

It is also agreed that a steward will not be excluded from overtime work provided he/she is able to do the work required.

ARTICLE 9 - PRODUCTIVITY

9.01 The Union and the Contractor recognizes the mutual value of improving by all proper and reasonable means, the productivity of the individual workman and both will undertake, individually and jointly to promote such increased productivity.

9.02 During the lifetime of this Agreement, the Union agrees there will be no strike, slow down or picketing or any other act which will interfere with the regular schedule of work, and the Contractor agrees that there shall be no lockout. The Company shall have the right to discharge or otherwise discipline employees who take part in or instigate any strike, picketing or slow down or any other act which interferes with the regular schedule of work..

9.03 The Union shall not involve the Contractor in any dispute which may arise between the Union and any other Company and the employees of such other company. The Union further agrees it will not condone a work stoppage or observe any picket line placed on a job site for jurisdictional purposes.

9.04 The Contractor agrees not to subcontract asphalt, concrete paving, curb and gutter work, bridges and reservoirs, or sewer and watermain work which the Company ordinarily performs itself or **work for which** the owner or general contractor requires the employment of Union members, to sub-contractors other than those who employ members of the Union.

9.05 If an Apprenticeship Program is established the parties agree to jointly participate in such Program.

ARTICLE 10 - PAYMENT OF WAGES

10.01 Wages shall be paid by cash or cheque on the job at the option of the Employer and shall be accompanied by a slip outlining all hours of work, overtime hours, deductions for income tax, unemployment insurance, pensions etc. where applicable. Wages may be paid by direct deposit provided that the employees agree.

10.02 In the case of lay off, all men shall receive one hour's notice in advance of the layoff.

10.03 Whenever Employment Insurance separation certificates are not given to employees at the time of termination, they shall be sent by the Contractor affected to the employee by registered mail to his/her last known address on file with the Company within seventy-two (72) hours of the time of termination. Further, an employee who is laid off will be sent his/her pay cheque and vacation pay credits within seventy-two (72) hours of layoff, and an employee who quits will be sent his/her pay cheque and vacation pay credits not later than the next regular pay day.

10.04 No employee will be discharged by his/her Employer because he/she fails to work in unsafe conditions as set out in government safety regulations. Any refusal by an employee to abide by such regulations after being duly warned will be sufficient cause for dismissal.

ARTICLE 11 - SAFETY, SANITATION & SHELTER

11.01 On all jobs where more than five (5) employees are continuously employed shelter (heated when necessary) will be provided for employees to eat their lunch and store their clothing. Sanitary toilets shall be provided in accordance with provisions of the Ontario Health and Safety Act before production work commences on the job. It is understood that the provisions of this section do not apply to jobs of short duration.

11.02 The Employer shall supply safety helmets to employees at no cost. If any employee at termination of employment does not return said helmet, he/she shall be charged at cost. If the helmet is returned and has been made unwearable from wilful neglect and abuse, the employee shall be charged for the full replacement value.

11.03 It is further agreed that drinking water and paper cups will be provided for employees on all jobs and that washing water will be provided where outlets are available to the Employer. Further, if a trailer is used at the job site for storage of tools and equipment in addition to use as lunchroom facilities, (heated when necessary) the tool storage area will be partitioned off.

11.04 A safety committee is to be established composed of two (2) members of the Union and two (2) representatives of the Contractor. Meetings, not to exceed one (1) per month, will be held when requested by either party.

11.05 When employees are required to perform their duties in wet weather, the Contractor agrees to supply suitable protective clothing including rubber boots which will be returned to the foreperson when the assigned duties are completed. It is understood that this provision does not apply to employees who are required to wear rubber boots in the normal course of their duties.

11.06 The Contractor shall at his/her own expense furnish to any employee injured in his/her employment who is in need of it immediate conveyance and transportation to a hospital or to a physician. It is further agreed that an ambulance shall be used where necessary and possible.

11.07 An employee who is injured during working hours in a compensable accident and is required to leave for treatment or is sent home because of such injury shall receive payment for the remainder of the shift at his/her regular rate of pay.

11.08 The trucks to be used to transport employees will be covered and tools will be secured in tool boxes. No materials will be carried in the trucks.

11.09 Employees shall be entitled to be reimbursed by the Contractor for loss of clothing due to fire on the Contractor's premises up to a maximum of two hundred fifty dollars ($250.00). In all cases, an employee must provide written evidence of such loss.

ARTICLE 12 - COFFEE AND LUNCH BREAK

12.01 Employees will be allowed one (1) coffee break in each half of the working shift.

12.02 Employees shall be allowed a one-half hour unpaid lunch break between 11:30 a.m. and 1:00 p.m. It is understood that no employee shall be required to work more than five (5) consecutive hours without a lunch break.

ARTICLE 13 - REINSTATEMENT OF EMPLOYEES UPON RETURN FROM INDUSTRIAL ACCIDENT

13.01 An employee injured in the performance of his/her duties will resume his/her regular work when medically fit to do so if work is available and he/she applies. The job of an injured worker shall be deemed to be available if upon his/her return any work within his/her classification on any project under this Agreement is being performed by an employee who, subsequent to the time of injury, was hired by the company or transferred or otherwise assigned to perform any work within the said classification on any project covered by this Agreement. Any employee who claims he/she has been denied employment contrary to this provision may have recourse to the grievance and arbitration procedures as set out in Articles 5 and 6 of this Agreement.

13.02 The above shall not apply if the injury is attributable solely to the wilful misconduct of the employee.

ARTICLE 14 - GOVERNMENT LEGISLATION

14.01 In the event that any of the provisions of this Agreement are found to be in conflict with any valid and applicable federal or provincial law now existing or hereinafter enacted, it is agreed that such law shall supersede the conflicting provision without in any way affecting the remainder of the Agreement.

ARTICLE 15 - DURATION

15.01 This Agreement shall be effective May 1st, 2002 and shall remain in effect until the 30th day of April, 2005, and shall continue in force from year to year thereafter, unless either party shall furnish the other with notice of termination of or proposed revision of this Agreement not more than one hundred twenty (120) days and not less than thirty (30) days before the 30th day of April, 2005 or in a like period in any year thereafter.

SCHEDULE "A"

1. HOURS OF WORK AND OVERTIME

a) The standard hours of work for all employees other than watchmen shall be based on fifty (50) hours per week exclusive of travelling time to and from the job.

b) Overtime at the rate of time and one-half (1½) the employee's current hourly rate shall be paid to all employees other than watchmen for all work performed in excess of ten (10) hours per day or in excess of fifty (50) hours per week or on Saturdays. (Overtime will only be paid once for the same hour).

c) Overtime at the rate of double the employee's current hourly rate shall be paid to all employees other than watchmen for all work performed on Sundays and on the following statutory holidays;

New Year's Day
Good Friday
Victoria Day
Canada Day
Flag Day when proclaimed
Simcoe Day
Labour Day
Thanksgiving Day
Christmas Day

The provisions of this sub-paragraph do not apply to repairers in emergency.

d) Watchmen shall receive overtime payment at the rate of time and one-half (1½) the employee's current hourly rate for all work performed on such employee's seventh consecutive shift.

2. REPORTING ALLOWANCE

a) An employee who reports for work at the Contractor's job site or shop unless directed not to report the previous day by his/her Employer and for whom no work is available due to reasons other than inclement weather shall receive a minimum of four (4) hours; reporting time and shall remain at other work if requested to do so by the foreperson.

b) An employee who reports for work at the Contractor's job site or shop unless directed not to report and for whom no work is available due to inclement weather shall receive a minimum of one (1) hour's reporting time, provided the employee remains on the job for one (1) hour after his/her designated starting time if requested to do so by the foreperson.

c) An employee who in the course of his/her shift is directed by the Contractor to wait on a job or travel from one job site to another job site within Area 9 shall be paid for such waiting or travel time.

3. SHIFT PREMIUMS

A shift premium of fifty-cents ($0.50) per hour will be paid for all work performed on a second shift and a shift premium of fifty-five cents ($0.55) per hour will be paid for all work performed on a third shift.

4. SPECIAL CONDITIONS

Where due to customer demands, the work to be performed can only be performed at times which would initiate shift or overtime premiums, then the said work is to be done at straight times rates.

5. VACATION PAY AND STATUTORY HOLIDAY PAY

a) Vacation and statutory holiday credits shall be paid to employees covered by this Collective Agreement at the rate of ten per cent (10%) of the gross wages earned. It is understood and agreed that six per cent (6%) is to be considered in lieu of statutory holiday pay.

b) It is further understood and agreed that the vacation pay and statutory holiday pay will be paid to the employees on a weekly basis.

6. TRAVEL AND LIVING EXPENSES

a) When employees are required to report to or return to the yard before starting or at the conclusion of their days work, they shall be paid from the yard and at the premium rate where applicable.

b) Employees required to work beyond a radius of seventy-five (75) kilometres from the Company yard shall be paid at their straight time rate for any time required to travel to and from the seventy-five kilometre radius and in no event shall they be paid less than for one-half (½) hour.

c) Employees required to provide their own transportation shall be paid at the rate of forty cents ($0.40) per kilometre beyond a seventy-five (75) kilometre radius from the Company.

d) Employees who are requested to work outside the territorial jurisdiction covered by this Agreement and who are required to remain away overnight shall be allowed seventy dollars ($70.00) per day for room and board.

e) It is understood that when an employee is sent out of town by his/her Employer in the circumstances contemplated by paragraphs (c) and (d) above, the employer will maintain the rate of wages and hours of work for such employee as provided in the Collective Agreement.

f) Where a camp is provided, room and board will be supplied free in lieu of the room and board allowance under (d) herein.

7. WELFARE BENEFIT

Effective November 21, 2002, the Contractor agrees to pay the sum of one dollar and sixty cents (1.60) per hour to the joint and equally trusted Local 183 Members Benefit Fund for each hour worked by the employees of the Contractor covered by the agreement for the purchase of benefits. Effective May 1st, 2003, the Contractor shall pay one dollar and seventy cents ($1.70) per hour and effective May 1st, 2004, the Contractor shall pay one dollar and eighty cents ($1.80) per hour for each hour worked by the employees of the Contractor covered by the agreement for the purchase of benefits.

8. PENSION

Effective November 21, 2002, the Contractor agrees to pay the sum of two dollars ($2.00) for each hour worked by employees represented in the Collective Agreement by the Union into the Central and Eastern Canada Labourers' International Union Pension Fund. Effective May 1st, 2003, the Contractor shall pay two dollars and ten cents ($2.10) for each hour worked and effective May 1st, 2004, the Contractor shall pay two dollars and twenty cents ($2.20) for each hour worked by employees represented by the Union into the Central and Eastern Canada Labourers' International Union Pension Fund.

Payments into the welfare fund and pension fund are to be made by the 15th day of the month following the month for which payment was made.

9. WORKING DUES

The Contractor agrees to deduct from the wages herein and pay on behalf of its employees covered by this Agreement working dues of two percent (2%) of the Base Rate per hour for each hour worked by them and to remit the same together with a list of the names, Social Insurance Number of each employee and the number of hours worked by each employee to the Secretary-Treasurer of the Union no later than the 15th day of the month for which they are due.

The Contractor also agrees to deduct and remit five cents ($.05) per hour for each hour worked by the said employees which shall be remitted monthly by the Local Union Secretary-Treasurer to the Labourers International Union of North America, Ontario Provincial District Union. It is agreed that the Contractor may use the Welfare Contribution Form with respect to the remittance of the working dues and information therein required

10. INDUSTRY & TRAINING FUND

Each Employer bound by this Agreement agrees to contribute the sum of five cents ($0.05) per hour for each hour worked by each employee covered by this Agreement and to remit same to the Labourer's Local 183 Members Training & Rehabilitation Fund. An additional ten cents ($0.10) per hour worked, per employee will be remitted along with the contributions for training, for the Oshawa Signatory Contractors Association's Industry Fund. The Local 183 Members Training & Rehabilitation Fund will forward all such amounts of industry funds received to the Oshawa Signatory Contractors Association.

SCHEDULE "B"
WAGES AND CLASSIFICATIONS
(Applicable to all work within the Regional Municipality of Durham, (except for the Towns of Ajax and Pickering) and all work on the Highway 407 Project.)

LABOURERS

1. Labourers (including wiremesh and steel rod reenforcing), operators of pumps (3 inch in diameter and under) and heaterpersons, interlocking brick setters (where the Company directly employs)

	May 1, 2001	Nov. 21, 2002	May 1, 2003	May 1, 2004
Wages	$ 23.43	$ 23.79	$ 24.15	$ 24.51
Vacation Pay	$ 2.34	$ 2.38	$ 2.42	$ 2.45
Welfare	$ 1.50	$ 1.60	$ 1.70	$ 1.80
Pension	$ 1.90	$ 2.00	$ 2.10	$ 2.20
Training	$ 0.05	$ 0.05	$ 0.05	$ 0.05
Tri-Fund	$ 0.05	$ 0.05	$ 0.05	$ 0.05
Total Package	$ 29.27	$ 29.87	$ 30.47	$ 31.06
Working Dues	$ 0.47	$ 0.48	$ 0.48	$ 0.49
OPDC	$ 0.05	$ 0.05	$ 0.05	$ 0.05

2. Jackhammer person including all machine-driven tools by gas, electric and air, small mixer operator (under 1 Yard), dinky motorperson, sheeting and shoring, miners and drillers, helpers, powderperson helper, mortarperson, scootcrete drivers, topperson, well point installers (as per Labourers and Engineers' Agreement), signalperson.

	May 1, 2001	Nov. 21, 2002	May 1, 2003	May 1, 2004
Wages	$ 23.48	$ 23.84	$ 24.20	$ 24.56
Vacation Pay	$ 2.34	$ 2.38	$ 2.42	$ 2.46
Welfare	$ 1.50	$ 1.60	$ 1.70	$ 1.80
Pension	$ 1.90	$ 2.00	$ 2.10	$ 2.20
Training	$ 0.05	$ 0.05	$ 0.05	$ 0.05
Tri-Fund	$ 0.05	$ 0.05	$ 0.05	$ 0.05
Total Package	$ 29.32	$ 29.92	$ 30.52	$ 31.12
Working Dues	$ 0.47	$ 0.48	$ 0.48	$ 0.49
OPDC	$ 0.05	$ 0.05	$ 0.05	$ 0.05

3. Concrete Workers including screedperson, puddler and floatperson, pipelayers' helpers, catch basin installers, diamond saw operators, fence erectors (Chainlink and other types - snow fence excluded), guard rail installers.

	May 1, 2001	Nov. 21, 2002	May 1, 2003	May 1, 2004
Wages	$ 23.57	$ 23.93	$ 24.29	$ 24.65
Vacation Pay	$ 2.36	$ 2.39	$ 2.43	$ 2.47
Welfare	$ 1.50	$ 1.60	$ 1.70	$ 1.80
Pension	$ 1.90	$ 2.00	$ 2.10	$ 2.20
Training	$ 0.05	$ 0.05	$ 0.05	$ 0.05
Tri-Fund	$ 0.05	$ 0.05	$ 0.05	$ 0.05
Total Package	$ 29.43	$ 30.02	$ 30.62	$ 31.22
Working Dues	$ 0.47	$ 0.48	$ 0.48	$ 0.49
OPDC	$ 0.05	$ 0.05	$ 0.05	$ 0.05

4. Manhole and valve chamber constructor.

	May 1, 2001	Nov. 21, 2002	May 1, 2003	May 1, 2004
Wages	$ 23.63	$ 23.99	$ 24.35	$ 24.71
Vacation Pay	$ 2.36	$ 2.40	$ 2.44	$ 2.47
Welfare	$ 1.50	$ 1.60	$ 1.70	$ 1.80
Pension	$ 1.90	$ 2.00	$ 2.10	$ 2.20
Training	$ 0.05	$ 0.05	$ 0.05	$ 0.05
Tri-Fund	$ 0.05	$ 0.05	$ 0.05	$ 0.05
Total Package	$ 29.49	$ 30.09	$ 30.69	$ 31.28
Working Dues	$ 0.47	$ 0.48	$ 0.48	$ 0.49
OPDC	$ 0.05	$ 0.05	$ 0.05	$ 0.05

5. Carpenters/Formsetters, Concrete road, curb and sidewalk finisher, curbsetter, gutter block setter, curb machine persons, concrete paving track setter, miners, grout machine person, powderperson and blasters.

	May 1, 2001	Nov. 21, 2002	May 1, 2003	May 1, 2004
Wages	$ 23.67	$ 24.03	$ 24.39	$ 24.75
Vacation Pay	$ 2.37	$ 2.40	$ 2.44	$ 2.48
Welfare	$ 1.50	$ 1.60	$ 1.70	$ 1.80
Pension	$ 1.90	$ 2.00	$ 2.10	$ 2.20
Training	$ 0.05	$ 0.05	$ 0.05	$ 0.05
Tri-Fund	$ 0.05	$ 0.05	$ 0.05	$ 0.05
Total Package	$ 29.54	$ 30.13	$ 30.73	$ 31.33
Working Dues	$ 0.47	$ 0.48	$ 0.48	$ 0.49
OPDC	$ 0.05	$ 0.05	$ 0.05	$ 0.05

6. Asphalt rakers and box sewer constructor.

	May 1, 2001	Nov. 21, 2002	May 1, 2003	May 1, 2004
Wages	$ 23.73	$ 24.09	$ 24.45	$ 24.81
Vacation Pay	$ 2.37	$ 2.41	$ 2.45	$ 2.48
Welfare	$ 1.50	$ 1.60	$ 1.70	$ 1.80
Pension	$ 1.90	$ 2.00	$ 2.10	$ 2.20
Training	$ 0.05	$ 0.05	$ 0.05	$ 0.05
Tri-Fund	$ 0.05	$ 0.05	$ 0.05	$ 0.05
Total Package	$ 29.60	$ 30.20	$ 30.80	$ 31.39
Working Dues	$ 0.47	$ 0.48	$ 0.48	$ 0.49
OPDC	$ 0.05	$ 0.05	$ 0.05	$ 0.05

7. Pipelayers (cast iron, tile, concrete, asbestos, cement, plastic, etc.)

	May 1, 2001	Nov. 21, 2002	May 1, 2003	May 1, 2004
Wages	$ 23.73	$ 24.79	$ 25.15	$ 25.51
Vacation Pay	$ 2.37	$ 2.48	$ 2.52	$ 2.55
Welfare	$ 1.50	$ 1.60	$ 1.70	$ 1.80
Pension	$ 1.90	$ 2.00	$ 2.10	$ 2.20
Training	$ 0.05	$ 0.05	$ 0.05	$ 0.05
Tri-Fund	$ 0.05	$ 0.05	$ 0.05	$ 0.05
Total Package	$ 29.60	$ 30.97	$ 31.57	$ 32.16
Working Dues	$ 0.47	$ 0.50	$ 0.50	$ 0.51
OPDC	$ 0.05	$ 0.05	$ 0.05	$ 0.05

8. Fine Grade Checker

	May 1, 2001	Nov. 21, 2002	May 1, 2003	May 1, 2004
Wages	$ 23.97	$ 24.33	$ 24.69	$ 25.05
Vacation Pay	$ 2.40	$ 2.43	$ 2.47	$ 2.51
Welfare	$ 1.50	$ 1.60	$ 1.70	$ 1.80
Pension	$ 1.90	$ 2.00	$ 2.10	$ 2.20
Training	$ 0.05	$ 0.05	$ 0.05	$ 0.05
Tri-Fund	$ 0.05	$ 0.05	$ 0.05	$ 0.05
Total Package	$ 29.87	$ 30.46	$ 31.06	$ 31.66
Working Dues	$ 0.47	$ 0.48	$ 0.48	$ 0.49
OPDC	$ 0.05	$ 0.05	$ 0.05	$ 0.05

9. **Flagperson**

	May 1, 2001	Nov. 21, 2002	May 1, 2003	May 1, 2004
Wages	$ 17.95	$ 18.31	$ 18.67	$ 19.03
Vacation Pay	$ 1.80	$ 1.83	$ 1.87	$ 1.91
Welfare	$ 1.50	$ 1.60	$ 1.70	$ 1.80
Pension	$ 1.90	$ 2.00	$ 2.10	$ 2.20
Training	$ 0.05	$ 0.05	$ 0.05	$ 0.05
Tri-Fund	$ 0.05	$ 0.05	$ 0.05	$ 0.05
Total Package	$ 23.25	$ 23.84	$ 24.44	$ 25.04
Working Dues	$ 0.36	$ 0.37	$ 0.37	$ 0.38
OPDC	$ 0.05	$ 0.05	$ 0.05	$ 0.05

10. **Working Foreman**

	May 1, 2001	Nov. 21, 2002	May 1, 2003	May 1, 2004
Wages	$ 23.73	$ 25.79	$ 26.15	$ 26.51
Vacation Pay	$ 2.37	$ 2.58	$ 2.62	$ 2.65
Welfare	$ 1.50	$ 1.60	$ 1.70	$ 1.80
Pension	$ 1.90	$ 2.00	$ 2.10	$ 2.20
Training	$ 0.05	$ 0.05	$ 0.05	$ 0.05
Tri-Fund	$ 0.05	$ 0.05	$ 0.05	$ 0.05
Total Package	$ 29.60	$ 32.07	$ 32.67	$ 33.26
Working Dues	$ 0.47	$ 0.48	$ 0.48	$ 0.49
OPDC	$ 0.05	$ 0.05	$ 0.05	$ 0.05

SCHEDULE "C"

WAGES AND CLASSIFICATIONS

1. Applicable to all heavy construction work, as defined by the Collective Agreement between the Heavy Construction Association of Toronto and Local 183, in the District of Muskoka and the City of Peterborough*)

	May 1, 2001	Nov. 21, 2002	May 1, 2003	*Rates will be negotiated in 2004 as per Arnott Agreement
Labourers	$ 17.70	$ 18.12	$ 18.54	
Jackhammer person	$ 17.70	$ 18.12	$ 18.54	
Concrete Workers	$ 18.71	$ 19.12	$ 19.54	
Manhole Constructor	$ 18.71	$ 19.12	$ 19.54	
Carpenter Formsetter	$ 18.71	$ 19.12	$ 19.54	
Asphalt Raker	$ 18.71	$ 19.12	$ 19.54	
Pipelayer	$ 19.70	$ 20.12	$ 20.54	
Flag Person	$ 14.92	$ 15.33	$ 15.75	

*All classifications shall receive an additional $1.00 per hour for all work performed in the City of Peterborough

SCHEDULE "D"
WAGES AND CLASSIFICATIONS

2. (Applicable to all areas , as described in Article 1.01 or work as described in the Collective Agreement preamble, but not covered by Schedules "B" or "C")

	May 1, 2001	Nov. 21, 2002	May 1, 2003	May 1, 2004
Labourers	$ 15.21	$ 15.57	$ 15.93	$ 16.29
Jackhammer person	$ 15.26	$ 15.62	$ 15.98	$ 16.34
Concrete Workers	$ 15.41	$ 15.77	$ 16.13	$ 16.49
Manhole Constructor	$ 15.41	$ 15.77	$ 16.13	$ 16.49
Carpenter Formsetter	$ 15.45	$ 15.81	$ 16.17	$ 16.53
Asphalt Raker	$ 15.51	$ 15.87	$ 16.23	$ 16.59
Pipelayer	$ 16.21	$ 16.57	$ 16.93	$ 17.29
Fine Grade Checker	$ 15.75	$ 16.11	$ 16.47	$ 16.83
Flag Person	$ 12.61	$ 12.97	$ 13.33	$ 13.69

CASUAL WATCHPERSON

Watch person (for six (6) nights' duty - ten (10) hours per day - fifty-five (55) hours per week).

NOTE:

A) An employee working as a labourer who is required to do casual watching or work as a flagman on a casual or intermittent basis will not have his/her rate reduced thereby.

B) Where working forepersons are employed by a member company of the Association, they will receive a premium of a minimum of One Dollar ($1.00) per hour over the highest rate paid to employees in such sub-foreperson's regular and permanent crew.

C) A qualified employee shall be paid the rate for the work to which he/she is assigned.

TUNNEL, SUBWAY AND COMPRESSED AIR PRODUCTS

It is agreed that any Contractors undertaking this work will abide by the rates and conditions as are in existence with Local Union 183 and their Contractors in the Toronto area.

A schedule applying to tunnel work which is to be interpreted to mean a project called as a tunnel and may not include tunnel work which is incidental to open-cut work for sewer and watermain construction up to sixty-six feet (66').

LETTER OF UNDERSTANDING NO. 1

Universal Workers Union, Labourers' International Union of North America, Local 183

Dear Sirs:

Upon prior approval of the employees affected and the Union, work may be scheduled to exceed ten (10) hours per day Monday through Thursday to permit leaving early on Friday without payment of overtime. Such arrangements are not to be abused.

Yours very truly,

Signed at _____ this _____ day of _____, 2002.

THE OSHAWA AREA SIGNATORY CONTRACTORS

PER: _____

UNIVERSAL WORKERS UNION, L.I.U.N.A. LOCAL 183

PER: _____

PER: _____

LETTER OF UNDERSTANDING NO. 2

Remittances and Contributions

The Parties agree that during the lifetime of the Agreement the Union shall have the right, at any time, to require the Employer to change the amount of contributions to any of the employee benefit funds set out in this Collective Agreement, or which may be established hereafter by the Union, by transferring any portion of the contributions required to be made to any particular employee benefit fund (now existing or existing in the future), other than the Vacation Pay Fund, to any other employee benefit fund (now existing or existing in the future) provided that there shall be no increase in the total monetary contributions required to be made under this Agreement.

The Parties agree that this Letter forms part of the Collective Agreement and may be enforced as such.

Signed at _____ this _____ day of _____, 2002.

THE OSHAWA AREA SIGNATORY CONTRACTORS

PER: _____

UNIVERSAL WORKERS UNION, L.I.U.N.A. LOCAL 183

PER: _____

PER: _____

LETTER OF UNDERSTANDING NO. 5

The parties agree that this Collective Agreement represents the entire bargain between the parties and that this Agreement replaces and renders of no force and effect any and all prior agreements between or binding on the parties.

The Union agrees that it will only enter into collective agreements covering similar work which require other employers to become bound by the terms and conditions of this Collective Agreement.

Signed at _____ this _____ day of _____, 2002.

THE OSHAWA AREA SIGNATORY CONTRACTORS

PER: _____

UNIVERSAL WORKERS UNION, L.I.U.N.A. LOCAL 183

PER: _____

PER: _____

COLLECTIVE AGREEMENT BETWEEN

THE HEAVY CONSTRUCTION ASSOCIATION
OF TORONTO

- and -

UNIVERSAL WORKERS UNION,
L.I.U.N.A. LOCAL 183

May 1, 2004 to April 30, 2007

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THIS AGREEMENT made and entered into this 1st day of May, 2004.

BETWEEN:

THE HEAVY CONSTRUCTION ASSOCIATION OF TORONTO
(hereinafter called the "Association")

OF THE FIRST PART

- and -

UNIVERSAL WORKERS UNION, L.I.U.N.A. LOCAL 183
(hereinafter called the "Union")

OF THE SECOND PART

WHEREAS the Association has been accredited by the Ontario Labour Relations Board;

NOW THEREFORE, the parties hereto agree as follows:

ARTICLE 1 - GENERAL PURPOSE

1.01 The general purpose of this Agreement is to establish mutually-satisfactory relations between the Employers and their employees, and to provide a means for a prompt and equitable disposition of grievances, and to establish and maintain satisfactory working conditions, hours of work and wages within the geographical area hereinafter set out for all construction employees performing work under the classifications listed in the Schedules forming part of the Agreement, in the employ of the Employers while employed in the Heavy Engineering Sector or engaged in such other work as has traditionally been performed under this Collective Agreement, as described in Article 3 hereafter, save and except construction employees covered by collective agreements respecting road building, sewer and watermain construction, and save and except non-working foremen and persons above the rank of non-working foreman.

The geographic area covered by this Agreement is defined as Board Areas 8, 9, 10, 11 & 18, set out by the Ontario Labour Relations Board.

ARTICLE 2 - TERM OF AGREEMENT

2.01 This Agreement shall be effective and operative from the first (1st) day of May 2004 and shall remain in full force and effect until the thirtieth (30th) day of April 2007.

2.02 Should the Union or the Association desire to change, add to, amend or terminate this agreement, written notice to that effect will be given not more than one hundred and twenty (120) days and not less than sixty (60) days prior to the termination of this agreement. On receipt of such notice, the parties to the Agreement shall convene a meeting within fifteen (15) days and bargain in good faith to endeavour to reach an agreement. If no such notice is given, this Agreement shall continue in force thereafter for a further three (3) year period unless either parties shall furnish the other with desire to change, add to, amend or terminate this Agreement within any like period of that set out above, in any third year thereafter.

ARTICLE 3 - RECOGNITION AND SCOPE

3.01 (a) The Association recognizes the Universal Workers Union, L.I.U.N.A., Local 183 as the sole and exclusive bargaining agent for all construction employees coming within the jurisdiction of this Agreement while working in the Heavy Engineering Sector, as defined by Article 1 of this Agreement and as further defined by Section (b) of this Article, or while engaged in any other work which has been traditionally performed under the terms and conditions of this Collective Agreement and such other construction employees covered by the collective agreements set out in Article 3.01(c); save and except non-working foremen, persons above the rank of non-working foreman, office and clerical staff, shop and yard employees, engineering staff and security guards. The Union recognizes the Association as an accredited bargaining representative for the Heavy Engineering Sector in Ontario Labour Relations Board Area 8, but recognizes that such representation is without liability against the Association for violations of the Collective Agreement by individual Employers.

(b) It is agreed that this Collective Agreement applies to all work falling within the Heavy Engineering Sector (which, for the purposes of this Agreement includes all work traditionally performed under the terms and provisions of this Collective Agreement) in Ontario Labour Relations Board Geographic Areas 8, 9, 10, 11 & 18 performed by members of the bargaining unit including, but not limited to, the construction, reconstruction, demolition, construction maintenance, rehabilitation, repair and, except as specifically excluded below, all associated work traditionally related thereto, of the following:

1. Bridges, including pedestrian bridges, underpasses and overpasses.

2. Retaining walls (all types), slurry walls and abutments associated with bridges, underpasses and overpasses.

3. All structures in connection with dams, docks, wharves and breakwaters.

4. Gabion work carried out on heavy construction work.

5. Precast rip-rap installations and all slopes retaining work directly associated with bridge construction.

6. Tunnels, save and except cable conduits (utilities), pipelines and sewer and watermain tunnels.

7. Structural work on reservoirs and pumping stations, and sewage and water treatment plants.

8. Installation and/or removal of piles, shoring, anchors, caissons and underpinning, including all welding related thereto.

9. Structures on transit systems (heavy rail or light rail) and on express-ways, including all welding related thereto.

10. Structures involved in river channelization and flood control projects, except structural work traditionally carried out by the roads or sewers industry.

11. Box culverts over 15 feet in overall surface span (the calculation of the span excludes intermediate piers or supports).

12. All T.T.C. projects including structural work on stations and sewer and watermain work on these projects, save and except work carried out according to past practices on stations by architectural and finishing trades and on roadways by road builders.

13. Field precast manufacturing operations as defined in Schedule "C" of this Agreement.

14. Erection, installation and finishing of precast concrete products directly associated with heavy construction work.

15. Cement lining of watermains.

16. All work involved in or related to the erection or dismantling of scaffolding including high load shoring systems or any of the above-noted works, projects or undertakings.

17. All work involved in or related to the installation, removal and operation of glycol-circulated ground heating systems on any of the above-noted works, projects or undertakings.

(c) If an Employer covered by this Agreement engages in work other than that falling within the Heavy Engineering Sector and/or work which has traditionally been performed under the terms of this Collective Agreement and such other work comes within the purview of any of the collective agreements set out in Schedule "E", then all terms and conditions of the applicable collective agreements shall apply.

ARTICLE 4 - UNION SECURITY

4.01 (a) The Employers agree to employ only members in good standing of the Union for work covered by this Agreement.

(b) As a condition of continued employment, all employees shall maintain in good standing their membership in the Union.

(c) The Union agrees that no discrimination shall be shown against any non-working foreman who elects to retain Union membership while functioning in this management capacity.

(d) Except as provided for hereafter, the Employers agree to sublet all work covered by this Agreement to companies which are bound to the terms and provisions of this Collective Agreement, and such work will be performed under the terms and provisions of this Collective Agreement by such subcontractors.

(e) (i) Except as provided in (e) (ii) the Employers agree to sublet all sewer and watermain work and all road construction work and all work falling under the Railroad Agreement (i.e. "Violin"), on the project within the jurisdiction of Universal Workers Union, L.I.U.N.A. Local 183, only to subcontractors who are in contractual relationship with the Local 183.

(ii) The Employers agree to sublet work falling within the scope of this Agreement in the erection, installation and finishing of precast products, sound wall and fencing of all types only to such contractors who are party to or bound by a collective agreement binding upon the Union and who employ only members of Local 183 to perform such work.

(iii) The Employers agree to subcontract utility construction work (as described by the collective agreement binding upon The Utility Contractors' Association of

Ontario, Inc. and the Union) in connection with the construction of any structure or bridge only to contractors who are party to or bound by a collective agreement with or binding upon the Union and who shall perform such work under such collective agreement.

(iv) The Employers agree to sublet all landscaping work only to contractors who are party to or bound by a collective agreement binding upon the Union.

(f) Each employee shall, when working in a position within the bargaining unit described in Article 3 above, be required as a condition of employment to have his regular monthly union dues and any required working dues checked off and the Union agrees to duly inform the Employer of the amounts of such union dues and working dues and any changes in the amounts. The Employer agrees to make such deductions from the first pay issued to the employees each calendar month and remit the same to the Union not later than the fifteenth (15th) day of the following month to the Secretary-Treasurer of the Union. The Employers shall, when remitting such dues, name the employees and their social insurance numbers from whose pay such deductions have been made. It is further agreed and understood that the Employers will receive at least 30 days notice of any changes in the amounts of working dues. It is also agreed and understood that this clause shall apply to all Schedules of this Collective Agreement.

(g) The Employers further agree that off-duty policemen will be used only where necessary or stipulated by contract specifications.

ARTICLE 5 - HIRING OF EMPLOYEES

5.01 (a) For T.T.C. projects and for mixed projects where fifty percent (50%) or more of the work falls within the Heavy Engineering Sector, the Employer agrees to call the Union Hall by 1:00 p.m. for his needed supply of men for the following day. All employees hired through the Union Hall shall present to the Employer a referral slip from the Union prior to commencing employment. It is understood that if the Union, having been requested by 1:00 p.m. to supply men, is unable to confirm by 4:30 p.m. of the same day that the required men will report at the job site ready for work at the starting time the following work day, the Employer is free to hire such local labour as is available without payment of any travel allowance. Any local labour so hired shall apply to the Union for membership within fifteen (15) calendar days of hiring, and as a condition of continued employment shall maintain membership in good standing in the Union.

(b) For mixed projects where less than fifty percent (50%) of the work falls within the Heavy Engineering Sector:

(i) The Employers shall have the right to hire up to fifty percent (50%) of the required work force on the project from any available source, provided however, that any employee so hired will be required to apply for a clearance slip from the Union before starting work. It is further agreed that when a new employee is hired, he will be required to apply for a clearance slip from the Union before starting work, except in emergency circumstances where the Employer requires the employee to start work immediately, in which event the employee must apply for clearance at the Union Hall not later than the Saturday following commencement of employment. The Employer shall supply a letter to the employee confirming he has been hired.

(ii) The balance of the required work force shall be hired through the Union Hall in accordance with Section (a) above.

(iii) The sequence and order of hiring employees under the provisions of sub-sections (i) and (ii) above shall be as mutually agreed from time to time between the Employer and the Union.

(c) It is further agreed that any employee hired under the provisions of Section (a) or (b) above can be transferred to any project of the Employer and assigned to work on any aspect of the said project, except that only employees who have been hired with a referral slip from the Union {Section (a) above} may be transferred to a T.T.C. project. It is further agreed that on a project where fifty percent (50%) or more of the work falls within the Heavy Engineering Sector, no more than twenty-five percent (25%) of the total number of employees engaged on that project and covered by this agreement shall be key employees of the Employer who have been transferred from other projects of the Employer where such employees were originally hired by clearance slip from the Union.

(d) It is agreed that should an Employer violate any of the terms and provisions set out above with respect to the hiring of employees, then, without prejudice to any other claim for damages which the Union may have, the Employer will pay to the Union general damages in an amount equal to all amounts which would have been paid to employees (whether members of the Union or not) and/or the Union and/or others on behalf of the Union and such employees had the Employer not violated the hiring provisions of this Agreement.

ARTICLE 6 - MANAGEMENT RIGHTS

6.01 The Union agrees that it is the exclusive function of the Employer:

(a) To conduct its business in all respects in accordance with its commitments and responsibilities, including the right to manage the jobs, locate, extend, curtail or cease operations, to determine the number of men required at any and all operations, to determine the kinds and locations of equipment to be used and the schedules of production, to judge the qualifications of the employees and to maintain order, discipline and efficiency.

(b) To hire, discharge, classify, transfer, promote, demote, layoff, suspend or otherwise discipline employees, provided that a claim by an employee that he has been discharged, suspended disciplined or disciplinarily demoted without reasonable cause, shall be subject to the provisions of the Grievance Procedure.

(c) To make, alter from time to time, and enforce reasonable rules of conduct and procedure to be observed by the employees.

(d) It is agreed that these functions shall not be exercised in a manner which is inconsistent with the express provisions of this Agreement or which is arbitrary, discriminatory or in bad faith.

ARTICLE 7 - CO-OPERATION

7.01 (a) The Employers agree to advise the Union when any major change is being made to working systems or working rules on the project and will discuss the intended changes with the Union.

(b) In the event new classifications are introduced under the scope of this agreement, the parties shall meet and negotiate the applicable wage rates which shall bear a proper ranking relationship to the wage rates set up in the Schedules of this agreement.

(c) A pre-job conference may be called at the option of either party on all T.T.C. projects and mixed projects.

ARTICLE 8 - WORK JURISDICTION, HOURS OF WORK, OVERTIME AND WAGE RATES

8.01 Attached hereto are Schedules "A", "B" "C" and "D" outlining hours of work, overtime, wage rates and classifications, which are hereby made part of this Agreement.

ARTICLE 9 - JURISDICTIONAL DISPUTES

9.01 When a work claim dispute arises between the Union which is a party to this Agreement and any other union, person or organization, which cannot be settled to the satisfaction

of all parties concerned, such dispute shall immediately be processed as a complaint to the Ontario Labour Relations Board requesting an order from that Board as outlined in Section 99 of the *Labour Relations Act, R.S.O. 1995*, Chapter 228, as amended, and in the meantime, work will continue as assigned by the Employer until otherwise directed by the Ontario Labour Relations Board.

ARTICLE 10 - HOLIDAYS

10.01 All work performed on Sundays and the following holidays:

New Year's Day	Labour Day
Good Friday	Thanksgiving Day
Victoria Day	Christmas Day
Civic Holiday	Boxing Day
Canada Day	

or any other statutory holidays legally declared by the Provincial or Federal Government, shall be deemed overtime work and paid for at the rate of double the regular day shift rate.

ARTICLE 11 - VACATION PAY AND STATUTORY HOLIDAY PAY

11.01 (a) Vacation and statutory holiday credits shall be paid to employees covered by this collective agreement at the rate of ten percent (10%) of the gross wages earned. It is understood and agreed that five percent (5%) is to be considered in lieu of statutory holiday pay.

(b) During the term of any one year, by mutual arrangement between an Employer and employee only two (2) weeks' vacation without pay will be taken by an employee, exclusive of statutory holidays. Vacation may be taken at any time during the calendar year at such time as may be most convenient to the Employer, but every effort shall be made to schedule vacation at times suitable to the employee.

(c) Vacation and statutory holiday pay as aforesaid shall be paid into the Local 183 Civil Engineering Vacation Pay Trust Fund, jointly administered by an equal number of Employer and Union trustees, which Employer trustees shall be appointed by the Greater Toronto Sewer and Watermain Contractors' Association, the Utility Contractors' Association of Ontario and The Heavy Construction Association of Toronto. One of the said Employer trustees shall be appointed by the Association. Payments into the Fund shall be made monthly and the interest earned by the investment of the monies in such fund shall be firstly applied against the administration costs of the Fund and secondly, against any deficit caused by the delinquency of a contributing Employer and

the balance shall be paid to the Association pro-rated on the basis of contributions into the Fund made by all Employers covered by this agreement, on account of the Association's costs of negotiating and administering this agreement. Payments into the Fund shall be made by the fifteenth (15th) day of the month following the month for which payment is due. The Chairmanship of the Trust Fund shall alternate annually between the Union and the Employer trustees.

Vacation with Pay Trust Fund surplus to be distributed as follows:

(i) Administration costs;

(ii) Deficits;

(iii) A reserve fund shall be established and maintained based on the past history of deficiencies as agreed by the trustees.

(iv) The surplus, if any, to be distributed equally to the Association and the Union on an annual basis.

ARTICLE 12 - MERGER OF VACATION PAY FUNDS

12.01 The Universal Workers Union, L.I.U.N.A. Local 183 and the Association agree to merge the Local 183 Members' Vacation Pay Trust Fund and the Local 183 Civil Engineering Vacation with Pay Trust Fund, subject to acceptance and adoption by the Trustees thereof, in accordance with Section 6.03 of the Trust Agreements establishing both Funds.

ARTICLE 13 - PAYMENT OF WAGES

13.01 (a) All time books are to be closed weekly.

(b) Employees shall be paid weekly. In the event that payment is by cheque, pay day shall not be later than Thursday. Payment shall be accompanied by a slip outlining all hours of work, overtime hours, hourly rate, deduction for income tax, unemployment insurance, pension, etc. where applicable.

(c) In the case of layoff or dismissal, all employees will receive one hour's notice in advance. When an employee quits a job, he shall give the Employer one hour's notice.

(d) Whenever an Employment Insurance Separation Certificate and pay cheque is not given to employees at the time of termination, they shall be sent by the Employer to the employee

by registered mail to his last known address within seventy-two (72) hours from the time of termination.

ARTICLE 14 - SAFETY, SANITATION AND SHELTER

14.01 (a) Every Employer shall provide a proper and adequate place of shelter sufficiently heated and securely locked in which the employees may eat their lunch and store their clothing. It is further agreed that the lunch room facilities shall be separated by a partition from the area in which the clothing is stored. Water, towels and soap shall be available at all times. It is clearly understood that the place of shelter shall not be used for any other purpose, such as storage of tools, etc. Sanitary toilets shall be provided in accordance with the regulations of the Occupational Health and Safety Act, as amended, and if located near the lunch room, shall be separated by a partition. The Employers agree to provide the above facilities before production work commences on the project. It is agreed that these facilities shall be on or in the vicinity of the working area.

Without in any way limiting the generality of the above, in the case of welders, employed by the Employer, the special clothing and protective equipment which the Employer is required to supply shall include the following:

- Suitable gloves for welding
- Leather sleeved or welding jackets
- Safety helmets and welding masks
- Cutting goggles
- All equipment required for normal welding duties

(b) In co-operation with the Employer's overall program of Accident Control and Prevention, the Job Steward and Health and Safety Representative may report to the Foreman for immediate corrective action of any unsafe conditions, unsafe acts or violation of safety regulations. Safe working conditions are primarily the responsibility of Management; therefore all supervisory personnel shall be made aware of all safety regulations and see that they are carried out.

(c) Every employee shall, as a condition of employment, be required to wear a Safety Helmet of an approved type. The Employers agree said helmets will be supplied by them at no cost to the employee. If an employee at termination of employment does not return said helmet, he shall be charged at cost.

(d) Every employee shall, as a condition of employment, own and wear suitable protective footwear. The Employer shall supply protective equipment required in the normal course of the

employee's duties including special clothing such as suitable gloves, at no cost to the employee. The Employer shall provide leather safety boots to the employees covered by this agreement at cost, which will be deducted from the employee's pay. It is further agreed that the Employer shall provide free of cost, rubber safety boots when necessary. The Union recognizes the right of Employers to economically supervise the distribution of the clothing provided and will co-operate with the Employers to prevent wasteful practices.

(e) A Safety Committee is to be established. This Committee will be composed of two (2) members of Universal Workers Union, L.I.U.N.A. Local 183, and two (2) representatives from the Association. Safety meetings, not to exceed one (1) per month, will be held and may be called by either party. A Safety Committee may be established by the Union on projects with twenty (20) employees or more coming within the jurisdiction of this agreement, provided that there is no more than one committee per project.

(f) The Employer shall, at his own expense, furnish to any workman injured in his employment who is in need of it, immediate conveyance and transportation to a hospital or to a physician. It is further agreed that an ambulance shall be used where necessary and possible.

(g) An employee who is injured during working hours and who is required to leave for treatment, or is sent home for such injury, shall receive payment for the remainder of the shift at his regular rate of pay.

(h) Locktenders' shift reports will be kept in ink.

(i) The trucks to be used to transport employees will be enclosed and tools will be secured in tool boxes. No materials will be carried in the trucks in a manner endangering the safety of the employees being transported.

(j) No employee will be discharged by his Employer because he fails to work in unsafe conditions as set out in government safety regulations. Any refusal by an employee to abide by such regulations after being duly warned, will be sufficient cause for dismissal.

(k) On projects where the Company is required under Article 13.01(a) to provide locked up facilities for employees to store their tools and clothing the Company will reimburse an employee up to three hundred and fifty dollars ($350.00) for loss due to fire, or theft resulting from a break-in to such locked up facilities. In all cases the employee must provide a written and signed statement substantiating the amount of the loss.

ARTICLE 15 - ERGONOMICS TRAINING

15.01 (a) As a condition of employment, newly-hired employees shall be required to attend and complete the ergonomics training course offered by the Labourers' Local 183 Members Training Fund.

(b) On-site supervisory personnel of any Employer shall be required to attend and complete the ergonomics training course offered by the Labourers' Local 183 Members Training Fund.

(c) Union Stewards shall be required to attend and complete the ergonomics training course offered by the Labourers' Local 183 Members' Training Fund.

(d) The Union shall ensure that in issuing a referral slip under Article 3, the employee has taken the ergonomics training course or that arrangements have been made to comply with (a) hereof.

(e) All of the above training shall not be performed on company time.

ARTICLE 16 - THE OCCUPATIONAL AND REHABILITATION HEALTH CLINIC FUND

16.01 The Employer agrees to co-operate with the programs established by the Soft Tissue Rehabilitation Clinic and the Occupational Health Clinic, and, in particular, to require his employees to attend at the Occupational Health Clinic for the requisite testing at least once every three (3) years and further, to notify the Soft Tissue Clinic of any Soft Tissue injury sustained by any of his employees, including the address and telephone number of such employee, within three (3) days of the Employer being advised that said employee sought medical attention.

ARTICLE 17 - BUSINESS AGENT AND SHOP STEWARD

17.01 The Business Agent of the Union shall have access to all jobs during working hours, but in no case shall his visits interfere with the progress of the work. When visiting a job, he will first advise the superintendent or other supervisory personnel of the Employer.

17.02 No discrimination shall be shown against any Shop Steward for carrying out his duties but in no case shall his duties interfere with the progress of the work. It is agreed that a Shop Steward may be appointed on all jobs of an Employer by a business agent of the Union on the basis of one (1) Shop Steward to twenty (20) employees or major fraction thereafter [on tunnel projects one (1) Shop Steward for up to two (2) mining crews per shift will be recognized] and shall

notify the job Superintendent at once (or the Foreman on the job if there is no job Superintendent) before he can be recognized. Such appointment shall be confirmed by the Union in writing to the Employer within seven (7) working days thereafter. By mutual agreement of the parties, where conditions require it, additional Stewards may be appointed. The Shop Steward, all other things being equal, shall be one of the last two men retained by the Employer on the shift if competent to perform the available work remaining. The Shop Steward on each job will be responsible for reporting any disputes to the Employer and Union Representative, so that these can be taken up in the proper manner without delay.

17.03 It is agreed that the Shop Steward will not be excluded from a gang for overtime work, provided he is able to do the work required. It is further agreed that there will be at least one (1) Shop Steward (or Acting Shop Steward) on the project at all times while work is in progress provided that the Steward (or Acting Steward) is able to do the work required. The Union will be notified when a Shop Steward is to be laid off or discharged.

ARTICLE 18 - NO STRIKES, NO LOCKOUTS

18.01 In view of the Grievance and Arbitration Procedures provided in this agreement, there shall be no strikes or lockouts so long as this Agreement continues to operate.

ARTICLE 19 - GRIEVANCE PROCEDURE

19.01 The parties to this Agreement agreed that it is of the utmost importance to adjust complaints and grievances as quickly as possible.

19.02 Grievances properly arising under this Agreement shall be adjusted and settled as follows:

Step No. 1

Within twenty (20) working days after the circumstances giving rise to the grievance occurred or originated, [save and except grievances arising out of discharge cases in which case the grievance shall be brought forward within ten (10) working days of the employee being notified of his discharge, and save and except monetary and benefit grievances as defined in Section 19.03 (a) and administered under Section 19.03 (b) and 19.03 (c) below], the aggrieved employee, with his business representative, may present his grievance, which shall be reduced to writing, to the Employer. Should no settlement satisfactory to the employee be reached within ten (10) full working days, the next step in the grievance procedure may be taken at any time within ten (10) working days thereafter.

Step No. 2

The Union Grievance Committee, if it considers it a valid grievance, may submit the grievance to a committee of the Association and the respective committees shall meet within five (5) working days thereafter in an endeavour to settle the grievance. If a satisfactory settlement is not reached within five (5) working days from this meeting, the grievance may be submitted to arbitration as provided in Article 20 below at any time within twenty (20) working days thereafter or referred to the Ontario Labour Relations Board for arbitration pursuant to Section 133 of the *Labour Relations Act* within reasonable time which shall not be more than twenty (20) working days thereafter.

19.03 (a) Monetary grievances are defined as those arising under this Agreement involving payment for hours of work, rates of pay, overtime, shift premiums, travelling expenses, room and board allowances and reporting allowances, but do not include grievances arising out of classification assignment. Benefit grievances are defined as those arising under this Agreement involving payment of pension and welfare contributions, union dues, working dues, industry and training fund, and vacation and statutory holiday pay.

(b) Monetary grievances shall be brought forward at Step 1 within three (3) months after the circumstances giving rise to the grievance became known or ought reasonably to have become known to the Council. It is further understood that the adjustment of any such grievance shall be retroactive to the first day of the alleged violation within the three (3) month period.

(c) Benefit grievances shall be brought forward at Step 1 within twelve (12) months after the circumstances giving rise to the grievance became known or ought reasonably to have become known to the Council. It is further understood that the adjustment of any such grievance shall be retroactive to the first day of the alleged violation within the twelve (12) month period.

ARTICLE 20 - ARBITRATION

20.01 The parties to this Agreement agree that any grievance concerning the interpretation or alleged violation of this Agreement, which has been properly carried through all the steps of the grievance procedure outlined in Article 19 above which has not been settled, will be referred to a Board of Arbitration at the request of either of the parties hereto.

20.02 The Board of Arbitration will be composed of one person appointed by the Association, one person appointed by the Union and a third person to act as Chairman chosen by the other two members of the Board.

20.03 The party requesting arbitration shall name its appointee at the time of requesting arbitration, and the other party shall name its appointee within two (2) working days thereafter.

20.04 Should the person chosen by the Association to act on the Board and the person chosen by the Union fail to agree on a third member as Chair within five (5) days of the notification mentioned above, the Minister of Labour of the Province of Ontario will be asked to nominate an impartial person to act as Chairman.

The decisions of the Board of Arbitration or a majority of such Board constituted in the above manner shall be binding on the employee, the Union, the Association and the Employers.

The Board of Arbitration shall not have any power to alter or change any of the provisions of this agreement or to substitute any new provisions for any existing provisions, nor to give any decision inconsistent with the terms and provisions of this agreement.

Each of the parties to this Agreement will bear the expense of the arbitrator appointed by it, and the parties will jointly bear the expense, if any, of the Chairman.

(a) The nature of the grievance, the remedy sought and the section or sections of the agreement which are alleged to have been violated, shall be set out in the written record of the grievance and not be subject to change in later steps;

(b) In determining the time which is allowed in the various steps, Sunday and Statutory Holidays shall be excluded, and any time limits may be extended by agreement in writing;

(c) If advantage of the provisions of Articles 19 and 20 hereof is not taken within the time limits specified therein or as extended in writing as set out above, the grievance shall be deemed to have been abandoned and may not be reopened.

ARTICLE 21 - MANAGEMENT GRIEVANCES AND UNION GRIEVANCES

21.01 (a) It is understood that an Employer and/or the Association may file a grievance with the Union, and that if such complaint is not settled to the satisfaction of the parties concerned, it may be treated as a grievance and referred to arbitration in the same way as a grievance of any employee. Such grievance shall be processed at Step No. 2 of the Grievance Procedure set out in Article 19 hereto.

(b) A Union grievance which is defined as an alleged violation of this agreement involving all or a number of employees in the bargaining unit in regard to which a number of employees have

signified an intention to grieve, or a grievance involving the Union itself, including the application or interpretation of this agreement, may be brought forward in writing in the same manner and within the same time limits as in the case of an employee grievance. Such grievance shall be processed at Step No. 1 of the Grievance Procedure as set out in Article 19 hereof. If it is not settled, it may go to a Board of Arbitration in the same manner as a grievance of an employee.

ARTICLE 22 - GOVERNMENT LEGISLATION

22.01 In the event that any of the provisions of this Agreement are found to be in conflict with any valid and applicable Federal or Provincial law now existing or hereinafter enacted, it is agreed that such law shall supersede the conflicting provision without in any way affecting the remainder of the Agreement.

ARTICLE 23 - PRODUCTIVITY

23.01 The Union and the Association recognize the mutual value of improving by all proper and reasonable means the productivity of the individual workman, and both will undertake individually and jointly to promote such increased productivity.

ARTICLE 24 - REPORTING ALLOWANCE

24.01 (a) An employee who reports for work at an Employer's job site or shop, unless directed not to report the previous day by his Employer, and for whom no work is available due to reasons other than inclement weather, shall receive a minimum of four (4) hours reporting time and shall remain at other work if requested to do so by the Foreman.

(b) Two (2) hour's pay shall be paid by the Employer when an employee covered by this Agreement reports for work at the Employer's shop or job site but work is not available due to inclement weather, provided the employee remains on the job for two (2) hours after 7:00 a.m. or remains on the job for two (2) hours after his designated starting time. However, no reporting pay shall be allowed where an employee has been informed not to report for work and such information has been given to him before quitting time on the previous day. When work starts late but within two (2) hours of the normal starting time, employees shall be paid from the normal starting time. If work starts later than two (2) hours after the normal starting time, employees shall be paid from the actual time work started, plus two (2) hour's reporting time.

In the event the employee commences work and work cannot proceed for any reason then the employee shall receive four (4) hours' pay.

(c) An employee directed to work after the noon lunch period and who commences to work shall receive four (4) hours' pay at the applicable hourly rate and shall also remain at other work if requested by the foreman. This provision does not apply when lack of work results from inclement weather.

*Note: See Letter of Understanding No. 11

(d) An employee directed to wait on the job site by his Employer will be paid for such waiting time.

ARTICLE 25 - COFFEE AND LUNCH BREAKS

25.01 (a) An employee will be allowed to have one coffee break of ten (10) minutes during each half of his working shift. An employee will be allowed a ten (10) minutes' rest period if required to work more than two hours beyond the end of his shift.

(b) Regular day shift employees shall be allowed one half-hour lunch break between 12:00 noon and 1:00 p.m., except where different hours are being worked on a two or three shift operation. It is understood that no employee shall be required to work more than five (5) consecutive hours without a meal break.

25.02 An employee required to work more than two (2) hours beyond the end of his shift shall be allowed to have one additional break of ten (10) minutes.

ARTICLE 26 - WELFARE , LONG TERM CARE, CAMPING GROUND AND PENSION

26.01 (a) The Employers agree to pay into the Local 183 Members' Benefit Fund, jointly administered by an equal number of Employer and Union trustees, for the purpose of purchasing weekly indemnity, life insurance, dental, medical and similar benefits, for the employees covered by this Agreement, represented by the Union as follows:

(i) Board Area 8

Effective May 3, 2004 - two dollars ($2.00) per hour
Effective May 2, 2005 - two dollars and five cents ($2.05) per hour
Effective May 1, 2006 - two dollars and ten cents ($2.10) per hour

(ii) Simcoe County

Effective May 3, 2004 - two dollars ($2.00) per hour
Effective May 2, 2005 - two dollars and five cents ($2.05) per hour
Effective May 1, 2006 - two dollars and ten cents ($2.10) per hour

(b) It is understood that the amounts mentioned in Article 26.01(a) include five cents (.05¢) per hour into the Tri-Fund.

(c) It is understood that the amounts mentioned in Article 26.01(a) also include ten cents (.10¢) per hour into the Seniors Fund.

(d) Long Term Care

The Employer agrees to contribute the following amounts for each hour worked by employees covered by this Agreement to the Local 183 Members' Benefit Fund for the purpose of purchasing benefits for Long Term Care:

(i) Board Area 8

Effective May 3, 2004 - forty cents ($0.40)
Effective May 2, 2005 - fifty cents ($0.50)
Effective May 1, 2006 - sixty cents ($0.60)

(ii) Simcoe County

Effective May 3, 2004 - forty cents ($0.40)
Effective May 2, 2005 - fifty cents ($0.50)
Effective May 1, 2006 - sixty cents ($0.60)

(e) Camping Ground

The Employer agrees to contribute the following amounts for each hour worked by employees covered by this Agreement to the Local 183 Members' Benefit Fund for the purpose of purchasing a Camping Ground:

(i) Board Area 8

Effective May 3, 2004 - ten cents ($0.10)
Effective May 2, 2005 - fifteen cents ($0.15)
Effective May 1, 2006 - twenty cents ($0.20)

(ii) Simcoe County

Effective May 3, 2004 - ten cents ($0.10)
Effective May 2, 2005 - fifteen cents ($0.15)
Effective May 1, 2006 - twenty cents ($0.20)

The Employer shall remit contributions to the Labourers' Local 183 Members' Benefit Fund monthly, together with a duly-completed report form, by the fifteenth (15th) day of the month following the month for which payment is due.

26.02 Pension

The Employer agrees to contribute the following amounts for each hour worked by employees covered by this Agreement into the Labourers' Pension Fund of Central and Eastern Canada:

(i) Board Area 8

Effective May 3, 2004 - five dollars and thirty cents ($5.30)
Effective May 2, 2005 - five dollars and eighty cents ($5.80
Effective May 1, 2006 - six dollars and thirty cents ($6.30)

(ii) Simcoe County

Effective May 3, 2004 - five dollars and ten cents ($5.10)
Effective May 2, 2005 - five dollars and forty cents ($5.40)
Effective May 1, 2006 - five dollars and seventy cents ($5.70)

The Employer shall remit contributions to the Labourers' Pension Fund of Central and Eastern Canada monthly, together with a duly-completed report form, by the fifteenth (15th) day of the month following the month for which payment is due.

26.03 The Employers shall inform the Trustees of the Members' Benefit Fund and the Pension Fund of any worker who is absent from work because of injury and who is entitled to receive benefits under the *Workplace Safety and Insurance Act 1997* as a result of an accident by including the following information on the next monthly contribution reports filed with the administrators of the said Fund following the accident, namely:

(i) the name, social insurance number and last known address of such worker;

(ii) the date when and the location where the accident occurred;

(iii) the Workplace Safety and Insurance Board claim number for such worker and proof from the said Board that the worker is entitled to receive benefits under the *Workers' Compensation Amendment Act, 1989*.

26.04 It is agreed that by joint agreement the Trustees of the Benefit Fund shall be empowered to charge interest at the rate of two percent (2%) per month on failure of an Employer to make payments due to the Benefit Fund in accordance with Article 26.01. It is further agreed that by joint agreement of the Union and the Association, interest at the rate of two percent (2%) per month may be charged on failure of an Employer to make payments due to the Pension Fund in accordance with Article 26.02. Interest charged shall not exceed twenty-four percent (24%) per annum.

ARTICLE 27 - PREPAID LEGAL PLAN

27.01 (a) The Employer agrees to pay the sum of ten cents (10¢) for each hour worked by each employee covered by this Agreement to the Local 183 Prepaid Legal Benefits Fund, jointly administered by an equal number of Employer and Union Trustees, for the purpose of providing legal benefits to such employees and their beneficiaries.

(b) The Employer shall remit contributions to the Local 183 Prepaid Legal Benefit Fund monthly, together with a duly completed employer's report form, by the fifteenth (15th) day of the month following the month for which the payment is due.

ARTICLE 28 - PROVINCIAL SALES TAX

28.01 The Employer agrees to pay provincial retail sales tax on contributions to the Local 183 Members' Benefit Fund and remit such taxes to the said Fund together with the contributions on which such tax is paid.

ARTICLE 29 - TRANSFER OF FUNDS

29.01 During the lifetime of this Agreement, the Union shall have the right, subject to the approval of the Trustees, at any time to require the Employer to change the amounts of the contributions to any Trust Funds other than the Vacation with Pay Trust Fund by transferring any portion of the contribution required to be made to any particular Trust Fund to any other Trust Fund provided that there shall be no increase in the total monetary contributions required to be made under this Agreement and also provided that the Trust Fund to which contribution is redirected to, is part of this Collective Agreement.

ARTICLE 30 - AMENDMENT PROVISIONS OF TRUST AGREEMENTS

30.01 The Universal Workers Union, LIUNA Local 183 and the Association agree to amend the following sections of the following Trust Funds:

(a) Section 8.01 of the Agreement of Declaration and Trust made as of October 1, 1980, as amended, establishing the Local 183 Members' Benefit Fund.

(b) Section 8.01 of the Agreement and Declaration of Trust made as of the 1st day of May, 1977 establishing the Local 183 Members' Training and Rehabilitation Fund, as amended.

(c) Local Union 183 Civil Engineering Vacation with Pay Trust Fund (the "Fund"), that Section 4.03 (h) of the Agreement and Declaration of Trust made as of the 1st day of July 1976, as amended, establishing the said Fund.

30.02 To provide that, with respect to the amendment of the Trust Agreement by the Union and the Party Associations, the Trust Agreement may be amended by the mutual agreement of the Union and at least sixty percent (60%) of the Party Associations provided that if the Trust Agreement is so amended by agreement involving at least sixty percent (60%) but less than one hundred percent (100%) of the Party Associations, any Association which claims it will suffer hardship as a result of such amendment may refer within fifteen (15) days the issue to an arbitrator appointed by mutual agreement, in which case the arbitrator shall have the authority to rescind the amendment if the grieving Association can substantiate its claim. If the parties cannot agree upon an arbitrator, the Office of Arbitration will be asked to appoint an arbitrator for them within fifteen (15) days hereafter.

ARTICLE 31 - REINSTATEMENT OF EMPLOYEES UPON RETURN FROM INDUSTRIAL ACCIDENT

31.01 An employee injured in the performance of his duties will resume his regular work when medically fit to do so if work is available and he applies. The job of an injured worker shall be deemed to be available if upon his return any work within his classification on any project under this agreement, is being performed by an employee who, subsequent to the time of injury was hired by the Employer or transferred or otherwise assigned to perform any work within the said classification on any project covered by this Agreement. An employee who claims he has been denied employment contrary to this provision may have recourse to the Grievance and Arbitration procedures as set out in Articles 19 and 20 of this Agreement.

The above shall not apply if the injury is attributable solely to the wilful misconduct of the employee.

31.02 The parties agree to the establishment within three (3) months of the signing of this Agreement, of a joint committee of equal representatives of the Toronto and Area Road Builders' Association, The Greater Toronto Sewer and Watermain Contractors' Association, The Heavy

Construction Association of Toronto and The Utility Contractors' Association of Ontario and the Union, for the purpose of exploring the possibilities of finding light work within the industry for injured workers. Any decisions reached by the said joint committee and approved by the Association and the Union shall be binding upon all Employers bound by this or a similar or like collective agreement.

ARTICLE 32 - INDUSTRY AND TRAINING

32.01 Each Employer bound by this Agreement or a like agreement adopting in substance but not necessarily in form, the terms and conditions herein, shall contribute the sum of ~~thirty-five~~ cents (~~35¢~~ 45¢) per hour for each hour worked by each employee covered by this Agreement or such like agreement, and remit monthly to the Local 183 Members Training and Rehabilitation Fund such contributions together with a duly completed Employer's report form, by the fifteenth (15th) day of the month following the month for which the payments are due, as follows:

(a) Each Employer bound by this Agreement or a like agreement shall pay the sum of twenty cents (20¢) per hour for each hour worked by each employee covered by this Agreement or such like agreement to the Local 183 Members Training and Rehabilitation Fund. Such amounts shall be immediately paid to the Association by the Trustees of the Local 183 Members Training and Rehabilitation Fund as such Employer's contribution to the cost of negotiating and administering this Agreement.

(b) The sum of twenty-five cents (25¢) for each hour worked by each employee covered by this Agreement or such like agreement, into the Local 183 Members Training and Rehabilitation Fund, jointly administered by an equal number of management and union trustees one of which management trustee shall be appointed by the Association.

(c) The parties agreed that a joint committee shall be struck to initiate an apprenticeship programme in conjunction with the Ministry of Education and Training which shall include an appropriate training procedure with hours and rates of pay within ninety (90) days of the signing of this Collective Agreement.

ARTICLE 33 - INDUSTRY GRADING

33.01 The parties agree to continue with the joint committee of equal representatives of the Association and the Union for the purpose of issuing recognized identification cards noting the employee's classification. The issuance of such cards will be based upon the certifications given by Employers in the Heavy Engineering Sector and/or such criteria or such standards as the Committee may adopt from time to time. The Committee shall continue to determine which

classifications contained in the groups in Schedule "A" and "B" hereto shall be subject to this procedure. *See letter attached to this Agreement.*

ARTICLE 34 - TRAVEL ALLOWANCE

34.01 The geographic area of this agreement will be divided into the following zones:

(a) Zone 1 - The area bounded on the east by the west boundary of Markham Road, on the west by the west boundary of the Highway 427, and on the north by the south boundary of Steeles Avenue. No travel expenses will be paid for work done within Zone 1.

(b) Zone 2 - In regard to travelling expense for work outside Zone 1, but within a 50-kilometre radius including the Town of Newmarket, employees will be granted $10.00 per day travelling allowance when company transportation is not supplied. No travelling expenses will be paid to employees whose normal place of residence is in the same township as that in which the job is located.

(c) Zone 3 - In regard to travelling expense in the fringe area, outside the 50-kilometre radius including the Town of Newmarket and up to 100 kilometres, the employee will be paid at the rate of thirty-five cents (35¢) per road kilometre one way, from the Toronto City Hall to the job site. Such payment is in lieu of room and board and is not paid when company transportation to the job is supplied and straight time is paid to the employee.

(d) Room and Board - It is understood that if the Employer requires an employee to be out of town overnight, the Employer will provide suitable room and board for the employee up to maximum of seventy ($70.00) per day with no limit.

(e) It is understood and agreed that when an employee works in a Board Area (including Board Areas not otherwise referred to herein), in which he does not regularly work, all terms and conditions set out in this Collective Agreement will be maintained and the employee will continue to receive his wage rate, hours of work and fringe benefits, as provided for in this Collective Agreement and that are applicable in the Board Area in which he regularly works, unless the employee is working in a Board Area where such terms and conditions are specifically governed by a Schedule forming part of this Collective Agreement and which provides for more beneficial terms and conditions for the employee, in which case the more beneficial terms and conditions shall apply.

(f) Where the Employer supplies transportation and where an employee is required by his Employer to report to a yard or assembly point within Toronto before going to a job outside of

Toronto, the employee will be paid at straight time while travelling to and from the job in excess of fifteen (15) minutes each way.

34.02 Downtown Parking - Employees required to work on projects within the downtown area of Toronto, (defined as that area bounded by Dufferin Street on the West, Bloor Street on the North and Don Valley Parkway on the East,) and for whom no transportation is provided, the Employer shall provide parking or refund to the employee upon presentation of a valid receipt for parking expenses paid by the employee the amount of the receipt to a maximum of seven dollars and fifty cents ($7.50) per day.

ARTICLE 35 - DEEMED ASSIGNMENT OF COMPENSATION UNDER THE *EMPLOYMENT STANDARDS AMENDMENT ACT, 1991*

35.01 The Trustees of the employee benefit plans referred to in this Collective Agreement shall promptly notify the Association of the failure by any Employer to pay any employee benefit contributions required to be made under this Collective Agreement and which are owed under the said plans in order that the Program Administrator of the Employee Wage Protection Program may deem that there has been an assignment of compensation under the said Program in compliance with the Regulation to the *Employment Standards Amendment Act, 1991* in relation to the Employee Wage Protection Program.

ARTICLE 36 - DELINQUENCIES

(a) In the event an Employer fails to remit any contributions or deductions for the Benefit Plan, Pension Plan, Prepaid Legal, dues, fees, Training Fund, Working Dues Check-Off, or Industry Fund, the Employer shall pay to the appropriate fund as liquidated damages and not as a penalty an amount equal to two percent (2%) [twenty-four percent (24%) per annum] per month compounded monthly for any delinquent contributions, deductions or remittances fifteen (15) days in arrears calculated from the date due, provided the Employer has received five (5) days prior written notice to correct such delinquency and has not done so.

(b) With reasonable cause, the Trustees may request an Employer to submit to them within a stipulated period a certified audited statement of payroll contributions to these funds for a period not to exceed the period from the effective date of this Agreement until the date the audit takes place. Such statements shall reply to the questions submitted to the Employer by the Trustees.

(c) If the Employer does not submit the certified audited statement as per Article 36(b), the Trustees may appoint an independent chartered accountant or other qualified person to enter upon the Employer's premises during regular business hours to perform an audit of the Employer's

records only with respect to the Employer's contributions or deductions to the required Employee Benefit Plan, Pension Plan, dues, fees, Working Dues Check-Off, and Industry Fund.

(d) Where the Trustees appoint an auditor, the cost shall be borne by the appropriate plan. In the event that the audit reveals discrepancies between the Employer's records and the contributions or deductions submitted, the cost shall be borne by the Employer.

(e) In the event such audit reveals that the Employer has failed to remit contributions in accordance with the provisions of this Agreement, the Employer shall, within five (5) days of receipt of written notice from the Trustees, remit all outstanding contributions together with any liquidated damages required under the terms of Article 36(a) above and completed supporting contribution report forms as required by the Plan.

(f) When an Employer fails to remit all delinquent contributions, the provisions of Article 36(e) shall apply to the Union, on instructions from the Trustees, shall immediately institute proceedings against the delinquent Employers under Section 126 of the *Labour Relations Act* of Ontario. All cost of such actions shall be borne by the appropriate plan or fund unless otherwise recoverable.

(g) Where the Union has taken prior proceedings and obtained a decision against an Employer for delinquent contributions, deductions or remittances, the Union may require the said Employer to post a cash bond or certified cheque not to exceed twenty thousand dollars ($20,000.00) to be held in trust by the Trustees for a period to be determined by the Trustees. In the event that the said Employer again becomes delinquent for contributions, deductions or remittances, the Union and/or the Trustees may apply the cash bond or certified cheque, or any portion thereof, to satisfy the delinquency and require the Employer to replenish the cash bond or certified cheque in a higher amount. In the event that the cash bond or certified cheque does not satisfy the full amount of the delinquency, the Union may take other proceedings to recover the balance.

(h) If an Employer does not have any employees in his employ, he shall submit a Nil report in accordance with the provisions of Article 36(e).

ARTICLE 37 - CONSTRUCTION CRAFT WORKER APPRENTICESHIP

37.01 The purpose of this Article is to provide a program to train skilled tradesmen by making provisions for Apprentices in the Heavy Construction sector as per Articles 4(a), 4(b) & 4(f) of this Agreement.

37.02 Apprentice(s) means an employee(s) within the Local 183 classifications considered to be in the training stage of his (their) career(s) by Local 183. Except as allowed for in Articles 37.07 and 37.08 below, all Apprentices shall be registered as such with Local 183 prior to being employed as Apprentices by any Employer.

37.03 When the Employer wishes to employ an Apprentice, the Employer shall make a request to the Local 183 Life Long Learning Centre. The Life Long Learning Centre shall make immediate efforts to dispatch an Apprentice within five (5) days of receipt of the request. Any person not dispatched in accordance with this Article shall not be considered to be an Apprentice for the purposes of this Agreement except as provided for in Articles 37.06 and 37.07 below.

37.04 The said Apprentices shall be obliged to attend all relevant Health and Safety Training Programs offered at the Local 183 Life Long Learning Centre on their own time at no cost to the Employer.

37.05 Training Requirements

	Rate	Hours
Phase 1	60% of full rate	0 - 800 hours
Phase 2	75% of full rate	800 - 1600 hours
Phase 3	85% of full rate	1600 - 2400 hours

Above 2400 hours and successful completion of the exam, the full rate will apply.

37.06 If the Union cannot supply such Apprentices to the Employer under Article 37.03, the Employer has the right to employ Apprentices from other sources. Such persons shall, as a condition of employment, and continued employment, be required to apply for membership in Local 183 and become registered as Apprentices within ten (10) working days of hiring.

37.07 If the Union cannot supply such Apprentices resident in Simcoe County for work in Simcoe County to the Employer under Article 37.03, the Employer has the right to employ Apprentices from other sources. Such persons shall, as a condition of employment, and continued employment, be required to apply for membership in Local 183 and become registered as Apprentices within ten (10) working days of hiring.

37.08 The Employer has the right to hire one (1) Apprentice per five (5) employees in the Local 183 portion of the bargaining unit.

37.09 Any person who is not registered as an Apprentice in accordance with the provisions of Articles 37.02, 37.07 or 37.08 (whichever is applicable) shall receive the full rate for the relevant period of employment.

37.10 If the ratio set out in Article 37.08 is not complied with, then all Apprentices shall receive the full rate for the relevant period of employment.

37.11 It is agreed that prior to laying off any full-rate employees, all Apprentices will be laid off. It is further agreed that a full-rated employee who has been laid off by the Company within two (2) months of the date of recalling or employing any Apprentice will be offered recall prior to recalling or employing any Apprentice. It is further agreed that prior to requesting or employing any new Apprentices, the Company will offer recall to any Apprentices which it has laid off within two (2) months, providing that such Apprentices are capable of performing the available work.

IN WITNESS WHEREOF the parties hereto have caused their duly authorized representatives to affix their signatures this 17th day of MARCH, 2005.

SIGNED ON BEHALF OF
THE HEAVY CONSTRUCTION ASSOCIATION OF TORONTO

(Signature)

EDDY MARIN
(Print Name)

(Signature)

Aldo Paganelli
(Print Name)

(Signature)

A. DIONISIO
(Print Name)

(Signature)

JACK OLIVEIRA
(Print Name)

E.O.E.

SIGNED ON BEHALF OF:
UNIVERSAL WORKERS UNION, L.I.U.N.A. LOCAL 183

(Signature)

D. SPEAKMAN
(Print Name)

(Signature)

E. J. LEWIS
(Print Name)

(Signature)

(Print Name)

(Signature)

ROCCO DI GIOVANNI
(Print Name)

SCHEDULE "A"

Applying to Heavy Construction work as defined in Article 3 of the Agreement but excluding all tunnel work covered under Schedule "B" and Field Precast manufacturing work covered by Schedule "C" of this Agreement attached hereto.

ARTICLE 1 - WORK WEEK, WORK DAY

The regular working day shall be eight and one half (8½) hours per day and subject to variation by mutual consent of the parties, shall be between 7:00 a.m. and 5:00 p.m., from Monday to Friday, inclusive. Any work done outside these hours shall be overtime or shift work. The maximum number of working hours per week shall be forty-two and one half (42½) hours and work outside these hours shall be overtime work, save and except the provisions of this agreement relating to shift work.

With regard to heaters and pumps being operated on a three shift basis, it is agreed that the first six (6) shifts in each week (Monday to Saturday inclusive) will be paid at straight time. Sundays will be paid for at double time.

ARTICLE 2 - OVERTIME

All work performed in excess of the regular working day of eight and one-half (8½) hours from Monday to Friday inclusive, shall be deemed overtime work. The rate of wages shall be time and one half (1½) the regular day shift rate.

All work on Saturdays shall be paid for at double the regular day shift rate.

Where three (3) shifts are working involving payment of Saturday or Sunday overtime under the provisions of this Agreement, it is agreed that shift premium where applicable, will be paid in addition to overtime. It is further agreed and understood that on a two (2) or three (3) shift operation or shifts starting after 6:00 p.m., the tenth (10th) or fifteenth (15th) shift as the case may be, may be worked at straight time on Saturday until 7:00 a.m. provided, however, that the applicable shift premium shall be paid.

ARTICLE 3 - SHIFT WORK

All second (2nd) shift work to be paid at time and one-eighth (1⅛) the regular day shift rate, and all third (3rd) shift work and shifts starting after 6:00 p.m. to be paid at time and one seventh (1-1/7) the regular day shift rate.

ARTICLE 4 - WAGES

The rates of wages for Board Area 8 during a regular day shift working period shall be:

Wage Classification	May 3, 2004	May 2, 2005	May 1, 2006
Group 1 - Labourers, including labourers on stripping on all form work, erecting and dismantling of all tubular scaffolding, and wire mesh installers, carpenter's labourers, epoxy injector, group-pointer-painter, mortar-man, dinky motorman, small mixers (under 1 yard), concrete workers (screedman, puddler, floatman) farm tractor driver, mixer man and grout pumpman including non-self propelled slurry pumps, mini skid steer loaders and mini backhoes of 50 h.p. and under and similar small equipment, pitbottom man, signalman, all machinery-driven tools by gas, electric and air, in open cut work, pipelayer's helper pumps - 3" and under, heater man (under 500,000 BTU and in groups of 4 or less); forklift operator; grout plant operator on surface	$29.13	$29.63	$30.13
Group 2 - Scootcrete, sheeting and shoring man, timberman in trench, labourers on well-points, pipelayers, manhole constructor and valve chamber constructor.	$29.38	$29.88	$30.38
Group 3 - Reinforced concrete workers, and form setters jackhammerman, concrete vibrator man, hydro demolisher man; carpenter improver.	$29.43	$29.93	$30.43
Group 4 - Pile installation - all types, steel strut installer and dismantler, concrete-cement finisher, precast installer, erector and finisher including post tensioning, rigging of components and sandblasting, rigger burner, pit miner, drillers of all types, wagon drillers in caissons, underpinning or shaft sinking, lead man - pile driving, grout man, gunite and shotcrete man, sandblaster, mixermen and grout pumpman including non-self propelled slurry pumps, shear-stud installer.	$29.53	$30.03	$30.53
Group 5 - Carpenter, welder (certified), (Rod or Semi-Automatic)	$31.13	$31.63	$32.13
Group 6 - Welder with own rig (Rod or Semi-automatic)	$50.61	$51.11	$51.61
Group 7 - Flagperson	$16.22	$16.72	$17.22
Group 8 - Watch Person (for 6 nights duty, 50 hours per week)	$731.00	$756.00	$781.00

Board Area 8

All Working Foremen will receive a minimum of one dollar ($1.00) per hour above the trade rate of the majority of the employees in the group supervised.

If an employee works more than fifty percent (50%) of his shift on a higher rated job than his regular classification, he will be paid the higher rate for the whole shift.

A qualified employee shall be paid the rate for the work to which he is assigned.

WAGES AND CLASSIFICATIONS - SIMCOE COUNTY

Hourly wage increases for Group 1 for Simcoe County during a regular day shift working period shall be: thirty -three cents ($0.33) effective May 3, 2004; thirty-eight cents ($0.38) effective May 2, 2005; and thirty-nine cents ($0.39) effective May 1, 2006.

Hourly wage increases Groups 2, 3, 4, 5 & 6 for Simcoe County during a regular day shift working period shall be: sixty-three cents ($0.63) effective May 3, 2004; sixty-eight cents ($0.68) effective May 2, 2005; and sixty-nine cents ($0.69) effective May 1, 2006.

Wage Classification	May 3, 2004	May 2, 2005	May 1, 2006
Group 1 - Labourers, including labourers on stripping on all form work, erecting and dismantling of all tubular scaffolding, and wire mesh installers, carpenter's labourers, epoxy injector, group-pointer-painter, mortar-man, dinky motorman, small mixers (under 1 yard), concrete workers (screedman, puddler, floatman) farm tractor driver, mixer man and grout pumpman including non-self propelled slurry pumps, mini skid steer loaders and mini backhoes of 50 h.p. and under and similar small equipment, pitbottom man, signalman, all machinery-driven tools by gas, electric and air, in open cut work, pipelayer's helper pumps - 3" and under, heater man (under 500,000 BTU and in groups of 4 or less); forklift operator; grout plant operator on surface	$18.87	$19.25	$19.64
Group 2 - Scootcrete, sheeting and shoring man, timberman in trench, labourers on well-points, pipelayers, manhole constructor and valve chamber constructor.	$20.17	$20.85	$21.54
Group 3 - Reinforced concrete workers, and form setters jackhammerman, concrete vibrator man, hydro demolisher man; carpenter improver.	$20.17	$20.85	$21.54
Group 4 - Pile installation - all types, steel strut installer and dismantler, concrete-cement finisher, precast installer, erector and finisher including post tensioning, rigging of components and sandblasting, rigger burner, pit miner, drillers of all types, wagon drillers in caissons, underpinning or shaft sinking, lead man - pile driving, grout man, gunite and shotcrete man, sandblaster, mixermen and grout pumpman including non-self propelled slurry pumps, shear-stud installer.	$20.17	$20.85	$21.54
Group 5 - Carpenter, welder (certified), (Rod or Semi-Automatic)	$21.17	$21.85	$22.54
Group 6 - Welder with own rig (Rod or Semi-automatic)	$40.65	$41.33	$42.02
Group 7 - Flagperson	$15.75	$15.75	$15.75
Group 8 - Watch Person (for 6 nights duty, 50 hours per week)	$708.50	$708.50	$708.50

Simcoe County

All Working Foremen will receive a minimum of one dollar ($1.00) per hour above the trade rate of the majority of the employees in the group supervised.

If an employee works more than fifty percent (50%) of his shift on a higher rated job than his regular classification, he will be paid the higher rate for the whole shift.

A qualified employee shall be paid the rate for the work to which he is assigned.

SCHEDULE "B"

Applying to Heavy Construction Tunnels and T.T.C. Subway Tunnel Work

ARTICLE 1 - WORK WEEK

The regular work week will start not earlier than 7:00 a.m. on Monday, and the regular working day, subject to variation by mutual consent of the parties, shall be between 7:00 a.m. and 5:00 p.m. from Monday to Friday, inclusive. Any work done outside these hours shall be overtime or shift work. The maximum number of working hours per week shall be forty (40), and work outside these hours shall be overtime work, save and except the provisions of this Agreement relating to shift work.

ARTICLE 2 - OVERTIME

All work performed in excess of the regular working day of eight (8) hours from Monday to Friday inclusive, shall be deemed overtime work. The rate of wages shall be time and one-half (1½) the regular day shift rate.

All work on Saturday shall be paid for at double the regular day shift rate, except where shift work is in operation. Time worked after midnight Friday night shall be paid for at the rate of time and one-half (1½) in respect of a shift commencing Friday evening and terminating not later than 7:00 a.m. on Saturday morning. All work on Sundays and Statutory Holidays shall be paid for at double the regular day shift rate.

ARTICLE 3 - SHIFT WORK

Where three (3) shifts are worked, the shift times shall be as follows, subject to variation by agreement of the Union and an Employer:

1st shift:	7:00 a.m.	-	3:00 p.m.
2nd shift:	3:00 p.m.	-	11:00 p.m.
3rd shift:	11:00 p.m.	-	7:00 a.m.

On such three (3) shift tunnelling operations, it is agreed the meal break will be paid.

Where three (3) shifts are working involving payment of Saturday or Sunday overtime under the provisions of this Agreement, it is agreed that shift premium, where applicable, will be paid in addition to the overtime.

All second (2nd) shift work to be paid at time and one-eighth (1⅛) the regular day shift rate, and all third (3rd) shift work to be paid at time and one-seventh (1-1/7) the regular day shift rate. On tunnel work, all hours worked on a second (2nd) shift after 11:00 p.m. will be paid at third (3rd) shift premium rate (time and one-seventh) [1-1/7], but this does not apply when the regular quitting time for the second (2nd) shift is 12:00 midnight.

ARTICLE 4 - WAGES - TUNNEL WORK

The rates of wages during regular day shift working periods on tunnel work shall be:

Wage Classification	May 3, 2004	May 2, 2005	May 1, 2006
Group 1 - Labourers (on surface) including labourers on stripping and tabular scaffolding, erectors, carpenter's helpers (on surface), classified labourers: (on surface) Dinky motorman, small mixers (under 1 yard) sheeting and shoring man, pipelayers helper, mortarman, concrete workers (screedman - puddler - floatman) form setters, farm tractor driver (no excavating attachment), mixer man and grout pumpman including non-propelled slurry pumps, mini skid steer loaders and mini backhoes of 50 h.p. and under and similar small equipment, signalman, deckman, pumps - 3" and under, hopperman (when needed) heater man (under 500,000 B.T.U. and in groups of 4 or less); carpenter improver; fork lift operator.	$31.43	$31.93	$32.43
Group 2 - Pitbottom man, caulkers, cage-signalman, plain and reinforced concrete workman, scootcrete, underground labourers, muckers, loco-driver, labourers on well - points in tunnel, concrete vibrator man, pipelayer in tunnel, manhole constructor and valve chamber constructor in tunnel, rigger burner, chucktender, concrete smoother.	$31.98	$32.48	$32.98
Group 3 - Operators of Jackhammers and air-spades in tunnel, miners including jack-leg and stopper man, drillers - all types, locktenders, trackman, yard and materials man, diamond-driller, wagon driller, pit miner on caisson, underpinning or shaft sinking, sandblaster gunite man, shotcrete man, powder man, lead concrete man, lead caulker (where 4 or more caulkers are employed on one contract).	$32.28	$32.78	$33.28
Group 4 - Slush driver, muck-machine driver, grout machine man and driver of concrete placing machine in tunnel, Scoop-Tram.	$32.58	$33.08	$33.58

Wage Classification	May 3, 2004	May 2, 2005	May 1, 2006
Group 5 - Lead miner, T.B.M. and micro tunnel operators, tunnel shield driver, tunnel mole driver, carpenter form builder-fabricator-erector, welder (certified) in tunnel (rod or semi-automatic)	$34.68	$35.18	$35.68
Group 6 - Welder (certified) with own rig (rod or semi-automatic).	$52.71	$53.21	$53.71
Group 7 - Flagperson	$16.22	$16.72	$17.22
Group 8 - Watch Person (for 6 nights duty, 50 hours per week)	$731.00	$756.00	$781.00

All Working Foremen will receive a minimum of one dollar ($1.00) per hour above the trade rate of the majority of the employees in the group supervised.

If an employee works more than fifty percent (50%) of his shift on a higher rated job than his regular classification, he will be paid the higher rate for the whole shift.

A qualified employee shall be paid the rate for the work to which he is assigned.

When new types of equipment for which rates of pay are not established by this Agreement are put into operation and such similar equipment is being operated by members of the Union, the rates covering such operations shall be subject to negotiations between the parties and if such negotiations do not result in agreement, the dispute will be settled as if it were a grievance arising under the provisions of the Agreement.

ARTICLE 5 - PREMIUM RATES AND CONDITIONS IN COMPRESSED AIR

(a) The following sliding scale of premium rates shall apply to workers in compressed air. These rates are non-cumulative.

Air Pressure	Premium per Shift
1 - 14 lbs.	$16.00
15 - 20 lbs.	$19.50
21 lbs.	$23.50

For air pressure over twenty-one (21) pounds, the Employer agrees to pay two dollars ($2.00) per pound compressed air premium for each pound over twenty-one (21) pounds, in addition to the twenty-one (21) pound rate.

(b) Where employees are required to work in compressed air they shall receive a minimum nine (9) hours per day or shift; it being understood and agreed that the ninth (9th) hour shall be paid at straight time.

(c) Rest periods when working under air pressure are to be paid as specified by law, and no deduction will be made for a meal break falling in the rest period between the two (2) working periods.

(d) Where employees are required to have their lunch break underground in compressed air, the Employer agrees that a proper sanitary lunchroom facility shall be provided, heated when necessary, and separate from the work area. Potable water shall be provided at all times. Sanitary toilets shall be provided and shall not be located in or near the lunchroom area.

(e) Hot beverages:

(i) The Employers shall, at their own expense, supply sugar and hot beverages for employees working in compressed air during rest periods;

(ii) Containers and cups for the beverages required as outlined above shall be maintained in a clean and sanitary condition and kept stored in a closed container.

ARTICLE 6 - PRODUCTIVITY PREMIUM

(a) The Employer agrees to negotiate with the Union any incentive bonus system before implementing it, provided that the Union's Negotiating committee will consist of, but not limited to, lead miners.

(b) It is further understood that any incentive bonus premium schedule is part of the collective agreement and therefore subject to the same provisions, such as grievance procedure, etc.

(c) Incentive bonus premium shall be paid over and above the employees' hourly rate, overtime premium, shift premium, compressed air premium, vacation with pay, travelling expense, welfare and pension contributions.

ARTICLE 7 - DECKMAN

It is agreed by the parties hereto, that on all tunnel projects there shall be a member of the Union at the top of the shaft employed as a deckman when work is in progress.

SCHEDULE "C"

A Schedule applying to Field Precast Manufacturing Operations, which shall include work pertaining to: site preparation, site restoration, erection and dismantling of temporary facilities, and all operations pertaining to field manufacturing, yard storage and handling of precast concrete products and components for heavy construction. This Schedule does not apply when precast units are supplied or purchased, provided such precast units are manufactured off-site.

ARTICLE 1 - HIRING OF EMPLOYEES

As provided for in Article 5, Section (b) of the Agreement.

ARTICLE 2 - WORK WEEK, WORK DAY

The regular working day shall be nine (9) hours per day and subject to variation by mutual consent of the parties, shall be between 7:00 a.m. and 7:00 p.m., from Monday to Friday, inclusive. Any work done outside these hours shall be overtime or shift work. The maximum number of working hours per week shall be forty-five (45) hours and work outside these hours shall be overtime work, save and except the provisions of this agreement relating to shift work. It is agreed and understood that the tenth (10th) shift of a two (2) shift operation and the fifteenth (15th) shift of a three (3) shift operation may be worked at straight time on Saturday until 7:00 a.m. provided, however, that the applicable shift premium shall be paid.

ARTICLE 3 - OVERTIME

All work performed in excess of the regular working day of nine (9) hours from Monday to Friday, inclusive, and all work performed on Saturday, shall be deemed overtime work. The rate of wages for overtime work shall be time and one-half (1½) the regular day shift rate.

Watchmen

Watchmen shall receive overtime payment at the rate of time and one-half (1½) the employee's current hourly rate for all work performed on such employee's seventh (7th) consecutive shift.

ARTICLE 4 - SHIFT WORK

Any shift or shifts falling between the hours of 7:00 a.m. and 7:00 p.m. shall be considered to be day shifts and shall attract no shift premium. Any shift or shifts commencing after twelve noon shall be considered to be an afternoon shift and a shift premium of fifty cents (50¢) per hour shall be paid for all hours worked during such afternoon shifts. Any shift or shifts commencing after 10:00 p.m. shall be considered to be a night shift and a shift premium of fifty cents (50¢) per hour shall be paid for all hours worked during such night shifts.

Wage Classification	May 3, 2004
Group 1 - General labourer; yardman and mini skid steer loaders and mini backhoes of 50 h.p. and under and similar small equipment; fork lift operator	$24.35
Group 2 - Concrete worker; rigger and burner signalman.	$24.60
Group 3 - Carpenter, reinforced concrete worker; concrete cement finisher, welder (certified) rod or semi-automatic.	$24.95
Group 4 - Watch Person (for 6 nights duty, 10 hours per day, 50 hours per week).	$560.50

All Working Foremen will receive a minimum of one dollar ($1.00) per hour above the trade rate of the majority of the employees in the group supervised.

SCHEDULE "D"

This Schedule applies to employees in the classifications shown below assigned to the clean-up and removal of hazardous contaminated soil on sites as designated by the appropriate governmental authority.

The classifications and rates are as follows:

Wage Classification	May 3, 2004
Group 1 - Labourers, operating all machine-driven tools by gas, air or electricity, including plate-tampers, operators of self-propelled hand compactors, burners, fence erectors - all types, sod layers, traffic control person.	$19.61
Group 2 - Labourers, operating high pressure water equipment, welders, fork lifts, farm-tractors, small trenchers, mini-skid steer loaders, and all other similar small equipment using attachments such as "sweepers", york rakes, "earth augers", "pallet or utility forks", "angle brooms", blade-backhoe or hydraulic breakers, sod or vibrator rollers, etc.	$20.36

Benefits for employees so assigned shall be as set out in Schedule "A" save that overtime work shall be paid only after fifty (50) hours worked with makeup time permitted on Saturdays. Employees working for his Employer under classifications and rates under Schedule "A" shall not have his rate of pay reduced, when assigned to work under this Schedule "D".

The Union agrees to train employees for this work in its recognized training school to standards established by the appropriate ministerial authority for the safety and health of employees.

SCHEDULE "E"

(a) **"The Sewer and Watermain Agreement"**, being a collective agreement between the Greater Toronto Sewer and Watermain Contractors' Association and A Council of Trade Unions acting as the representative and agent of Teamsters' Local 230 and the Union;

(b) **"The Roads Agreement"**, being a collective agreement between the Toronto and Area Road Builders' Association and the Union;

(c) **"The Forming Agreement"**, being a collective agreement between the Ontario Formwork Association and the Formwork Council of Ontario;

(d) **"The House Basements Agreement"**, being a collective agreement between the Residential Low Rise Forming Contractors' Association of Metropolitan Toronto and Vicinity and the Union;

(e) **The Apartment Builders Agreement"**, being a collective agreement between the Metropolitan Toronto Apartment Builders Association and the Union;

(f) **"The House Builders Agreement"**, being a collective agreement between the Toronto Residential Construction Labour Bureau and the Union;

(g) **"The Concrete and Drain Agreement"**, being a collective agreement between the Ontario Concrete and Drain Contractors' Association and the Union;

(h) **"The Utilities Agreement"**, being a collective agreement between the Utility Contractors' Association of Ontario and Labourers' International Union of North America, Ontario Provincial District Council and its affiliated Local Unions;

(i) **"The Carpentry Agreement"**, being a collective agreement between The Residential Framing Contractors' Association of Metropolitan Toronto and Vicinity and the Union;

(j) **"The Landscaping Agreement"**, being a collective agreement between the Landscaping Contractors in Ontario Labour Relations Board Area No. 8 and 18 and the Union;

(k) **"The Agreement Covering Building Restorations and Associated Work"**, being a collective agreement between the Building Restorations and Associated Work Contractors in Ontario Labour Relations Board Area No. 8 and the Union;

(l) **"The Bricklaying and Masonry Residential Sector Agreement"**, being a collective agreement between various independent bricklaying and masonry contractors and the Union;

(m) **"The Marble, Tile, Terrazzo & Cement Masons Agreement"**, being a collective agreement between various independent marble, tile, terrazzo and cement masons contractors and the Union;

(n) **"The Residential Plumbing Agreement"**, being a collective agreement between various independent plumbing contractors and the Union;

(o) **"The Fencing Agreement"**, being a collective agreement between various independent fencing contractors and the Union;

(p) **"The Trim Carpentry Agreement"**, being a collective agreement between independent trim carpentry contractors and Laborers' International Union of North America;

(q) **"The Residential Roofing Agreement"** , being a collective agreement between independent residential roofing contractors and Laborers' International Union of North America.

SCHEDULE "F"

This Schedule applied to employees covered by this Agreement who are not working in, or who do not regularly work in Ontario Labour Relations Board Area 8 and Simcoe County.

For employees covered by this Schedule rates of pay, hours of work, remittances and other monetary terms and conditions of employment shall be as per the Collective Agreement binding upon Local 183 and the Oshawa Signatory contractors.

LETTER OF UNDERSTANDING NO. 1

LETTER TO: The Heavy Construction Association of Toronto

FROM: Universal Workers Union, L.I.U.N.A. Local 183

RE : Collective Agreement - May 1st, 2004

Further to the signing of the Collective Agreement between us, this letter will serve to confirm certain understandings which were reached in connection with the classifications of Reinforced Concrete Worker, Carpenter Improver and Pipelayer. It is understood that the classification of "Reinforced Concrete Worker" applies to those employees engaged within the jurisdiction of the Agreement in laying reinforcing rod or mesh; similarly, the classification Carpenter Improver applies to those employees engaged within the jurisdiction of this Agreement in the setting of travelling steel forms and wood forms. Further, the "Pipe Layer" classification is intended to apply to not more than one man per crew.

DATED at TORONTO, Ontario this 17th day of MARCH, 2005.

SIGNED ON BEHALF OF:
THE HEAVY CONSTRUCTION ASSOCIATION OF TORONTO

(Signature)

EDDY MANN
(Print Name)

(Signature)

Aldo Paganelli
(Print Name)

(Signature)

D. SPEAKMAN.
(Print Name)

(Signature)

E J LEWIS
(Print Name)

SIGNED ON BEHALF OF:
UNIVERSAL WORKERS UNION, L.I.U.N.A. LOCAL 183

(Signature)

A. DIONISIO
(Print Name)

(Signature)

JACK OLIVEIRA
(Print Name)

(Signature)

Rocco Di Giovanni
(Print Name)

(Signature)

(Print Name)

LETTER OF UNDERSTANDING NO. 2

RE: Collective Agreement - May 1st, 2004

Further to the signing of the Collective Agreement between us, this letter will serve to confirm certain understandings which were reached regarding the items falling within the Heavy Engineering Sector.

The parties agree that a Joint Committee shall be established between the Association and the Union to review any dispute arising out of the interpretation and meaning of any of the agreed-upon definitions and to decide upon the application of the same to any given project or part thereof. The Joint Committee shall consist of two members each from the Association and the Union. A majority decision of the Committee shall be binding upon the parties. Failing settlement of any dispute concerning interpretation of definitions, then the matter shall be referred to arbitration.

DATED at TORONTO, Ontario this 17th day of MARCH, 2005.

SIGNED ON BEHALF OF:
THE HEAVY CONSTRUCTION ASSOCIATION OF TORONTO

(Signature)

EDDY MARIN
(Print Name)

(Signature)

Aldo Pagarelli
(Print Name)

(Signature)

D. SPEAKMAN.
(Print Name)

(Signature)

E. J. LEWIS
(Print Name)

SIGNED ON BEHALF OF:
UNIVERSAL WORKERS UNION, L.I.U.N.A. LOCAL 183

(Signature)

A. DIONISIO
(Print Name)

(Signature)

JACK OLIVEIRA
(Print Name)

(Signature)

RECCO DI GIOVANNI
(Print Name)

(Signature)

(Print Name)

LETTER OF UNDERSTANDING NO. 3

RE: Collective Agreement - May 1st, 2004

The parties to this Collective Agreement agree that notwithstanding the provisions of the Collective Agreement the hours of work on bridge repairs shall be nine (9) hours per day and forty-five (45) hours per week.

If the project is the replacement of the total deck, the hours will be eight and one half (8½) hours per day as per Schedule "A".

DATED at TORONTO, Ontario this 17th day of MARCH, 2005.

SIGNED ON BEHALF OF:
THE HEAVY CONSTRUCTION ASSOCIATION OF TORONTO

(Signature)

EDDY MANN
(Print Name)

(Signature)

Aldo Pagarelli
(Print Name)

(Signature)

D. SPEAKMAN.
(Print Name)

(Signature)

EJ LEWIS
(Print Name)

SIGNED ON BEHALF OF:
UNIVERSAL WORKERS UNION, L.I.U.N.A. LOCAL 183

(Signature)

A. DIONISIO
(Print Name)

(Signature)

JACK OLIVEIRA
(Print Name)

(Signature)

ROCCO DI GIOVANNI
(Print Name)

(Signature)

(Print Name)

LETTER OF UNDERSTANDING NO. 4

RE: Collective Agreement - May 1st, 2004

Further to the signing of the Collective Agreement between us, letter will serve to confirm certain understandings between the parties:

1. The parties agree to establish a Joint Committee to meet with representatives of the T.T.C. to explain to them the amendments made to the former collective agreement which have been incorporated into the new collective agreement effective from May 1st, 2004 to April 30th, 2007 (the "Collective Agreement").

DATED at TORONTO, Ontario this 17th day of MARCH, 2005.

SIGNED ON BEHALF OF:
THE HEAVY CONSTRUCTION ASSOCIATION OF TORONTO

(Signature)

EDDY MANN
(Print Name)

(Signature)

Aldo Pagarelli
(Print Name)

(Signature)

D. SPEAKMAN
(Print Name)

(Signature)

E.T. LEWIS
(Print Name)

SIGNED ON BEHALF OF:
UNIVERSAL WORKERS UNION, L.I.U.N.A. LOCAL 183

(Signature)

A. DIONISIO
(Print Name)

(Signature)

JACK OLIVEIRA
(Print Name)

(Signature)

ROCCO DI GIOVANNI
(Print Name)

(Signature)

(Print Name)

LETTER OF UNDERSTANDING NO. 5

RE: Classification Recognition Committee

(A) A Recognition Committee for classification purposes of two representatives of each party be established to accept Company certification cards of proficiency for the following classifications:

1. Miner
2. Lead Miner
3. Mucker
4. Tunnel Machine Operator

(B) Card must be clearly identifiable and contain member's name, Social Insurance Number, date of birth, etc.

(C) Card to be used for Union Registration purpose only. Card will not be used in any grievance procedures, nor will it be used to increase any hourly rate of pay, (i.e. a certified pipelayer is hired as a Labourer, he shall receive Labourer's rate of pay).

(D) Should there be any question of the Card holder's capabilities or proficiency, any employee or Employer can make a request to the Committee for a review. The employee in question shall be sent to the Training Centre for a proficiency test.

DATED at Toronto, Ontario this 17th day of MARCH, 2005.

SIGNED ON BEHALF OF:
THE HEAVY CONSTRUCTION ASSOCIATION OF TORONTO

(Signature)

EDDY MANN
(Print Name)

(Signature)

Aldo Paganelli
(Print Name)

(Signature)

D. SPEAKMAN.
(Print Name)

(Signature)

E. J. LEWIS
(Print Name)

SIGNED ON BEHALF OF:
UNIVERSAL WORKERS UNION, L.I.U.N.A. LOCAL 183

(Signature)

A. DIONISIO
(Print Name)

(Signature)

JACK OLIVEIRA
(Print Name)

(Signature)

RICCO DI GIOVANNI
(Print Name)

(Signature)

(Print Name)

LETTER OF UNDERSTANDING NO. 6

RE: Occupational and Rehabilitation Health Clinic

It will not be a violation of Article 16 if, notwithstanding the Employer's best efforts, an employee refuses to attend at the Occupational Health Clinic for testing at least once every three (3) years.

DATED at TORONTO, Ontario this 17th day of MARCH, 2005.

SIGNED ON BEHALF OF:
THE HEAVY CONSTRUCTION ASSOCIATION OF TORONTO

(Signature)

EDDY MANN
(Print Name)

(Signature)

Aldo Pagarelli
(Print Name)

(Signature)

D. SPEAKMAN.
(Print Name)

(Signature)

E J LEWIS
(Print Name)

SIGNED ON BEHALF OF:
UNIVERSAL WORKERS UNION, L.I.U.N.A. LOCAL 183

(Signature)

A. DIONISIO
(Print Name)

(Signature)

JACK OLIVEIRA
(Print Name)

(Signature)

ROCCO DI GIOVANNI
(Print Name)

(Signature)

(Print Name)

LETTER OF UNDERSTANDING NO. 7

RE: Schedule "A"

The Association agrees that equipment historically operated by Universal Workers Union, L.I.U.N.A. Local 183 shall continue to be operated by Universal Workers Union, L.I.U.N.A. Local 183.

DATED at TORONTO, Ontario this 17th day of MARCH, 2005.

SIGNED ON BEHALF OF:
THE HEAVY CONSTRUCTION ASSOCIATION OF TORONTO

(Signature)

EDDY MANN
(Print Name)

(Signature)

Aldo Pagnanelli
(Print Name)

(Signature)

D. SPEAKMAN.
(Print Name)

(Signature)

E J LEWIS
(Print Name)

SIGNED ON BEHALF OF:
UNIVERSAL WORKERS UNION, L.I.U.N.A. LOCAL 183

(Signature)

A. DIONISIO
(Print Name)

(Signature)

JACK OLIVEIRA
(Print Name)

(Signature)

ROCCO DI GIOVANNI
(Print Name)

(Signature)

(Print Name)

LETTER OF UNDERSTANDING NO. 8

RE: Schedule "A"

The Association will incorporate classifications and rates of Cement Lining of Watermains as agreed to by specialty contractors into this Collective Agreement.

DATED at TORONTO, Ontario this 17th day of MARCH, 2005.

SIGNED ON BEHALF OF:
THE HEAVY CONSTRUCTION ASSOCIATION OF TORONTO

(Signature)

EDDY MANN
(Print Name)

(Signature)

Aldo Pagarelli
(Print Name)

(Signature)

D. SPEAKMAN
(Print Name)

(Signature)

E.J. LEWIS
(Print Name)

SIGNED ON BEHALF OF:
UNIVERSAL WORKERS UNION, L.I.U.N.A. LOCAL 183

(Signature)

A. DIONISIO
(Print Name)

(Signature)

JACK OLIVEIRA
(Print Name)

(Signature)

ROCCO DI GIOVANNI
(Print Name)

(Signature)

(Print Name)

LETTER OF UNDERSTANDING NO. 9

RE: Schedule "B"

The Parties agreed that T.B.M. and Micro Tunnelling Operators are Universal Workers Union, L.I.U.N.A. Local 183 jurisdiction and to be included in Group 5 of Schedule "B" subject to the Employer's agreement on the selection of the operators for same.

DATED at TORONTO, Ontario this 17th day of MARCH, 2005.

SIGNED ON BEHALF OF:
THE HEAVY CONSTRUCTION ASSOCIATION OF TORONTO

(Signature)

EDDY MANN
(Print Name)

(Signature)

Aldo Pagamelli
(Print Name)

(Signature)

D. SPEAKMAN.
(Print Name)

(Signature)

E J LEWIS
(Print Name)

SIGNED ON BEHALF OF:
UNIVERSAL WORKERS UNION, L.I.U.N.A. LOCAL 183

(Signature)

A. SIONISIO
(Print Name)

(Signature)

JACK OLIVEIRA
(Print Name)

(Signature)

ROCCO DI GIOVANNI
(Print Name)

(Signature)

(Print Name)

LETTER OF UNDERSTANDING NO.10

The parties hereto agree that the last sentence of Article 24(c) does not apply in the shoring, piling and lagging operations.

DATED at TORONTO, Ontario this 17th day of MARCH, 2005.

SIGNED ON BEHALF OF:
THE HEAVY CONSTRUCTION ASSOCIATION OF TORONTO

(Signature)

EDDY MAHLN
(Print Name)

(Signature)

Aldo Pagnanelli
(Print Name)

(Signature)

D. SPEAKMAN.
(Print Name)

(Signature)

EJ LEWIS
(Print Name)

SIGNED ON BEHALF OF:
UNIVERSAL WORKERS UNION, L.I.U.N.A. LOCAL 183

(Signature)

A. DIONISIO
(Print Name)

(Signature)

JACK OLIVEIRA
(Print Name)

(Signature)

ROCCO DI GIOVANNI
(Print Name)

(Signature)

(Print Name)

LETTER OF UNDERSTANDING NO. 11

FORKLIFT LETTER

Local 183 claims jurisdiction over the operation of forklifts and will take all necessary action to defend its jurisdictional claims

Local 183 understands that other Unions may also claim jurisdiction over the operation of forklifts.

Therefore, Local 183 undertakes that should it be necessary to file a grievance with respect to this issue, it will not seek damages against an Employer unless there has been a previous decision award or agreement in relation to the specific Employer for the operation of forklift by members of Local 183.

DATED at Toronto, Ontario this 17th day of MARCH, 2005.

SIGNED ON BEHALF OF:
THE HEAVY CONSTRUCTION ASSOCIATION OF TORONTO

(Signature)

CODY MANN
(Print Name)

(Signature)

Aldo Pagarelli
(Print Name)

(Signature)

D. SPEARMAN.
(Print Name)

(Signature)

EJ LEWIS
(Print Name)

SIGNED ON BEHALF OF:
UNIVERSAL WORKERS UNION, L.I.U.N.A. LOCAL 183

(Signature)

A. DIONISIO
(Print Name)

(Signature)

JACK OLIVEIRA
(Print Name)

(Signature)

ROCCO DI GIOVANNI
(Print Name)

(Signature)

(Print Name)

LETTER OF UNDERSTANDING NO. 12

SURFACE GROUTING EQUIPMENT

With respect to the fixed grout plant on surface (Area 4 McNally-PCL-Foundation JV, Sheppard Subway) the present practice will continue as agreed upon but such continuation shall be without prejudice to any future position of Local 183.

With respect to all other grouting equipment of all types, including mobile equipment, the parties agree that the operation of such equipment is, and shall remain, within the jurisdiction of Local 183.

DATED at TORONTO, Ontario this 17th day of MARCH, 2005.

SIGNED ON BEHALF OF:
THE HEAVY CONSTRUCTION ASSOCIATION OF TORONTO

(Signature)

EDDY MANN
(Print Name)

(Signature)

Aldo Pagarelli
(Print Name)

(Signature)

D. SPEAKMAN.
(Print Name)

(Signature)

EJ LEWIS
(Print Name)

SIGNED ON BEHALF OF:
UNIVERSAL WORKERS UNION, L.I.U.N.A. LOCAL 183

(Signature)

A. DIONISIO
(Print Name)

(Signature)

JACK OLIVEIRA
(Print Name)

(Signature)

Ricco Di Giovanni
(Print Name)

(Signature)

(Print Name)

LETTER OF UNDERSTANDING NO. 13

BETWEEN:

The Heavy Construction Association of Toronto
(the "Association")

-and-

Universal Workers Union, L.I.U.N.A. Local 183
(the "Union")

HIRING

In order to ensure that the Employers bound to the terms and conditions of the Collective Agreement binding upon the Union and the Association continue to have access to an efficient and skilled work force in an expeditious manner, which the parties agree will benefit the unionized portion of this industry, and will thereby benefit all members of the Union, the parties hereby agree as follows:

(a) Notwithstanding the provisions of Article 5 of the Collective Agreement requiring the Employer to obtain all, or some, of its workforce from the Union's Hiring Hall, the Employer may make a request of the Union to hire specific Union members, who have previously been employed by the Employer, under the provisions of this Collective Agreement, within a six (6) month period prior to the date of any such request. Should it receive such a request, the Union may, at its sole and exclusive discretion, allow some or all of the requested individuals to be hired by the employer notwithstanding the Hiring Hall provisions set out in the Collective Agreement depending upon all of the circumstances which the Union considers relevant, including, but not necessary limited to, the general state of the Heavy Engineering sector of the construction industry in the various areas covered by the Collective Agreement ; the levels of employment amongst members of the Union; the particular skill levels of the requested employees; the Employer's general compliance with the hiring and other provisions of the Collective Agreement whether or not any instances of non-compliance have resulted in grievances; and any other circumstances which the Union considers relevant;

(b) Should the Union agree that the employer may hire some or all of the requested individuals, all other provisions set out in this Collective Agreement concerning hiring or otherwise, will apply and therefore, without limiting the generality of the

foregoing, such individuals must be Union members in good standing and must have obtained referral slips from the Union prior to commencing work;

(c) The parties agree that this Letter of Understanding forms part of the Collective Agreement binding upon them and is enforceable as such.

DATED at TORONTO, Ontario this 17th day of MARCH, 2005.

SIGNED ON BEHALF OF:
THE HEAVY CONSTRUCTION ASSOCIATION OF TORONTO

(Signature)

EDDY MARTIN
(Print Name)

(Signature)

Aldo Pagarelli
(Print Name)

(Signature)

D. SPEAKMAN.
(Print Name)

(Signature)

EJ LEWIS
(Print Name)

SIGNED ON BEHALF OF:
UNIVERSAL WORKERS UNION, L.I.U.N.A. LOCAL 183

(Signature)

A. DIONISIO
(Print Name)

(Signature)

JACK OLIVERA
(Print Name)

(Signature)

Rocco Di Giovanni
(Print Name)

(Signature)

(Print Name)

LETTER OF UNDERSTANDING #14

BETWEEN:

Universal Workers Union, L.I.U.N.A. Local 183
(the "Union")

-and-

The Heavy Construction Association of Toronto
(the "Association")

Remittances and Contributions

THE PARTIES agree that during the lifetime of the Agreement, the Union shall have the right, at any time, to require the Employer to change the amount of contributions to any of the employee benefit funds including, but not limited to, the Pension Fund, Welfare Fund and Pre-Paid Legal fund, set out in this Collective Agreement, or which may be established hereafter by the Union, by transferring any portion of the contributions required to be made to any particular employee benefit fund (now existing or existing in the future), other than the Vacation Pay Fund and the Industry Fund, to any other employee benefit fund (now existing or existing in the future) provided that there should be no increase in the total monetary contributions required to be made under this Agreement.

THE PARTIES agree that this Letter of Understanding forms part of the Collective Agreement binding upon them and may be enforced as such.

DATED at TORONTO, Ontario this 17th day of MARCH, 2005.

SIGNED ON BEHALF OF:
THE HEAVY CONSTRUCTION ASSOCIATION OF TORONTO

(Signature)

EDDY MARIN
(Print Name)

(Signature)

Aldo Paganelli
(Print Name)

D. Speakman
(Signature)

D. SPEAKMAN.
(Print Name)

(Signature)

E J LEWIS
(Print Name)

SIGNED ON BEHALF OF:
UNIVERSAL WORKERS UNION, L.I.U.N.A. LOCAL 183

(Signature)

A. Dionisio
(Print Name)

(Signature)

JACK OLIVEIRA
(Print Name)

Rocco di Giovanni
(Signature)

ROCCO DI GIOVANNI
(Print Name)

(Signature)

(Print Name)

LETTER OF UNDERSTANDING #15

BETWEEN:

Universal Workers Union, L.I.U.N.A. Local 183
(the "Union")

-and-

The Heavy Construction Association of Toronto
(the "Association")

Union Dues

With respect to the deduction and remittance of Union dues for Local 183 provided for in Article 4.01(f), the parties agree as follows:

1. Of the working dues deducted and remitted under this Agreement, fifteen cents (15¢) may be remitted to the Ontario Provincial District Council of LIUNA after, and provided that,

   (a) the Organizing Trust Fund, and the OPDC Motions thereto, are found to be proper and valid at the conclusion of the Court and other legal proceedings;

   (b) such remittances and deductions are approved by the members that regularly work under this Agreement in a separate secret ballot vote concerning this specific issue.

2. Other than with the regular dues which are set by the International Convention of LIUNA, there shall be no increase in the amount of dues and assessments deducted and remitted pursuant to the terms of this Collective Agreement unless such increases are approved by a secret ballot vote of the members normally working under this Collective Agreement.

3. The Parties agree that this Letter of Understanding forms part of the Collective Agreement which is binding upon them and is enforceable as such.

DATED at TORONTO, Ontario this 17th day of MARCH, 2005.

SIGNED ON BEHALF OF:
THE HEAVY CONSTRUCTION ASSOCIATION OF TORONTO

(Signature)

EDDY MANN
(Print Name)

(Signature)

Aldo Paganelli
(Print Name)

(Signature)

D. SPEAKMAN
(Print Name)

(Signature)

E J LEWIS
(Print Name)

SIGNED ON BEHALF OF:
UNIVERSAL WORKERS UNION, L.I.U.N.A. LOCAL 183

(Signature)

A. DIONISIO
(Print Name)

(Signature)

ANDY OLIVEIRA
(Print Name)

(Signature)

ROCCO DI GIOVANNI
(Print Name)

(Signature)

(Print Name)

LETTER OF UNDERSTANDING #16

BETWEEN:

Universal Workers Union, L.I.U.N.A. Local 183
(the "Union")

-and-

The Heavy Construction Association of Toronto
(the "Association")

Industry Development Fund

The Association and the Union agree to form a Sub-Committee in order to establish an Industry Development Fund which shall be managed and/or trusteed by participating Employer Associations. The Sub-Committee will be made up of representatives of the Union, the Association and other interested Employer Associations to review and determine the governance of the Fund, its terms of reference and the amount to be contributed per hour, subject to final approval by the Association. It is agreed that if the Union and the Association reach an agreement upon the establishment of the Fund, the five cents (.05¢) per hour allocated to the Tri-Fund under Article 26.01(b) will henceforth be remitted to the Industry Development Fund instead.

It is agreed that one of the issues which will be discussed by the Sub-Committee will be the ability of the Labourers' Canadian Tri-Fund to make proposals for funding from the Industry Development Fund if and when it becomes established.

The Parties agree that this Letter of Understanding forms part of the Collective Agreement which is binding upon them and is enforceable as such.

DATED at TORONTO, Ontario this 17th day of MARCH, 2005.

SIGNED ON BEHALF OF:
THE HEAVY CONSTRUCTION ASSOCIATION OF TORONTO

(Signature)

EDDY MARIN
(Print Name)

(Signature)

(Print Name)

(Signature)

D. SPEAKMAN
(Print Name)

(Signature)

E J LEWIS
(Print Name)

SIGNED ON BEHALF OF:
UNIVERSAL WORKERS UNION, L.I.U.N.A. LOCAL 183

(Signature)

A. DIONISIO
(Print Name)

(Signature)

JACK OLIVEIRA
(Print Name)

(Signature)

ROCCO DI GIOVANNI
(Print Name)

(Signature)

(Print Name

LABORERS' INTERNATIONAL UNION OF NORTH AMERICA APPENDIX

The amendments contained in the Statement of Settlement dated May 18, 2000, have been incorporated into the Laborers' Appendix in accordance with the "Term of Agreement" article contained in the Master Portion of this Agreement.

EPSCA / LABORERS' APPENDIX

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LABORERS' INTERNATIONAL UNION OF NORTH AMERICA APPENDIX

to the

Collective Agreement

by and between

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION
(hereinafter called "EPSCA")

and the

POWER COUNCIL OF UNIONS
(hereinafter called the "Council")

As provided in the "Appendices" article of the Master Portion of the Collective Agreement, EPSCA and the Council have agreed to the following conditions to apply to employees in classifications listed in Article 1 of this Appendix, subject to the following:

The "Classifications", "Wages", "Shift Differential Rate" and "Overtime Rates" articles of this Appendix and the "Hours of Work" article of the Master Portion of this Agreement do not apply for work such as driveway and parking lot construction, railroad construction, landscaping, precast concrete erection, fencing or demolition. When such work is undertaken, the classifications, wages, weekly hours of work, shift differential rate and overtime rates appropriate for the class and character of work shall be as established by the nearest influencing representative agreements between locals of the Union and builders' exchanges, contractors' associations or contractors for the class and character of work.

For tunneling work the wages, classifications, shift differential rates, compressed air premiums, hours of work and other individual employee working conditions shall be as set forth in the Tunnel Schedule of the Collective Agreement between the Heavy Construction Association of Toronto and the Laborers Union.

Article 1

CLASSIFICATIONS

1.1 The following classifications are covered by this Appendix:

Group I	Watchman
Group II	Laborer Heaterman Power Sweeper Operator Siamese Blowgun Operator Carpenter Helper Flagman Signalman Spotter Janitorial Cleaner (Construction Site) Area Captain (BHWP)
Group III	Formworker (Lakeview and Pickering Projects only)
Group IV	Conveyer Belt Attendant Scaler Wrecker - Demolition of Complete Buildings Yardman - Used Building Materials Formstripper Powderman Helper Air Trac Driller Helper Bricklayer Helper/Mason Tender Stressing Operator Helper - Post-Tensioning and Prestressing Caulker including Tile and Concrete Pipe Grouter Operator (not machine) Portable Compressor Operator Small Pump Operator Pipe Layer Small Mixer Operator
Group V	Concrete Worker Floatman Puddler Screedman Mortarman

Group VI	Air Tool Operator Concrete Core Drill Machine Operator Jackhammer Operator Tamper Operator Chainsaw Operator Vibrator Operator Electrical Tool Operator Pressurized Grouterman Bomag Operator Scootcrete Operator Chipping Hammer Operator Concrete Breaker Jackleg Operator Rocksplitter Operator Farm Tractor Operator Tool Crib Attendant Building Laborer (Lines and Stations only) Stump Cutter Operator Stress Operator - Post-Tensioning and Prestressing Welder - Post-Tensioning and Prestressing
Group VII	Powderman
Group VIII	Air Trac/Hydraulic Drills and Self-Propelled Hydraulic Drills
Group IX	Diamond Driller

1.2 If additional classifications are required, they will be negotiated, as appropriate, for work in the electrical power systems sector.

1.3 Classifications and wages for tunnelling shall be as set forth in the tunnel schedule of the Collective Agreement between the Heavy Construction Association of Toronto and the Laborers Union.

Article 1.4 is applicable to work at Existing Generating Sites where work involves construction of a new facility (new function) and/or new (additional) generating unit(s) and at New Generating Sites (ie: Greenfield Work).

For work at Existing Generating Sites <u>excluding</u> work involving construction of a new facility (new function) and/or new (additional) generating unit(s) please refer to Section 1, Addendum 1 – Modified Provisions of this Construction Appendix

1.4 On stand alone jobs when the crew is five (5) or less, the foreman may only work with the tools, at the foreman rate, on mutual agreement of the EPSCA Representative and the Local Business Manager.

Article 2

WAGES

2.1 REV Effective May 1, 2000 and until April 30, 2004 the rates of pay for employees in the classifications listed in Article 1 of this Appendix shall be as set forth in the wage schedules attached hereto.

The table of relationships dated September 1973 and amended August 1984 will be maintained.

2.2 EPSCA shall provide the Council with current wage schedules.

2.3 REV The rate of the subforeman classification listed in Section 1.1 of Article 1 shall be the appropriate hourly rate for his classification plus $1.75 per hour and shall be set forth in the wage schedules attached hereto.

Article 3

WEEKLY HOURS OF WORK

3.1 The weekly hours of work for Watchmen shall be forty-eight (48) hours per week. Watchmen may be required to work up to twelve (12) hours per day.

3.2 The weekly hours of work for tunnelling shall be forty (40) per week.

The regular workweek will start not earlier than 7:00 am on Monday, and the regular working day, subject to variation by mutual consent of the parties, shall be between 7:00 am and 5:00 pm, from Monday to Friday, inclusive. Any work done outside these hours shall be overtime or shift work. The maximum number of working hours per week shall be forty, and work outside these hours shall be overtime work, save and except the provisions relating to shift work.

Article 3.3. does NOT apply to work falling within the scope of Addendum 1

3.3 The weekly hours of work for mason tenders shall be forty (40) comprised of eight and one-half hours Monday through Thursday and six hours on Friday. All work in excess of the daily hours shall be overtime.

Article 4

SHIFT DIFFERENTIAL RATE

4.1 Employees required to work shift work, other than the regular day shift, shall receive a shift differential of one-seventh (1/7) for normal scheduled shift hours worked.

Employees required to work shift work on the third shift of a three shift operation shall receive a shift differential of one-fifth (1/5) for normal scheduled shift hours worked.

4.2 For employees required to work shift work on tunnelling, the following conditions will apply:

Where three shifts are worked, the shift times shall be as follows, subject to variation by agreement of the Union and an employer:

1st Shift	-	7:00 am	-	3:00 pm
2nd Shift	-	3:00 pm	-	11:00 pm
3rd Shift	-	11:00 pm	-	7:00 am

On such three shift tunnelling operations, it is agreed the meal break will be paid.

Where three shifts are working involving payment of Saturday or Sunday overtime under the provisions of this agreement, it is agreed that shift premium, where applicable, will be paid in addition to the overtime.

All second shift work to be paid at time and one-eighth the regular day shift rate, and all third shift work to be paid at time and one-seventh the regular day shift rate. On tunnel work, all hours worked on a second shift after 11:00 pm will be paid at third shift premium rate (time and one-seventh), but this does not apply when the regular quitting time for the second shift is 12:00 midnight.

Article 5

OVERTIME RATES

5.1 Overtime rates are paid for work performed outside of normal hours as defined in the "Hours of Work" article of the Master Portion of this Agreement and for work performed on Saturday, Sunday and the Statutory Holidays listed in Article 16 of this Appendix shall be as set forth in the wage schedules subject to 5.2 below.

5.2 REV Effective May 1, 2000 and until April 30, 2004, EPSCA shall amend wage schedules with respect to overtime to conform to the overtime rates of pay for the classifications listed in Article 1 of this Appendix paid in the locality by Employers under agreement with the Union for construction work of a related nature.

5.3 When overtime work is required, a minimum of one-half (1/2) hour's work will be provided.

5.4 WATCHMEN

Overtime rates for Watchmen (excluding tunnelling) shall be one and one-half times the basic rate for all hours worked outside of twelve (12) hours per day or in excess of forty-eight (48) hours per week.

Two times the basic rate shall be paid for all hours worked on the Statutory Holidays listed in Article 16 of this Appendix.

5.5 TUNNELLING

All work performed in excess of the regular working day of eight (8) hours from Monday to Friday inclusive, shall be deemed overtime work. The rate of wages shall be time and one-half the regular day shift rate.

All work on Saturday, Sunday and recognized holidays shall be paid for at double the regular day shift rate, except where shift work is in operation. Time worked after midnight Friday night shall be paid for at the rate of time and one-half in respect of a shift commencing Friday evening and terminating not later than 7:00 am on Saturday morning.

5.6 PROJECTS AND STATIONS ONLY

The Chief Steward will be informed of all overtime and shall be given the opportunity to work providing he is capable to perform the available work. In the event he declines the work, he shall be responsible to designate a steward to work the overtime who is qualified to perform the available work.

Article 6

BENEFITS

6.1 The Employer agrees to pay into operative welfare, pension, prepaid legal and supplementary unemployment benefit plans, whether in addition to the wage rates or deducted from the wage rates, for employees covered by this Appendix. The amounts shall be as set out in the wage schedules attached hereto.

6.2 The Union agrees to supply the Employer with all information regarding the welfare, pension and supplementary unemployment benefit plans and also all administrative material that is required for the implementation of them.

Should the welfare, pension or SUB plan contributions recognized under this Agreement change during the term of this Agreement then an adjustment may be made to the base rate. The total wage package will not be changed.

Within three (3) weeks of receipt of an acceptable written notice from the Union, any changes to such contributions will be implemented. The effective date will be the date of implementations.

6.3 In the event an Employer is more than fifteen (15) days in arrears of the requirement to forward contributions and/or deductions to the Trustees by the fifteenth of the month following, the Employer shall pay as liquidated damages and not as a penalty an amount equal to two (2%) percent (equivalent to 24% per annum) for each month or part thereof that the contributions and/or deductions are in default for greater than fifteen (15) days provided the Employer has received five (5) days' written notice to correct such default. The trustees may require a delinquent Employer to pay for the costs, legal or otherwise, of collecting the amount owing, as outlined in the operative benefit plan trust documents.

6.4 The Trustees of the Employee Benefit Plans referred to in this Collective Agreement shall promptly notify the Union of the failure by any Employer to pay any employee benefit contributions required to be made under this Collective Agreement and which are owed under the said plans in order that the program administrator of the Employee Wage Protection Plan may deem that there has been an assignment of compensation under that said program in compliance with the regulation to the *Employment Standards Amendment Act, 1991* in relation to the Employee Wage Protection Program.

Article 7

INCLEMENT WEATHER PAY

7.1 An employee, who reports for work at the beginning of a shift and is unable to commence work due to inclement weather, will receive two (2) hours' pay at the applicable rate. To qualify, the employee must remain on the job site for two (2) hours, unless excused earlier by an authorized representative of the Employer.

7.2 An employee who reports for and commences work, but is unable to continue work due to inclement weather, shall receive two (2) hours' pay at the applicable rate or pay for the actual time worked for that shift, whichever is greater.

7.3 An employee who qualifies for inclement weather pay shall also receive travel or board allowance, if applicable.

Article 8

KEY TRADESMEN

8.1 Employers reserve the right to transfer tradesmen from one location to another to effectively utilize their special skills, having regard for the special requirements of thermal, nuclear and hydraulic generation and transmission and transformation construction.

8.2 The number of key tradesmen to be transferred shall be determined at a pre-job conference identified in the "Advance Notice" article of the Master Portion.

8.3 All key tradesmen, requested by the Company and agreed to by the Union, must obtain clearance from the Local Union and the local EPSCA office before commencing work.

Article 9

TRAVEL AND TRANSPORTATION

9.1 INITIAL EMPLOYMENT

On recruitment of tradesmen who live between 80 and 161 radius kilometers from the project, the Employer shall pay $25.00 for the initial trip to the project.

9.2 ONTARIO RESIDENTS

On recruitment of tradesmen who live in Ontario but beyond 161 radius kilometers from the project, the Employer shall pay as an allowance 25¢ per radius kilometer, plus travel time based on one (1) hour's pay for each 80 radius kilometers of travel to a maximum of eight (8) hours' pay, for the initial trip to the project from where the tradesman lives or place of recruitment, whichever is closer to the project.

9.3 NON-ONTARIO RESIDENTS

On recruitment of tradesmen who live outside Ontario and beyond 161 radius kilometers from the project, the Employer shall pay as an allowance the equivalent of the cost of public transportation plus travel time based on one (1) hour's pay for each 80 radius kilometers of travel to a maximum of eight (8) hours' pay, for the initial trip to the project from where the tradesman lives or place of recruitment, whichever is closer to the project.

9.4 To qualify for payment in 9.1, 9.2 or 9.3, the employee must remain at the project for a minimum of fifteen (15) working days or the duration of the job, whichever is lesser.

9.5 On termination of employment due to a reduction of staff, an employee entitled to payment under 9.1, 9.2 or 9.3 shall be entitled to return expenses calculated in the same manner as in 9.1, 9.2 or 9.3 above for the return trip from the project to where the tradesman lives or place of recruitment, whichever is closer to the project. An employee whose employment terminates for any reason other than reduction of staff shall not be eligible for return payment.

9.6 TRANSFER

When transferring employees, the Employer shall pay the equivalent of the cost of public transportation for the initial trip to the project from the employee's most recent work location. In addition, the Employer shall pay travelling time at straight-time rates up to a maximum of eight (8) hours.

Article 10

TOOLS

10.1 Employers may supply tools and equipment to employees. Employees receiving such tools or equipment shall be responsible for them in accordance with the "Tools and Clothing" article of the Master Portion of this Agreement.

10.2 Gang tools, referred to in the "Tools and Clothing" article of the Master Portion of this Agreement, are tools which are issued to a foreman and are used by one or more members of the crew.

Article 11

PROTECTIVE CLOTHING AND EQUIPMENT

11.1 Employees must, at their own expense, provide suitable clothing for the performance of their regular duties. Employees are required to wear protective clothing and use protective equipment, as determined by the Employer, for the work being done, subject to sections 11.2 and 11.3 below.

11.2 The Employer shall provide suitable rainwear, when required.

11.3 The protective clothing and equipment covered in sections 11.1 and 11.2 of this Article that is provided by the Employer shall be charged out to an employee and the employee shall be responsible for the return of such clothing and equipment to his Employer.

No charge will be made against an employee for protective clothing which can be substantiated as having been lost or stolen due to circumstances beyond the employee's control. Any lost or stolen articles are to be reported to the supervisor immediately.

11.4 On abnormally dirty and/or corrosive work in which employees' clothes may be permanently damaged, the Employer shall supply and maintain the appropriate protective clothing at no cost to the employee. Such protective clothing will remain the property of the Employer and will be returned by employee upon completion of the work involved.

Article 12

APPRENTICESHIP AND TRAINING PROGRAMS

12.1 The Employer agrees to pay into operative apprenticeship or training funds the amounts specified for apprenticeship or training as set forth in the wage schedules attached hereto, for employees covered by this Appendix during the time they are employed.

The Union agrees to supply EPSCA with all pertinent information regarding these funds.

Article 13

PROJECT LAYOFF PROCEDURE

13.1 During staff reduction the Employer shall lay off the last employee hired, providing the remaining employees are able to perform the work currently under way.

13.2 Subject to Article 10.1 of the Foreman's Appendix to the EPSCA/Power Council of Unions Master Portion collective agreement, the employer shall have the right to move foremen from construction site to construction site.

When a requirement for foremen no longer exists, the treatment of foremen shall be as follows:

(i) Foremen who are transferred into, or hired as a Foreman at, an Ontario Power Generation Inc or Hydro One construction site as a foreman shall be laid off as a foreman or transferred out to another Ontario Power Generation Inc or Hydro One construction site as a foreman.

(ii) An employee who has been promoted to the foreman level by the Employer during the course of his employment on an Ontario Power Generation Inc or Hydro One construction site, shall not be subject to (i) above and will be reduced to a working position at such site. For layoff purposes, the employee will then be subject to Article 13.1.

Article 14

PREMIUMS

14.1 When an employee covered by this Appendix is required to work from a bosun chair or swing stage, he/she will receive an additional forty-five cents (45¢) per hour for each hour worked.

Article 15

VACATION PAY

15.1 The Vacation Pay rate shall be four (4) percent of vacationable gross earnings*. Payment shall be made weekly on the employee's regular pay cheque.

* ***"Vacationable gross earnings" means pay for regular hours, overtime, premium pay, shift differential, lines and stations daily travel time, retroactive pay adjustments, reporting pay, inclement weather pay, call-in pay, Saturday and Sunday premiums and trade training, but does not include payment for initial and return travel.***

A three (3) week leave of absence for the purpose of taking an annual vacation will be granted in the calendar year in which the employee completes one year of service*. In special circumstances, where the work schedule permits, additional time off may be granted an employee. The additional time off will not be unreasonably denied.

Article 16

STATUTORY HOLIDAYS

16.1 The Statutory Holiday pay rate shall be six (6) percent of vacationable gross earnings. Payment shall be made weekly on the employee's regular pay cheque.

The Statutory Holidays recognized under this Agreement are:

New Year's Day	Civic Holiday
Good Friday	Labour Day
Easter Monday	Thanksgiving Day
Victoria Day	Christmas Day
Canada Day	Boxing Day

EPSCA agrees to recognize Heritage Day when proclaimed by legislation.

Recognized holidays falling on a Saturday or Sunday shall be observed on the following Monday. When Christmas Day falls on a Saturday or Sunday, it shall be observed on the following Monday and Boxing Day on the following Tuesday. When New Year's Day falls on a Saturday or Sunday, it shall be observed on either the preceding Friday or the following Monday.

EPSCA reserves the right to change the day of observance of a Statutory Holiday when such a holiday falls on a Tuesday or Thursday.

Article 17

GREENMAN RECALL

NEW

In the case of a recall to work, Employers reserve the right to recall Green qualified Atomic Radiation Workers in sequence from the out of work list to the location from where they were laid off. This recall provision can only be used when all Green qualified Atomic Radiation Workers currently employed are being utilized for greenmanning duties. Recalled Greenmen will perform only Greenman work and will not work with the tools as a Labourer.

* ***Service will be calculated based on an employee's length of continuous service with his Employer.***

The incorporated specific Statement of Settlement amendments to the Laborers' International Union of North America Appendix of the Collective Agreement between The Electrical Power Systems Construction Association and The Power Council of Unions have been agreed to by the bargaining committees of the Laborers' and The Electrical Power Systems Construction Association. These proposed amendments are herewith recommended to the EPSCA Board of Directors and the Officers of the Council in accordance with Article 33.1 of the Master Portion of the Collective Agreement for approval and incorporation into the Laborers' Appendix of the Collective Agreement.

Dated this *18th* day of *May* , 2000.

For: The Laborer Bargaining Committee

Rick Weiss

_____

For: The EPSCA Bargaining Committee

Barry Roberts

_____

Approved for incorporation into the Laborers' Appendix effective this *10th* day of *April* , 2001.

For: **The Electrical Power Systems Construction Association**

Jim Coathup

_____

Joe Dotchin

_____

For: **The Power Council of Unions**

Rick Weiss

_____

Claude Cournoyer

_____

Phil Bertrand

_____

_____

ADDENDUM 1

MODIFIED PROVISIONS OF THIS CONSTRUCTION APPENDIX

These provisions will apply to:

(a) all work on Lines and Stations, and

(b) all work on existing generating sites except the construction of:

- a new facility which provides a new function
- a new (i.e. additional) generating unit

Definitions:

Facility Something that is built composed of multi-systems which serves a specific function

Function Examples - Generation, Administration, Warehousing, Heavy Water Production, Flue Gas Desulphurization, Tritium Removal, Site Services (e.g. Shops)

Dispute Resolution Process

A dispute as to whether the 'Modified Provisions of this Construction Agreement' apply to the construction of a new facility will be referred to the Executive Committee for resolution and the Executive Committee will meet within five (5) working days. If the Executive Committee is unable to resolve the dispute, the dispute will be referred to a single arbitrator within ten (10) working days for a final and binding resolution. The arbitrator shall give an oral decision within five (5) working days, and a written decision, if requested, within twenty (20) working days.

All terms of this appendix shall apply to work covered by Addendum 1, with the exception of Article 1.4 and Article 3.3.

EPSCA/LABORERS' APPENDIX

ADDENDUM 1

MODIFIED PROVISIONS

OF THIS CONSTRUCTION APPENDIX

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Section 1

WORKING FOREMEN

REV When the *crew size is five (5) or less, including the foreman, the foreman may be required to work with the tools of the trade. The foreman, if not already eligible to act as a working foreman during the normal scheduled hours of work, will not act as a working foreman on overtime.

Section 2

LINES AND STATIONS FOREMEN RATE

NEW

The rate of pay for Foremen working in Lines and Stations under the Modified Provisions of this construction agreement shall be $3.00 per hour above the journeyman rate. **(Article 5 – Wages – Foreman Appendix, Master Portion does not apply)**

Section 3

HIRING, TRANSFERS AND RECALL

NEW

The parties agree that this Article fulfills the previous commitment as set out in the hiring and mobility re-opener language of April 28, 2000.

TRANSFER PROVISIONS – ALL LOCALS

The parties agree an employer is allowed to transfer employees within the geographic area of the Local Union for projects covered by this collective agreement.

HIRING AND RECALL – LOCAL UNION PROVISIONS

Hiring and recall shall be as set out in the ICI collective agreement and as amended from time to time (excluding foremen – see Foremen's Appendix, Master Portion of this collective agreement). As amendments take place, they will be incorporated into this Article.

* *A crew is defined as the foreman and the total number of tradespersons directly supervised.*

Local 625 – Windsor

The employer shall have the prerogative, when adding to his workforce, to first re-hire any employees who are unemployed and have been in his employ during the preceding twelve (12) months, provided that they are in good standing.

Local 625 - Chatham

The employer shall have the prerogative, when adding to his workforce, to first re-hire any employees who are unemployed and have been in his employ during the preceding twelve (12) months, provided that they are in good standing.

Local 1089 - Sarnia

The employer shall be permitted to recall former employees who are unemployed and registered at the local union office, provided he does so within a twelve (12) month period from date of layoff and said employees are in good standing with the union.

Local 1059 – London

No appendix provisions.

Local 1081 – Brantford (Cambridge)

The employer, when adding to his workforce, shall have the prerogative of first recalling any unemployed member in good standing with Local 1081, as long as the member has worked for ten (10) consecutive days previous to being recalled.

The member has to have been in his/her employ during the twelve (12) months of the date of rehire, and such employees shall retain a referral slip from the union within two (2) working days of the date of rehire.

Members of other local unions who have transferred into Local 1081 will not be eligible for recall unless the member has transferred into Local 1081 at least twelve (12) months prior to the date of recall.

Members that transfer out of Local 1081 with a company and back, will have the right to be recalled within twelve (12) months of his return to membership in Local 1081.

Local 1081 – Kitchener (Cambridge)

The employer, when adding to his workforce, shall have the prerogative of first recalling any unemployed member in good standing with Local 1081, as long as the member has worked for ten (10) consecutive days previous to being recalled.

The member has to have been in his/her employ during the twelve (12) months of the date of rehire, and such employees shall retain a referral slip from the union within two (2) working days of the date of rehire.

Members of other local unions who have transferred into Local 1081 will not be eligible for recall unless the member has transferred into Local 1081 at least twelve (12) months prior to the date of recall.

Members that transfer out of Local 1081 with a company and back, will have the right to be recalled within twelve (12) months of his return to membership in Local 1081.

Local 837 – Hamilton

The employer agrees to employ only members of the union in good standing during he term of this agreement and will call the union for its needed supply of men. The union, upon request, will supply the employer with two (2) former employees and for additional men thereafter, on the basis of twenty-five per cent (25%) ratio of former employees who were employed by the contractor in the past six (6) months prior to the job award.

Local 837 – St. Catharines (Niagara)

No appendix provisions.

Local 506 – Toronto

The employer may name hire up to fifty per cent (50%) of the total crew within each project, provided that:

a) the person is a member in good standing of Local 506.

b) the member is registered on a Local 506 work referral list and is currently unemployed as a result of layoff or if for any other reason has been registered for two (2) weeks or more.

c) the employer notified the union hall directly with the request to name hire any individual member and at the same time provide the request for hall referrals to comply with above requirements. The employer may hire the odd-numbered member only with consent of the union. Such consent will not be unreasonably denied.

Local 506 – Barrie (Simcoe County Schedule)

The employer may name hire up to fifty per cent (50%) of the total crew within each project, provided that:

a) the person is a member in good standing of Local 506.

b) the member is registered on a Local 506 work referral list and is currently unemployed as a result of layoff or if for any other reason has been registered for two (2) weeks or more.

c) the employer notified the union hall directly with the request to name hire any individual member and at the same time provide the request for hall referrals to comply with above requirements. The employer may hire the odd-numbered member only with consent of the union. Such consent will not be unreasonably denied.

Local 597 - Oshawa

The employer shall have prerogative, when adding to his workforce, to first rehire any employees who are unemployed and have been in his employ during the preceding six (6) months, provided that they are in good standing with Local 597. Such employees shall obtain a referral slip prior to commencing employment.

Local 597 – Peterborough/Huntsville

The union agrees the employer may recall former employees for a period of up to six (6) months from date of layoff.

The employer shall have the prerogative, when adding to his workforce, to first rehire any employees who are unemployed and have been in his employ during the preceding six (6) months, provided that they are in good standing with Local 597. Such employees shall obtain a referral slip prior to commencing employment.

Local 247 - Kingston

The employer may name hire one (1) employee for each one (1) employee referred by the union.

Upon request, the union will supply the employer with the first employee name by the employer, the second employee will be referred by the union, and so on, alternately, until all labour requirements are filled.

To be eligible for name hire, an employee must be a member in good standing of Local 247 and must have been registered on the union unemployment list for a period of not less than forty-five (45) days. The forty-five (45) day provision will not apply to Local 247 members who are re-name hired to the same employer.

Local 527 – Ottawa

When hiring, a request by the employer for a named individual who is a member in good standing of the union, registered on the out of work list, shall not being reasonably denied by the union.

When hiring, the employer shall have the prerogative of first rehiring any employee who has been in his employ during the preceding twelve (12) months of the date of rehire and such employee shall first obtain a referral slip from the union.

Local 527 – Cornwall, Smith Falls, Arnprior

When hiring, a request by the employer for a named individual who is a member in good standing of the union, registered on the out of work list, shall not being reasonably denied by the union.

When hiring, the employer shall have the prerogative of first rehiring any employee who has been in his employ during the preceding twelve (12) months of the date of rehire and such employee shall first obtain a referral slip from the union.

Local 527 – Hawkesbury/Pembroke

When hiring, a request by the employer for a named individual who is a member in good standing of the union, registered on the out of work list, shall not being reasonably denied by the union.

When hiring, the employer shall have the prerogative of first rehiring any employee who has been in his employ during the preceding twelve (12) months of the date of rehire and such employee shall first obtain a referral slip from the union.

Local 493 – Sudbury

The employer shall have the prerogative, when adding to his workforce, to first rehire any employees who are unemployed and who have been in his employ during the preceding twelve (12) months, provided they are in good standing with the union.

Local 493 – N.E. Miscellaneous

The employer shall have the prerogative, when adding to his workforce, to first rehire any employees who are unemployed and who have been in his employ during the preceding twelve (12) months, provided they are in good standing with the union.

Local 491 – Timmins

The employer may rehire former employees who have been in his employ during the preceding twelve (12) months who have remained in good standing with the union and are registered as out of work, to be eligible for rehire.

The employee must not have worked in the E.P.S. sector for any other contractor during that period. Subject to availability to perform the work, employees will be recalled in inverse order of layoff.

Hiring will be on the following basis:

1st employee selected by the employer
2nd employee selected by the union
3rd employee selected by the employer
4th employee selected by the union, and this sequence to continue in this method for each employee.

Local 1036 – Sault Ste. Marie

The employer shall have the prerogative, when adding to his workforce, to first rehire any employees who are unemployed and who have been in his employ during the preceding twelve (12) months, provided they are in good standing with the union.

The parties agree that after the fifth employee recalled as above, the union shall have the right to include one (1) employee of its choice who may be designated as Steward for the project.

Local 607 – Thunder Bay

The employer may rehire former employees who have been in his employ during the preceding twelve (12) months, who have remained in good standing with the union and are registered as out of work provided that the employee(s) have not worked for another employer during that period.

Hiring will be on the following basis:

1st employee selected by the employer
2nd employee selected by the union
3rd employee selected by the employer,
and this sequence to continue in this method for each employee

Should an employer elect to recall employees as above, then before the employer can utilize the hiring clause above, an equal number of employees as were recalled will be provided by the union.

September 27, 1973

EPSCA AGREEMENT

LABORERS' INTERNATIONAL UNION OF NORTH AMERICA APPENDIX

The wage schedule for this Appendix will be prepared in a similar manner to the schedule presently contained on Ontario Hydro's Agreement with the Allied Construction Council, with the following changes:

1. The table of relationships will be converted from a percentage differential to a cents-per-hour differential.

2. The cents-per-hour differential will be frozen at the present level.

3. The wage schedule which is produced will not apply to those types of work excluded in the preamble to this Appendix.

April 7, 1983

EPSCA LABORERS' APPENDIX

GENERATION STATION PROJECTS
OVERTIME RATE SCHEDULE

In accordance with Article 5.2, Generation Station Projects, of this Appendix, the overtime rates of pay are as follows:

Lakeview and Pickering Projects

One and one-half times the appropriate hourly rate for his classification for the first three hours worked outside of normal hours in any one day, Monday to Friday.

Two times the appropriate hourly rate for his classification after the first three hours worked outside of normal hours in any one day, Monday to Friday, and for all hours worked on Saturday, Sunday and the Statutory Holidays listed in Article 16 of this Appendix.

Bruce Project

Two times the appropriate hourly rate for his classification for all hours worked outside of normal hours in any one day, Monday to Friday, and for all hours worked on Saturday, Sunday and the Statutory Holidays listed in Article 16 of this Appendix.

Nanticoke, Wesleyville and Darlington Projects

One and one-half times the appropriate hourly rate for his classification for the first two hours worked outside of normal hours in any one day, Monday to Friday.

Two times the appropriate hourly rate for his classification after the first two hours worked outside of normal hours in any one day, Monday to Friday, and for all hours worked on Saturday, Sunday and the Statutory Holidays listed in Article 16 of this Appendix.

EPSCA LABORERS' APPENDIX (continued)

Thunder Bay and Atikokan Projects

One and one-half times the appropriate hourly rate for his classification for the first three hours worked outside of normal hours in any one day, Monday to Friday.

Two times the appropriate hourly rate for his classification after the first three hours worked outside of normal hours in any one day, Monday to Friday, and for all hours worked on Saturday, Sunday and the Statutory Holidays listed in Article 16 of this Appendix.

Effective June 2, 1980:

One and one-half times the appropriate hourly rate for his classification for the first two hours worked outside of normal hours in any one day, Monday to Friday.

Two times the appropriate hourly rate for his classification after the first two hours worked outside of normal hours in any one day, Monday to Friday, and for all hours worked on Saturday, Sunday and the Statutory Holidays listed in Article 16 of this Appendix.

LETTER OF UNDERSTANDING

Between

THE ELECTRICAL POWER SYSTEMS
CONSTRUCTION ASSOCIATION

And

LABOURERS INTERNATIONAL UNION OF NORTH AMERICA

Hydro One Senior Foreperson

It was agreed in negotiations that, if Hydro One should implement the classification of Senior Foreperson, the rate will be established at $3.75 per hour above the local area journeyperson rate.

For EPSCA:

Barry Roberts

For LIUNA:

Rick Weiss

LETTER OF UNDERSTANDING

Between

THE ELECTRICAL POWER SYSTEMS
CONSTRUCTION ASSOCIATION

And

LABOURERS INTERNATIONAL UNION OF NORTH AMERICA

Niagara Tunnel Project

It is agreed by the parties that if the Niagara Tunnel Project begins and the term of this agreement expires, there will be no strikes or lockouts while the tunneling portion of the project is in progress.

If the tunneling portion of this project continues past the expiration date of this collective agreement, all terms and conditions of this collective agreement shall be binding on the parties and wage increases will be retroactive to May 1, 2004 for those employees employed on work covered by this Letter of Understanding.

For EPSCA:

Barry Roberts

For LIUNA:

Rick Weiss

(1)

Memorandum of Agreement

Between: The Heavy Construction Association Toronto (Association)

and

Universal Worker Union, LIUNA Local 183

Whereas the parties are party to a Collective Agreement which expires Apr. 30, 2004

And whereas the parties have agreed to a renewal of the Agreement subject to those amendments listed below and further subject to ratification by each of the parties by May 31, 2004

And whereas the Agreement if ratified shall be effective May 1, 2004

The parties agree as follows:

1. Except as hereinafter modified the collective Agreement terms + conditions shall remain status quo

2. Add as Letter of Understanding the letter attached as Appendix "A"

3. Article 4 (e)(i) shall be amended by deleting "with the Union ... work" in the 3RD last line and adding "with Local 183".

4 TOTAL WAGE PACKAGE INCREASE - BOARD AREA 8

MAY 3, 2004	-	$1.25
MAY 2, 2005	-	$1.25
MAY 1, 2006	-	$1.25

5. The parties agree that they shall meet in the 1st 4 months of the 3RD year of this agreement to discuss the implementation of a "no strike/no lockout - arbitration" provision. If same is

(8)

agreed upon this collective agreement shall be amended to include same so that it is in effect for the 2007 round of bargaining.

6. New - Schedule F.

This Schedule applies to employees covered by this Agreement who are not working in, or who do not regularly work in OLRB Area 8 and Simcoe County.

For employees covered by this Schedule rates of pay, hours of work, remittances and other monetary terms and conditions of employment shall be as per the Collective Agreement bearing upon Local 183 and the Oshawa Signatory contractors

7. The parties shall meet to form a joint committee to discuss issues of concern relating to apprentices and arrive at possible at solutions to be incorporated into this Agreement

DATED AT TORONTO THIS 27TH DAY OF APRIL 2004

FOR THE UNION

FOR THE ASSOCIATION

APRIL 27/04

Apr 27/04

MEMORANDUM OF SETTLEMENT

BETWEEN

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION

AND

LABOURERS' INTERNATIONAL UNION OF NORTH AMERICA

Dated this 6th day of December 2004

It is agreed that the existing agreement between the parties which expired April 30, 2004 will be renewed with the following amendments:

GENERAL

There is agreement to create a "free standing" collective agreement. Master Portion, Foreman's Appendix, Labourers' Appendix and December 6, 2004 Memorandum of Settlement to be incorporated into one collective agreement.

Language to be modified where necessary –

e.g. delete references to the "Power Council of Unions" and "Power Council of Unions and affiliates" and replace with "the Union"

APPENDIX D — MODIFIED PROVISIONS

Modified Provisions to apply as follows:

- Modified Articles – *Hours of Work, Reporting Pay* and *Meals on Overtime* from Master Portion to replace corresponding articles in main body of agreement
- *Working Foremen, Lines and Stations Foremen Rate* and *Hiring, Transfer and Recall* in Labourers' Appendix to be placed into main body of the agreement

ARTICLE 8 — UNION STEWARDS

"Where practicable and where requested by an employee, a Union Steward and/or Union Representative will be present at a meeting where there will be discipline or discharge meted out to an employee. There may be instances where this is not practicable (e.g. security breaches, fighting, safety breaches) or where a Union Steward and/or Union Representative is not available. This Article applies to generation sites only."

ARTICLE 10 WORK ASSIGNMENT

Revised language to read as follows:

10.1

(a) A markup process will be utilized when an Employer intends to perform work on a project site*. The purpose of this markup process is to indicate to the Union the work which is planned to be carried out by the Employer in order to minimize the potential for jurisdictional disputes.

(b) When work is to be performed on a project site and it meets the following criteria: same employer, same work, same project site, the markup process will not be required. This procedure shall not preclude a Union's right to contest previously disputed work.

(c) When an Employer has work that is less than a 3 week duration and there are ten (10) or fewer employees covered by EPSCA Collective Agreements employed on this specific work, the Union will be notified of the scope of work and the Employer's proposed work assignments. The Unions will have two (2) weeks from the date of notification to submit jurisdictional claims and supporting evidence to the Employer for consideration. The Employer will notify the Union of the final work assignments prior to the commencement of the work.

(d) All work that does not meet the criteria set out in clauses 10.1 (b) or 10.1 (c) will be reviewed and assigned at a markup meeting.

(e) EPSCA will provide written notice to the Union as far in advance as possible of markup meetings. The Union may attend these markup meetings, and every effort will be made to settle questions of jurisdiction before the work is expected to commence.

(f) The Employer who has the responsibility for the work shall make a proposed assignment of the work involved. The Employer shall be responsible for providing copies of proposed assignments to the Unions in attendance at the markup meeting. The Employer will specify a reasonable time limit for the Unions involved to submit evidence of their claims. The Employer will evaluate all evidence submitted and make a final assignment of the work involved. The Employer will advise the Unions of the final assignments prior to the work commencing.

(g) The EPSCA representative will record the proposed assignments and jurisdictional claims and forward a copy of them within fifteen (15) working days to the Union.

(h) The parties recognize that circumstances may arise, particularly with discovery and emergency work, where the process set out above may not be practical or possible, however reasonable effort will be made by the Employer to adhere to the appropriate trade jurisdiction.

* ***For the purposes of this Article, Nanticoke, Lambton, Lakeview/Hearn, BNPD, Pickering, Darlington, Lines and Stations and the Five Electricity Production Zones are each considered individual project sites.***

ARTICLE 11 — JURISDICTIONAL DISPUTES

Revise language to read as follows:

11.1
In the event there is a jurisdictional dispute which cannot be settled on a local basis by the Unions involved, it shall be submitted to the Ontario Labour Relations Board without permitting it to interfere in any way with the progress of the work at any time.

11.2
In the event the Union elects to pursue or respond to the Jurisdictional Dispute at the Ontario Labour Relations Board as governed by 11.1 above, the arbitration board panel appointed by the Ontario Labour Relations Board pursuant to the Act is not authorized to award damages in respect of a mis-assignment of work only in circumstances where the other union(s) involved in the proceedings is (are) equally restricted in their ability to claim for damages. However this clause 11.2 shall not apply where the Jurisdictional Dispute and the mis-assignment of work involves the same employer and the same work, and on the same job previously the subject of a Jurisdictional Dispute before the Ontario Labour Relations Board.

11.3
The board panel appointed by the Ontario Labour Relations Board will govern its decision pursuant to its normal criteria.

11.4
In the event the Union elects to pursue or respond to the Jurisdictional Dispute at the Ontario Labour Relations Board as governed by 11.1 above, the decision of the panel of the Ontario Labour Relations Board will be final and binding upon the parties to this agreement with no further recourse to the Plan on the issue decided by the Ontario Labour Relations Board.

ARTICLE 12 UNION SECURITY

Replace Article 12.2 with the following:

12.2 Union Dues and Checkoff

a) The Employer agrees to deduct from each employee covered by the terms of this agreement. Working dues at the rate provided for in the applicable Local Union Schedule which shall be remitted to the Secretary-Treasurer of the applicable Local Union by the fifteenth (15th) day of the month following the month in which such deduction were made.

b) Ontario Provincial District Council working dues consisting of fifteen cents ($0.15) per hour shall be deducted and remitted by the Employer directly to the Labourers' Pension Fund of Central and Eastern Canada, along with the pension contributions.

c) The amounts of the Ontario Provincial District Council working dues deductions, as well as the recipient of said deductions, may only be altered by the Secretary-Treasurer of the Ontario Provincial District Council in accordance with Article 12.2 (f) below.

d) The Employer shall, when remitting such dues, submit a list of names and social insurance numbers (where permissible under applicable legislation) for and on whose behalf such deductions were made, on one (1) Standard Benefits Form showing all applicable deductions and/or contributions.

e) The aforesaid remittances shall be made directly by the Employer as aforesaid notwithstanding anything contained in any other article, Appendix or Schedule to this Agreement.

f) Wage schedule, dues and remittance changes are to be provided in writing to EPSCA and changes shall only take place during the months of April and November of each calendar year. The effective date of such changed wage schedules, dues and remittances shall be within 30 days of receipt of such notice.

The above noted time frames shall not apply proceeding contract ratification for a period of forty-five (45) days.

ARTICLE 14 — WAGES AND PAY PROCEDURE

Add: "The parties agree to direct deposit for direct hire employees of OPG, Hydro One and Bruce Power LP. An employer will provide assistance to employees who require assistance obtaining a bank account. Employers other than OPG, Hydro One and Bruce Power LP may implement direct deposit with employee consent."

ARTICLE 17/ SECTION 1 — GENERATION PROJECTS DAILY TRAVEL ALLOWANCE AND ROOM AND BOARD

Travel rings and Board and Travel to be increased (and rounded to the nearest 5 cents) as follows:

- Upon signing – 4%
- May 1, 2005 – 2%
- May 1, 2006 – 2%
- May 1, 2007 – 4%
- May 1, 2008 – 2%
- May 1, 2009 – 2%

ARTICLE 18 — LINES AND STATIONS CONSTRUCTION TRAVEL ALLOWANCE AND ROOM AND BOARD

Travel rings and Board to be increased as follows:

Travel:
Effective upon signing and May 1st in each subsequent year – 50 cents

Board:
Effective upon signing and May 1st in each subsequent year - $1.00

ARTICLE 20 STANDOFF

Amend 20.1 (b) as follows:

> ".... No travel allowance will be paid to an employee for the Standoff period. Subsistence allowance will only be paid when proof that temporary residence is being maintained is provided. Proof of residency will be in a form acceptable to Management such as a Landlord receipt, hotel/motel receipt etc..."

Amend 20.2 to state, "An employee who qualifies for subsistence allowance (subject to 20.1)..."

ARTICLE 24 TOOLS AND CLOTHING

Amend 24.4 as follows: $12.00 per day upon ratification
$15.00 per day effective May 1, 2006

SECTION 2/ ARTICLE 26 HOURS OF WORK

Amend 2nd and 3rd paragraph of Section 2.1 to read:

(i) The weekly hours of work Monday to Friday inclusive shall consist of forty (40) hours for all employees of Employers covered by this agreement and working on a one (1) or two (2) shift operation.

The weekly hours of work may be arrived at by having the employees work either:

- four (4) consecutive ten-hour shifts, Monday to Thursday or;
- four (4) consecutive ten-hour shifts, Tuesday to Friday or;
- five (5) consecutive eight-hour shifts

but not concurrently on the same work program.*

Employees will not be moved from work program to work program to circumvent overtime. Disputes arising from this Article are subject to the grievance procedure.

Each Employer will notify the Local Union of the weekly hours of work for each work program* at the site.

Weekly hours of work will be established for a minimum period of two (2) weeks.

If an Employer, with the approval of the owner, intends to change the weekly hours of work, a minimum of seven (7) days written notice shall be sent to the Local Union.

**** For the purposes of this section, a work program may be defined as work taking place on a site that could include the following:***

- ***Outages,***
- ***Specific contracted scopes of work,***
- ***Various and different modifications in an operating plant where the owner dictates the hours of work, or***
- ***Subcontracts for a prime contractor where the prime contractor dictates the hours of work.***

(ii) Amend start time in 3rd paragraph of Section 2.1 to read 7:00 am.

(iii) The start time for the afternoon shift shall be immediately following the day shift or within two (2) hours either way of the end of the day shift.

(iv) Add:

"Shift differential will not be paid on overtime hours."

ARTICLE 33 <u>TERM OF AGREEMENT</u>

Duration – Amend to read as follows:

"This Agreement shall continue in full force and effect from May 1, 2004 until April 30, 2010 inclusive..."

SECTION 2 <u>WAGES</u>
LABOURERS
APPENDIX

Effective July 31, 2004 – ICI increases
May 1, 2005 – ICI increases
May 1, 2006 – ICI increases

ICI increase/date for the following three years of agreement.

<u>MISCELLANEOUS</u>:

- RESP, DeNovo and Tri-Fund to be deducted from the Total Wage Package amount

December 6, 2004

LETTER OF UNDERSTANDING

Between

THE ELECTRICAL POWER SYSTEMS
CONSTRUCTION ASSOCIATION

AND

LABOURERS' INTERNATIONAL UNION
OF NORTH AMERICA

RE: APPENDIX A - MOOSE RIVER BASIN

Moose River Basin shall be defined as that part of the District of Cochrane, North of the fiftieth (50th) parallel of latitude which drains into the Moose River. EPSCA will meet with the Union to discuss and update this portion of the agreement when work is scheduled for that geographic location.

EPSCA

LIUNA

December 6, 2004

LETTER OF UNDERSTANDING

Between

THE ELECTRICAL POWER SYSTEMS
CONSTRUCTION ASSOCIATION

AND

LABOURERS' INTERNATIONAL UNION
OF NORTH AMERICA

RE: OLRB Certifications

- Letter of Understanding to be drafted regarding carry over of LIUNA agreement pending OLRB certification hearings.
- Target date for draft letter – mid-January 2005
- Target date for final letter – end of January 2005

EPSCA

LIUNA

The parties agree to recommend this settlement for ratification.

Unless otherwise indicated, all terms in this settlement shall be conditional upon ratification by December 9, 2004 and shall form the new agreement between the Parties.

Dated this 6th day of December, 2004 at Toronto, Ontario.

For EPSCA

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For LIUNA

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MAP CODE:
L-7

ISSUED:
DECEMBER 14, 2001

REVISED:
APRIL 29, 2005

LABORERS
Local 837
St. Catharines

EPSCA WAGE SCHEDULE FOR PROJECTS WITHIN THE GEOGRAPHIC AREA OF THIS LOCAL (52)

GRADE AND STEP	CLASSIFICATIONS OCCUPATION CODES & EFFECTIVE DATES		BASE HOURLY RATE	VACATION & STAT. HOLIDAY	WELFARE (1)	PENSION (1)	UNION FUNDS (1)	TOTAL WAGE PACKAGE	EPSCA ASSOC. FUND(1)
	FOREMAN - 425065								
25-9	GROUP II	2004-07-31	27.23	2.72	2.30	4.12	0.62	36.99	0.15
		2005-05-01	27.68	2.77	2.40	4.42	0.62	37.89	0.15
		2006-05-01	28.14	2.81	2.50	4.72	0.62	38.79	0.15
	SUBFOREMAN - 425055								
24-8	GROUP I	2004-07-31	25.04	2.50	2.30	4.12	0.62	34.58	0.15
		2005-05-01	25.49	2.55	2.40	4.42	0.62	35.48	0.15
		2006-05-01	25.95	2.60	2.50	4.72	0.62	36.39	0.15
25-8	GROUP II	2004-07-31	25.98	2.60	2.30	4.12	0.62	35.62	0.15
		2005-05-01	26.43	2.64	2.40	4.42	0.62	36.51	0.15
		2006-05-01	26.89	2.69	2.50	4.72	0.62	37.42	0.15
26-8	GROUP III	2004-07-31	N/A						
		2005-05-01	N/A						
		2006-05-01	N/A						
27-8	GROUP IV	2004-07-31	26.23	2.62	2.30	4.12	0.62	35.89	0.15
		2005-05-01	26.68	2.67	2.40	4.42	0.62	36.79	0.15
		2006-05-01	27.14	2.71	2.50	4.72	0.62	37.69	0.15
28-8	GROUP V	2004-07-31	26.37	2.64	2.30	4.12	0.62	36.05	0.15
		2005-05-01	26.82	2.68	2.40	4.42	0.62	36.94	0.15
		2006-05-01	27.28	2.73	2.50	4.72	0.62	37.85	0.15
29-8	GROUP VI	2004-07-31	26.43	2.64	2.30	4.12	0.62	36.11	0.15
		2005-05-01	26.88	2.69	2.40	4.42	0.62	37.01	0.15
		2006-05-01	27.34	2.73	2.50	4.72	0.62	37.91	0.15
30-8	GROUP VII	2004-07-31	26.92	2.69	2.30	4.12	0.62	36.65	0.15
		2005-05-01	27.37	2.74	2.40	4.42	0.62	37.55	0.15
		2006-05-01	27.83	2.78	2.50	4.72	0.62	38.45	0.15
31-8	GROUP VIII	2004-07-31	27.14	2.71	2.30	4.12	0.62	36.89	0.15
		2005-05-01	27.59	2.76	2.40	4.42	0.62	37.79	0.15
		2006-05-01	28.05	2.81	2.50	4.72	0.62	38.70	0.15
32-8	GROUP IX	2004-07-31	27.63	2.76	2.30	4.12	0.62	37.43	0.15
		2005-05-01	28.08	2.81	2.40	4.42	0.62	38.33	0.15
		2006-05-01	28.54	2.85	2.50	4.72	0.62	39.23	0.15

(1) = per hour worked; (2) = per hour paid

LABORERS
Local 837
St. Catharines

EPSCA WAGE SCHEDULE FOR PROJECTS WITHIN THE GEOGRAPHIC AREA OF THIS LOCAL (52)

GRADE AND STEP	CLASSIFICATIONS OCCUPATION CODES & EFFECTIVE DATES		BASE HOURLY RATE	VACATION & STAT. HOLIDAY	WELFARE (1)	PENSION (1)	UNION FUNDS (1)	TOTAL WAGE PACKAGE	EPSCA ASSOC. FUND(1)
	LABORER - 425035								
24-6	GROUP I	2004-07-31	23.29	2.33	2.30	4.12	0.62	32.66	0.15
		2005-05-01	23.74	2.37	2.40	4.42	0.62	33.55	0.15
		2006-05-01	24.20	2.42	2.50	4.72	0.62	34.46	0.15
25-6	GROUP II	2004-07-31	24.23	2.42	2.30	4.12	0.62	33.69	0.15
		2005-05-01	24.68	2.47	2.40	4.42	0.62	34.59	0.15
		2006-05-01	25.14	2.51	2.50	4.72	0.62	35.49	0.15
26-6	GROUP III	2004-07-31	N/A						
		2005-05-01	N/A						
		2006-05-01	N/A						
27-6	GROUP IV	2004-07-31	24.48	2.45	2.30	4.12	0.62	33.97	0.15
		2005-05-01	24.93	2.49	2.40	4.42	0.62	34.86	0.15
		2006-05-01	25.39	2.54	2.50	4.72	0.62	35.77	0.15
28-6	GROUP V	2004-07-31	24.62	2.46	2.30	4.12	0.62	34.12	0.15
		2005-05-01	25.07	2.51	2.40	4.42	0.62	35.02	0.15
		2006-05-01	25.53	2.55	2.50	4.72	0.62	35.92	0.15
29-6	GROUP VI	2004-07-31	24.68	2.47	2.30	4.12	0.62	34.19	0.15
		2005-05-01	25.13	2.51	2.40	4.42	0.62	35.08	0.15
		2006-05-01	25.59	2.56	2.50	4.72	0.62	35.99	0.15
30-6	GROUP VII	2004-07-31	25.17	2.52	2.30	4.12	0.62	34.73	0.15
		2005-05-01	25.62	2.56	2.40	4.42	0.62	35.62	0.15
		2006-05-01	26.08	2.61	2.50	4.72	0.62	36.53	0.15
31-6	GROUP VIII	2004-07-31	25.39	2.54	2.30	4.12	0.62	34.97	0.15
		2005-05-01	25.84	2.58	2.40	4.42	0.62	35.86	0.15
		2006-05-01	26.30	2.63	2.50	4.72	0.62	36.77	0.15
32-6	GROUP IX	2004-07-31	25.88	2.59	2.30	4.12	0.62	35.51	0.15
		2005-05-01	26.33	2.63	2.40	4.42	0.62	36.40	0.15
		2006-05-01	26.79	2.68	2.50	4.72	0.62	37.31	0.15

(1) = per hour worked; (2) = per hour paid

LABORERS
Local 837
St. Catharines

EPSCA WAGE SCHEDULE FOR PROJECTS WITHIN THE GEOGRAPHIC AREA OF THIS LOCAL (52)

Overtime Rate

Mon - Fri = 1-1/2x
Sat = 1-1/2x
Sun & Hol = 2x

Union Funds

Union Funds include the following items:

Training - $0.62 per hour worked (May 1, 2001)

Union Dues

Local Union Dues Checkoff - $23.00 per month and $0.64 per hour worked - effective July 31, 2004
$24.00 per month and $0.69 per hour worked - effective January 1, 2005
$25.00 per month and $0.74 per hour worked - effective May 1, 2007

OPDC Working Dues - $0.15 per hour worked (not included in the Union Dues Checkoff)

Union Dues are not included in the above-noted Union Funds.
Union Dues are to be deducted from the Base Hourly Rate.

Pension, Health Benefits and Dues Administration

Remittances excluding the EPSCA Association Fund, should be sent to the following locations:

Pension

All Pension monies and OPDC dues should be forwarded to:

The Labourers' Pension Fund of Central and Eastern Canada
P.O. Box 40, Station 'Q'
TORONTO, ON
M4T 2L7

Health Benefits

Labourer Health and Welfare benefits for this Local should be forwarded to:

L.I.U.N.A. Local 837
44 Hughson St. South
HAMILTON, ON
L8N 2A7

Dues Administration

Both the Local Union Dues checkoff and the amount deducted on behalf of the Training Fund should be forwarded to the above noted address for Health Benefits.

GEOGRAPHIC AREA: In Haldiman-Norfolk (RM) that portion east of a line drawn southeasterly along the road from Hartford past Varency and continuing on to the shore of Lake Erie and Niagara (RM)

Labourers Board and Travel increases

	Current	New											
		2004		2005		2006		2007		2008		2009	
		4%	($)	2%	($)	2%	($)	4%	($)	2%	($)	2%	($)
Gen Projects (Mod. Provisions)													
40-56	$20.35	$21.15	$0.80	$21.55	$0.40	$22.00	$0.45	$22.90	$0.90	$23.35	$0.45	$23.80	$0.45
56-80	$23.60	$24.55	$0.95	$25.05	$0.50	$25.55	$0.50	$26.55	$1.00	$27.10	$0.55	$27.65	$0.55
80-97	$27.10	$28.20	$1.10	$28.75	$0.55	$29.35	$0.60	$30.50	$1.15	$31.10	$0.60	$31.70	$0.60
Over 97 Travel	$31.35	$32.60	$1.25	$33.25	$0.65	$33.90	$0.65	$35.25	$1.35	$35.95	$0.70	$36.65	$0.70
Board - north of French	$76.00	$79.05	$3.05	$80.65	$1.60	$82.25	$1.60	$85.55	$3.30	$87.25	$1.70	$89.00	$1.75
Board - south of French	$62.00	$64.50	$2.50	$65.80	$1.30	$67.10	$1.30	$69.80	$2.70	$71.20	$1.40	$72.60	$1.40
Board - Pickering & Darlington	$49.50	$51.50	$2.00	$52.55	$1.05	$53.60	$1.05	$55.75	$2.15	$56.85	$1.10	$58.00	$1.15
Misc: Over 97 kms	$37.60	$39.10	$1.50	$39.90	$0.80	$40.70	$0.80	$42.35	$1.65	$43.20	$0.85	$44.05	$0.85
		2004		2005		2006		2007		2008		2009	
		4%	($)	2%	($)	2%	($)	4%	($)	2%	($)	2%	($)
Gen Projects (Greenfield)													
20-40	$17.10	$17.80	$0.70	$18.15	$0.35	$18.50	$0.35	$19.25	$0.75	$19.65	$0.40	$20.05	$0.40
40-56	$20.35	$21.15	$0.80	$21.55	$0.40	$22.00	$0.45	$22.90	$0.90	$23.35	$0.45	$23.80	$0.45
56-80	$23.60	$24.55	$0.95	$25.05	$0.50	$25.55	$0.50	$26.55	$1.00	$27.10	$0.55	$27.65	$0.55
80-97	$27.10	$28.20	$1.10	$28.75	$0.55	$29.35	$0.60	$30.50	$1.15	$31.10	$0.60	$31.70	$0.60
Over 97 Travel	$31.35	$32.60	$1.25	$33.25	$0.65	$33.90	$0.65	$35.25	$1.35	$35.95	$0.70	$36.65	$0.70
Board - north of French	$76.00	$79.05	$3.05	$80.65	$1.60	$82.25	$1.60	$85.55	$3.30	$87.25	$1.70	$89.00	$1.75
Board - south of French	$62.00	$64.50	$2.50	$65.80	$1.30	$67.10	$1.30	$69.80	$2.70	$71.20	$1.40	$72.60	$1.40
Board - Pickering & Darlington	$49.50	$51.50	$2.00	$52.55	$1.05	$53.60	$1.05	$55.75	$2.15	$56.85	$1.10	$58.00	$1.15
Misc: Over 97 kms	$37.60	$39.10	$1.50	$39.90	$0.80	$40.70	$0.80	$42.35	$1.65	$43.20	$0.85	$44.05	$0.85
		2004		2005		2006		2007		2008		2009	
		50 cents		50 cents		50 cents		50 cents		50 cents		50 cents	
Lines & Stations													
40-56	$20.10	$20.60		$21.10		$21.60		$22.10		$22.60		$23.10	
56-97	$23.60	$24.10		$24.60		$25.10		$25.60		$26.10		$26.60	
80-97	$27.10	$27.60		$28.10		$28.60		$29.10		$29.60		$30.10	
Over 97 Travel	$30.35	$30.85		$31.35		$31.85		$32.35		$32.85		$33.35	
Misc: Over 97 kms	$35.85	$36.35		$36.85		$37.35		$37.85		$38.35		$38.85	
		2004		2005		2006		2007		2008		2009	
		$1.00		$1.00		$1.00		$1.00		$1.00		$1.00	
Board	$75.00	$76.00		$77.00		$78.00		$79.00		$80.00		$81.00	

Operating Engineers

03-1571

FILE No.	409-306
CERT. FILE	
CERT. DATE	
TOTAL EMPS	100
EFF. DATE	01-MAY-2000
EXP. DATE	30-APR-2004
CODING CONTROL	DATE / CODER
IDENT CODED	MAY 10 2004
RECEIVED -	
UNION / EMPLOYER	
OTHER	

H.C.A. OPERATING ENGINEERS LOCAL AGREEMENT/MASTER PORTION

AGREEMENT

BETWEEN: THE HEAVY CONSTRUCTION ASSOCIATION OF WINDSOR
(hereinafter called the EMPLOYER OF THE FIRST PART)

- AND -

INTERNATIONAL UNION OF OPERATING ENGINEERS, LOCAL 793
(hereinafter called the UNION OF THE SECOND PART)

WHEREAS the Union and the Employer are desirous of establishing a form of standard collective agreement with respect to all employees engaged in heavy construction work within the geographical area defined herein so as to provide uniform interpretation, application and administration of the relationship established.

IT IS EXPRESSLY AGREED AND DECLARED
BY AND BETWEEN THE PARTIES HERETO AS FOLLOWS

ARTICLE 1 - DURATION OF AGREEMENT

1.1 This agreement shall become effective on the 1st day of May 2000 and shall continue to remain in effect until the 30th, of April 2004 and shall continue in force from year to year thereafter unless either party shall furnish the other with notice of termination, or proposed revision of this agreement within ninety (90) days before the 30th, day of April 2004, or in a like period of any year thereafter.

OFFICE OF
MAY 10 2004
COLLECTIVE BARGAINING INFORMATION

ARTICLE 2 - RECOGNITION

2.1 The employer recognizes the Union as the exclusive bargaining agent for all employees of the Employer covered by the classifications set out in this agreement, and any additional classifications as may be agreed to by the parties save and except, non-working foremen and persons above the rank: office, clerical staff and security guards.

2.2 The employer agrees to employ only members of the Union in good standing and the Union agrees to give the Employer preference in supplying men for such work.

2.3 The Union will not sign any Agreement with an Employer who is engaged in the same work as the Employers to whom this Agreement applies for less than the terms of this Agreement.

2.4 (a) With respect to all work performed or undertaken or contractors let or sublet that does not come within the purview of this agreement, the Employer and the Union hereby acknowledge and agree to recognize, observe and be bound by all terms, conditions, provisions (both monetary and non-monetary) and all of the relevant schedules of the Provincial Collective Agreement between the Operating Engineers Employer Bargaining Agency, including the amendments, additions or renewals thereof, as if the same were made between the Union and the Employer. The Employer hereby acknowledges that it is in possession of a copy and is familiar with all the terms, conditions, and provisions of the Provincial Agreement.

2.4 (b) For the purpose of clarity, it is agreed that the Windsor Heavy Agreement shall apply to within of the five (5) feet of the exterior wall of any building or structure. The stripping of topsoil shall be covered by the H.C.A. Agreement.

ARTICLE 3 - UNION SECURITY

3.1 The Employer agrees that whenever he requires personnel to perform work covered by this agreement he shall first call the Union Office for his requirements in the area where the work is to be performed.

3.2 The Union will advise the Employer of their progress in obtaining personnel within twenty four (24) hours. If the Union cannot supply qualified and competent personnel within two working days (excluding Saturday, Sundays and Holidays) the Employer may hire from any source available to him. Any request made after 12:00 p.m. noon shall not be considered a part of the two working days for supply.

3.3 All personnel hired shall be required to have a clearance card issued by the Union before they start to work unless other arrangements are made by the Union dispatcher. Such clearance card will not be unreasonably withheld.

3.4 All employees working under this Agreement shall apply to become members of the Union within fourteen (14) working days and maintain their membership in good standing or be replaced. Probationary employees so hired will be paid 80% of the rate for the appropriate class for three months and become a member of the Union or be replaced at that time.

3.5 The Employer shall have the prerogative when adding to it's working force, to first re-hire former regular employees through the Union hall who have been employed by the Employer for at least three (3) calendar months of the last twelve (12) calendar months or as otherwise provided for in the attached schedules.

3.6 The Employer only agrees to engage only those sub-contractors including owner - operators, who are in contractual relations with the Union to perform work set out in the classifications of this Agreement. The Union may, if contacted prior to bid closing, give permission to use specialty type sub-contractors. If relief is given, it will be given to any member contractors who request it through the Heavy Construction Association of Windsor, prior to bid closing.

3.7 The Employer agrees to remove any sub-contractor in violation of section 3.6 upon written notification from the Union Representative, subject to Letter of Understanding as applicable.

3.8 (a) As a condition of employment the Employer shall request each employee to sign a form which authorizes the Employee to deduct regular monthly union dues, working dues, initiation fees and annual assessments from the employee's pay. The regular monthly union dues shall be deducted from each employee on the first pay period of each month. The Union shall notify the Employer of the amounts and changes thereto of the above mentioned deductions.

3.8 (b) All dues, fees and assessments so deducted shall be remitted together with Pension and/or Benefit Contributions set out in this Agreement on or before the 15th. day of the following month in which such deductions were made. The Employer shall, when making all remittances to the Union, identify employees both by name and Social Insurance Number and indicate the amount deducted from each employee.

ARTICLE 4 - MANAGEMENT RIGHTS

4.1 The Union agrees and acknowledges that the Employers have exclusive right to manage the business, and to exercise such right without restriction, save and accept such prerogatives of management that may be specifically modified by the terms and the conditions of this agreement.

Without restricting the generality of the foregoing paragraph, it is the exclusive function of the Employer:

(a) To determine qualifications, classify, transfer, hire direct promote, layoff, discipline and discharge employees for just cause and to increase or decrease working forces in accordance with the terms of this agreement.

(b) To determine the materials to be used, design of the products to be handled, facilities and equipment required, scheduling of work and location of equipment.

(c) To determine the rules and regulations to be observed by Employees, violations of which may be the cause for discipline and may include discharge.

4.2 The Employer recognizes that the employee and the Union have recourse through the grievance procedure if they feel that the Employer has exercised any of the forgoing rights contrary to the terms of this Agreement and further that discipline and discharges shall only be exercised for just cause.

4.3 Notices of discipline and discharge shall be provided in written form with reasons therefore, if requested in writing by the effected employees.

4.4 The Employer shall not discriminate against any employee and the Union. Employer and employees shall all comply with the Ontario Labour Relations Act, Human Rights Code, Workers Compensation Act and all other applicable legislation.

ARTICLE 5 - Geographical Area

As per appendices

ARTICLE 6 - GRIEVANCE PROCEDURES

6.1 There shall be an earnest effort on the part of both parties to this agreement to settle promptly through the procedure set out herein, any complaints, grievances or disputes arising from the interpretation, application or administration of this agreement.

6.2 It is understood and agreed that an employee does not have a grievance until he has discussed the matter with his supervisory personnel acting in his capacity and given him an opportunity of dealing with the complaint. His decision shall be made known to said employee within forty-eight (48) hours. Grievances properly arising under this agreement shall be adjusted and settled as follows:

STEP 1- Within ten (10) days after the circumstances giving rise to the grievance the aggrieved employee, with or without Union Representation, shall present his grievance in writing to the official of the Employer named by the Employer to handle grievances at this step. If a settlement satisfactory to Union and the Employee concerned is not reached within five (5) full working days a grievance may be presented as indicated in Step 2 at any time within five (5) full working day thereafter.

STEP 2- At this step the grievance may be processed as an individual, joint, employer or union grievance and shall be presented in writing by a Union Steward or Representative to the company official assigned to handle written grievances.

6.3 All grievances to be dealt with under Step 2 above shall be in writing on a form supplied by the Union and signed by the employee having such grievance.

6.4 The Employer shall designate and name the official to who a written grievance is submitted at Step 2.

6.5 Written grievances to be valid shall set out the nature of the grievance: the Article or Articles of the Agreement alleged to be violated and the nature of the remedy sought and shall not be subjected to change at later steps except by mutual agreement in writing with the Employer, or in the case of remedy, by an Arbitration Board.

6.6 In determining the time which is allowed in the various steps, Saturday, Sunday and Statutory Holidays shall be excluded and any time limits may be extended by mutual agreement in writing.

6.7 If advantage of the provisions of Articles 6 and 7 hereof is not taken within the time limits specified therein or as extended in writing as set out above, the grievance shall be deemed to have been abandoned and may not be re-opened.

6.8 Notwithstanding the above, a grievance concerning wages may be presented within ten (10) days after the circumstances giving rise to the grievance occurring or originating and further provide that a grievance concerning welfare or pension contributions may be presented within ten (10) days after the particulars of such grievance should have reasonably become first known to a Union Representative.

ARTICLE 7 - ARBITRATION

7.1 The parties to this agreement agree that any grievance concerning the interpretation or alleged violation of this agreement which has been properly carried through all the steps of the grievance procedure outlined in Article 6 which has not been settled will then be referred to a Board of Arbitration at the request of either of the parties hereto.

7.2 The Board of Arbitration will be composed of one person appointed by the Employer, one person by the Union and a third person to act as chairman chosen by the other two members of the Board.

7.3 Within five (5) working days of the request by either party for a Board, each party shall notify the other in writing of the name of its appointee.

7.4 Should the person chosen by the Employer to act on the Board and the person chosen by the Union fail to agree on a third member as chairman within five (5) days of the notification mentioned above, the Minister of Labour of the Province of Ontario will be asked to appoint a chairman.

7.5 The decision of the Board of Arbitration or a majority of such Board constituted in the above manner shall be binding on the parties of this agreement.

7.6 The Board of Arbitration shall not have any power to alter or change any of the provisions of this agreement or to substitute any provisions for any existing provisions, nor to give any decision inconsistent with the terms and provisions of this Agreement.

7.7 Each of the parties of this Agreement will bear the expenses of the Arbitrator appointed by it and the parties will jointly bear the expenses of the Chairman.

ARTICLE 8.1 - NO STRIKES, NO LOCKOUT

8.1 In view of the grievance and arbitration procedures provided in this agreement, it is agreed by the Union that there shall be no strike, picketing, slowdown or stoppage of work, either complete or partial and the Employer agrees that during the terms of this agreement, there shall be no lockout.

ARTICLE 9 - UNION REPRESENTATION

9.1 The Union Representative shall, in the course of his duty, have access to work, where possible, on which members of the Union are employed and the Employer shall assist the Union Representative to obtain passes to the premises where necessary. The Union Representative shall make his presence known to the Employers senior representative or his delegate. In no instances, however, shall he interfere with the progress of work.

9.2 It is agreed that the Union may appoint one employee per shift, per company project as Steward.

9.3 Whenever possible, considering the nature of the work to be performed, Steward shall be one of the last two employees covered under terms of this agreement to remain, providing he is qualified, competent and capable of performing the remaining work.

9.4 The Steward or Stewards, where possible, will be responsible for reporting any complaints or grievances to the Employers and to the Union so that these may be dealt within the proper manner and without undue delay.

9.5 The Employer agrees that one employee shall be selected by the Union to serve as the Employees safety representative on each of the Employers projects when there are five (5) or more employees on the project.

9.6 SPECIAL INFORMATION FOR THE EMPLOYERS: In order to comply with the Construction Safety Act the Employers shall notify those Unions who have members on the site that the numbers of employees is five (5) or more and that a Safety Representative should be selected.

ARTICLE 10 - JURISDICTIONAL DISPUTES

10.1 The Employer and the Union agree that there shall be no work stoppage resulting from jurisdictional disputes. In the case of a jurisdictional dispute the Employer agrees to assign work in accordance with the decision of the Labour Relations Board of Ontario

ARTICLE 11 - SAFETY SANITATION AND SHELTERS

11.1 In co-operation within the Employer's overall program of accident control or prevention, the Steward or any employees shall report to the foreman for immediate investigation of an alleged unsafe condition, unsafe acts or violations of safety regulations for correction if required.

11.2 Employees shall be provided with adequate protection from falling material and other hazards on the job, in accordance with the appropriate Safety Acts. Adequately heated enclosures or cabs for men operating equipment shall be provided where as reasonably required.

11.3 Every employee shall, as a condition of employment, be required to wear an approved safety helmet a safety vest. The Employer agrees that such helmets may be purchased from him at cost. When the Employer makes mandatory the wearing of a specific helmet it will be released on a charge-out basis.

11.4 Every employee shall wear suitable protective footwear. Other personal protective equipment required under abnormal conditions or during inclement weather will be supplied by the Employer.

11.5 The Employer agrees to supply the necessary drinking water and proper sanitary facilities including flush toilets which shall be maintained in a clean and sanitary condition by the employees and the Employer as required under the occupational health and safety regulations.

11.6 Suitable adequately heated shelters for men to eat their lunch shall be provided by the Employer, with table and seating space, which shall be maintained in a clean and sanitary condition by the employees and Employer separate from any work area.

11.7 The Employer agrees to replace or insure any or all tools brought on the job at his request for the purpose of maintenance and repair of equipment , if an inventory of the tools is given to the Employer, on employment, by the employee; all deletions and additions will be recorded as they occur.

11.8 Operators of hoisting equipment shall disregard signals from anyone except Competent signalmen who shall be supplied by the Employer when required.

11.9 If an employee is injured and receives medical attention by a qualified physician, he will receive his regular wages and other benefits for the full day If in the opinion of the physician he is unable to return to work or if instructed by his foreman or superintendent, if another employee is required to leave the job site with the injured employee to assist him in getting medical attention, he too shall be paid his regular wages and other benefits. The Union office and the Employer shall be notified immediately of an accident to an employee.

11.10 Due to the safety factor involved, no employee shall work alone on any project where there is any possibility of accident and injury.

11.11 A safety Committee is to be established in accordance with the Occupational Health and Safety Act and Regulations for Construction Projects.

ARTICLE 12 - PAYMENT OF WAGES AND LAY OFF

12.1 (a) Wages shall be paid in cash or (direct deposit) or cheque at the option of the Employer and no later than Thursday of each week during the working hours. Employees will be paid every week as mutually agreed to, by the Employer and the Union.

(b) Accompanying each payment of wages shall be a statement identifying both the Employer and the Employee showing total hours marked "regular" & "overtime", the total earnings, the rate of pay, the amount of each deduction, the purpose thereof, the net earnings, and the amount of vacation pay as required by the Employment Standards Act.

12.2 If any one or more of the above requirements or parts thereof bf this Article are violated, it shall be the privilege of the Union to immediately withdraw the right of the offending Employer's privilege to pay by cheque.

12.3 In the case of lay off, all employees shall be paid up to the date on the job site where practical; otherwise cheques and EI record of employment certificate shall be forwarded by registered mail to his last known address within the next pay period of the lay off. Notification to, or attempted notification of lay-off, to an employee on a Saturday, Sunday or Holiday shall not be considered proper notice unless the employee is working on such days. When laid off, employees shall be allowed sufficient time to clear up their personal and company properly on the job site. When employees who are laid off are not paid up to date on the job site and should the Employer fail to send such wages and or employment records as stated above, the Employer shall pay eight (8) hours pay at the regular hourly rate for each additional regular working day the employee is required to wait for his pay and records after giving such notice to the employee, and giving him eight (8) hours to correct such default.

12.4 In the event of a reduction of the working force, the member employer shall first lay off all probationary employees who have not become members of the Union; secondly to apply the principle of "last- one on....first-one-off" insofar as it is consistent to an efficient work force.

12.5 One (1) hour notice with pay shall be given by the Employer when an employee is temporarily laid off or discharged and the employee shall work such hour, in lieu of such notification the employee shall receive one (1) additional hours pay.

ARTICLE 13 - HOURS OF WORK AND OVERTIME

May 1, 2000 – April 30, 2001

13.1 (a) Sewers - Fifty (50) hours per week between the hours of 7:00 am and 7:00 pm Monday through Friday, and 7:00 am to 1:00 pm on Saturday with a maximum five (5) hours on Saturday.

Roads - Fifty-five (55) hours per week between the hours of 7:00 am and 7:00 pm Monday through Friday. Saturday 7:00 am to 1:00 pm with a maximum five (5) hours on Saturday.

General Excavating - Fifty (50) hours per week between the hours of 7:00 am and 1:00 pm Monday through Friday. Saturday 7:00 am to 1:00 pm with a maximum five (5) hours on Saturday.

Landscaping/Tug Boat Operations - Fifty-five (55) hours per week between the hours of 7:00 am and 7:00 pm Monday through Friday. Saturday 7:00 am to 1:00 pm with a maximum five (5) hours on Saturday.

Landfilling Operations - Fifty-five (55) hours week between the hours of 7:00 am to 7:00 pm Monday through Friday. Saturday 7:00 am to 1:00 pm with a maximum five (5) hours at straight time (Rates to be negotiated at a later date).

Residential Operations - Fifty-five (55) hours per week between the hours of 7:00 am and 7:00 pm Monday through Friday and 7:00 am to 1:00 pm on Saturday with a maximum of five hours (5) hours on Saturday. Residential work at 85% of the rate, 100% of the Benefits. This section does not cover any work normally performed by other Agreements with Local 793 and the Employer. If the operator works less than ten (10) hours at this rate, he will be paid the full rate. All current operators will be red circled and shall continue to be paid as per the H.C.A. including all increases.

13.1 (b) All work performed in excess of the daily (Monday through Friday 7:00 am and 7:00 pm or Saturday 7:OO am and 1:OO pm) hours hall be paid at the rate of time and one half (1.5).

May 1, 2001 – April 30, 2003

13.1 (c) Sewers - Fifty (50) hours per week between the hours of 7:00 am 7:00 pm Monday through Friday.

Roads - Fifty-five (55) hours per week between the hours of 7:00 am and 7:00 pm Monday through Friday.

General Excavating - Fifty (50) hours per week between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday.

Landscaping/Tug Boat Operations - Fifty-five (55) hours per week between the hours of 7:00 am and 7:00 pm Monday through Friday.

Landfilling Operations - Fifty-five hours per week between the hours of 7:00 am and 7:00 pm Monday through Friday. (Rates to be negotiated at a later date.)

Residential Operations - Fifty-five (55) hours per week between the hours of 7:00 am and 7:00 pm Monday through Friday . Residential work at 85% of the rate, 100% of the benefits. This section does not cover any work normally performed by other Agreements with Local 793 and the Employer. If the operator works less than ten (10) hours at this rate, he will be paid the full rate. All current operators will be red circled and shall continue to be paid as per the H.C.A. including all increases.

13.1 (d) All hours performed in excess of the daily (Monday through Friday 7:00 am and 7:00 pm hours shall be paid at the rate of time and one half (1. 5) .

13.1 (e) If during the week , eight (8) or more hours are lost due to inclement weather , one (1) eight hour shift may be made up on Saturday at straight rate of pay.

13.1 (f) Where the above hours are exceeded by reason of an emergency out of control of the Employer these excess hours shall be paid at straight time.

13.2 Overtime at the rate of double time shall be paid to all employees, except watchmen, for all work performed on Sundays and the following holidays. Should any of these Holidays occur on a Saturday or Sunday, such Holiday shall be observed on the Monday and / or Tuesday following unless changed by mutual agreement between the Employer and the Union.

New Year's Day	Good Friday	Victoria Day
Dominion Day	Civic Holiday	Labour Day
Thanksgiving Day	Christmas Day	Boxing Day

ARTICLE 14 - SHIFT WORK AND REPORTING TIME

14.1 The member employer reserves the right to institute shift work subject to Article 14.1.

DAY SHIFT - Five (5) consecutive shifts at regular day shift rate
2nd SHIFT - Five (5) consecutive shifts at forty (.40) cents per hour premium
3rd SHIFT - Five (5) consecutive shifts at fifty (.50) cents per hour premium above regular day shift rate

The Employer will meet with the Union prior to shift work being implemented on any job site.

14.2 (a) Any employee who reports as usual on any day Monday through Friday for work under this provision, unless directed not to report the previous day by his Employer shall receive a minimum of one (1) hours pay and shall remain at other work of his craft if requested by the foreman. Two Hours shall be paid to employees who must travel in excess of Sixty (60) road kilometres to the job site.

(b) If climatic conditions indicate the possibility that work could not commence the employee shall contact the Employer or the Employer Representative for such direction prior to reporting for work.

(c) Work break is to be ten (10) minutes duration midway in each half shift or as designated by management. Wherever possible this work break must be taken at the work station. Abuse of such privilege will result in such disciplinary action against offenders.

(d) In the event that any employee is called back for work of an emergency after completion of his regular shift, he shall be guaranteed a minimum of two (2) hours pay at the applicable rate.

ARTICLE 15 - TRAVEL TIME AND LIVING ALLOWANCE

15.1 There shall be a free zone extending to a twenty five (25) kilometre radius from Walker Road and Highway 401. To any employees supplying their own transportation any distance travelled in excess of the twenty five (25) kilometre zone, the Employer shall pay them at the rate of Thirty-Three (33) cents per kilometre both ways. The travel time for the County of Kent is to be the same as for Essex County but computed from Chatham City Hall with a free zone of twenty five (25) kilometres in radius.

15.2 Where an employee is required to work beyond one hundred and sixty (160) road kilometres from point of hire or dispatch, the Employer shall pay full expenses suitable and reasonable room and board based on a per day worked. Where the job is in excess of four hundred (400) road kilometres from point of hire or dispatch the Employer shall pay full expenses for suitable and reasonable room and board per calendar day.

15.3 Where transportation is supplied by the Employer the Employee shall receive travel time one way at straight time rate when he is requested to travel outside the County of Essex.

15.4 Where an employee is required to wait in excess of one half (1/2) hour for employer supplied transportation to leave the job at the completion of his work day, for any reason within the control of the Employer, he shall be paid any time in excess of the half (1/2) hour at straight time rates.

ARTICLE 16 - STUDENTS

16.1 Students may be hired at the ratio of one (1) to seven (7) regular members of the Union; pay union dues and no benefits and receive wages at the rate of fifty (50%) percent of their classification with the consent of the Union. A students term shall not exceed four (4) months in any twelve (12) consecutive months.

ARTICLE 17 - SHOP CLAUSE

17.1 If any Employer has no productive contract work as an alternative to laying off employees he may retain one or more of them to perform work of a non productive nature. However, anything less than one (1) day shall be paid at regular rates of pay, anything in excess of one (1) day shall be at seventy five (75%) percent of the regular rate of pay and one hundred (100%) percent fringe benefits.

ARTICLE 18 - PRE-JOB CONFERENCE

18.1 On projects valued in excess of $250,000.00 the Employer where requested by the Union will hold a pre-job conference and inform the Union signatory to this agreement of the proposed list of subcontractors if he proposes to subcontract any portion of the job.

ARTICLE 19 - DELINQUENCY CONTROL

19.1 In the event an Employer fails to remit any contributions, deductions or remittances for the Benefit Plan, the Pension Plan, dues, fees, assessments for Training Fund and Industry by the fifteenth (15th) of the month due, pursuant to the "Union Security Clause," the Employer shall pay to the appropriate fund as liquidated damages and not as a penalty, an amount equal to two (2%) percent per month, deductions or remittances fifteen (15) days in arrears calculated from the date due provided the Employer has received five (5) days prior, written notice to correct such delinquency and has not done so.

19.2 With reasonable cause, the Trustees may request an Employer to submit to them within a stipulated period a certified audited statement of payroll contributions to these funds for a period not to exceed the period from the effective date of this Agreement until the audit takes place. Such statements shall reply to the questions submitted to the Employer by the Trustees.

19.3 If the Employer does not submit the certified audited statement as per the above paragraph, the Trustees may appoint an Independent Chartered Accountant to enter upon the Employer's premises during regular business hours to perform an audit of the Employers contributions or deductions to the required Benefit Plan. Where the Trustees appoint an auditor, the cost shall be borne by the appropriate Plan.

19.4 In the event such audit reveals that the Employer has failed to remit contributions in accordance with the provisions of this Agreement, the Employer shall within five (5) days of receipt of written notice from the Trustees, remit all outstanding contributions together with any liquidated damages required under the terms of this provisions and completed supporting contribution report forms as required by the Plan.

19.5 Where the Union has taken prior proceedings and obtained a decision against an Employer for delinquent contributions, deductions or remittances, the Union may require the said Employer to post a cash bond or certified cheque not to exceed Ten Thousand Dollars ($10,000.00) to be held in trust by the Trustees. In the event that the said Employer again becomes delinquent for contributions, deductions or remittances, the Union and/or the Trustees may apply the cash bond or certified cheque, or any portion thereof to satisfy the delinquency and require the Employer to replenish the cash bond or certified cheque in a higher amount. In the event the cash bond or certified cheque does not satisfy the full amount of the delinquency, the Union may take other proceedings to recover the balance.

19.6 If the Employer does not have any employees in it's employ, the Employer shall remit one initial nil report outlining all pertinent information.

19.7 If the Ontario Labour Relations Board or Board of Arbitration to which grievance alleging failure to make appropriate payments to a Trust Fund or an administrator as required by this Agreement is litigated and the Board determines that an Employer has violated the Agreement, then the Ontario Labour Relations Board of Arbitration shall also require the Employer to pay all reasonable costs incurred by the Union in prosecuting the grievance including but not limited to, all legal costs on a solicitor-and client basis, travel, meal and accommodation cost of all witness(es) and business representative (such as) conduct money, cost incurred in serving a summons, any expenses incurred by the Union pursuant to Section 126 (4) of the Labour Relations Act or otherwise, for the Board of Arbitration.

CLASSIFICATION AND WAGE RATES FOR MEMBERS OF LOCAL 793

The rate of hourly wages shall be set forth for all employees of the member employers engaged in the operating, repairing, maintaining, oiling or greasing on all power driven, power generating construction equipment coming within jurisdiction of the International Union of Operating Engineers as recognition by the Ontario Labour Relations Board.

WAGE SCHEDULE FOR ESSEX COUNTY

This Agreement shall in no way be construed to effect a reduction of wages or existing privileges of the employees covered by this Agreement where he Union has received voluntary recognition or certification of a new contractor.

A-1-A - Licensed operators operating all friction and brake hoisting plants with all attachments, all barge mounts.

	Wages	Vacation Pay	Training Fund	Pension Fund	Benefit Fund	Total Pkg.
May 1st, 2000	$25.44	$2.29	$0.19	$3.62	$1.99	$33.53
May 1st, 2001	$26.05	$2.34	$0.19	$3.82	$2.13	$34.53
May 1st, 2002	$26.62	$2.39	$0.19	$4.02	$2.31	$35.53
May 1st, 2003	$27.22	$2.44	$0.19	$4.22	$2.46	$36.53

A-1 Operators of all Hydraulic Cranes, Clams, Shovels, 360 degree rotation hydraulic excavators 1/2 yard and greater, gradalls, mobile truck cranes and licensed tug boat operators, fine grade operators subject to employer designation.

	Wages	Vacation Pay	Training Fund	Pension Fund	Benefit Fund	Total Pkg.
May 1st, 2000	$24.98	$2.25	$0.19	$3.62	$1.99	$33.03
May 1st, 2001	$25.59	$2.30	$0.19	$3.82	$2.13	$34.03
May 1st, 2002	$26.16	$2.35	$0.19	$4.02	$2.31	$35.03
May 1st, 2003	$26.76	$2.40	$0.19	$4.22	$2.46	$36.03

A-2 Operators of all dozers, scrapers, front end loaders and all similar equipment, 360 degree rotation backhoes less than 1/2 yard but greater than 1/4 yard, engineers operating batching plants, asphalt plants, asphalt and concrete spreaders, paver operators, steam heating plants, operators of drilling and boaring machines, directional drills (except handheld), industrial tractors with excavating attachments, trenching machines, air tuggers, locomotive operators for tunnel work, heavy duty mechanics on job sites, power operated compactor with blade, paving and milling machine operators, unlicensed tugboat operators, curb machines.

	Wages	Vacation Pay	Training Fund	Pension Fund	Benefit Fund	Total Pkg.
May 1st, 2000	$24.39	$2.20	$0.19	$3.62	$1.99	$32.39
May 1st, 2001	$25.00	$2.25	$0.19	$3.82	$2.13	$33.39
May 1st, 2002	$25.57	$2.30	$0.19	$4.02	$2.31	$34.39
May 1st, 2003	$26.17	$2.35	$0.19	$4.22	$2.46	$35.39

A-3 Engineers operating portable compressors of over 210 CFM, or two or more 100 CFM, pumpcrete pumps, well point systems, gas, diesel or steam driven portable generators, concrete mixers, one (1) yard capacity or more, 6" pumps and over, asphalt rollers, heavy duty mechanics at shop, blacksmith welders and boom trucks.

	Wages	Vacation Pay	Training Fund	Pension Fund	Benefit Fund	Total Pkg.
May 1st, 2000	$24.12	$2.17	$0.19	$3.62	$1.99	$32.09
May 1st, 2001	$24.73	$2.22	$0.19	$3.82	$2.13	$33.09
May 1st, 2002	$25.30	$2.27	$0.19	$4.02	$2.31	$34.09
May 1st, 2003	$25.90	$2.32	$0.19	$4.22	$2.46	$35.09

A-4 Firemen for steam equipment, truck crane drivers, kubota, bobcat, skid steer type loaders, off/road unlicensed trucks, A-frames, concrete mixers under one yard, pumps under "6",trenching machines under "6", loaders less than 65 horse powers and greater than 40 horse power. Steel drum roller, sheepsfoot compactor.

	Wages	Vacation Pay	Training Fund	Pension Fund	Benefit Fund	Total Pkg.
May 1st, 2000	$22.41	$2.02	$0.19	$3.62	$1.99	$30.23
May 1st, 2001	$23.02	$2.07	$0.19	$3.82	$2.13	$31.23
May 1st, 2002	$23.59	$2.12	$0.19	$4.02	$2.31	$32.23
May 1st, 2003	$24.19	$2.17	$0.19	$4.22	$2.46	$33.23

CLASSIFICATION AND WAGE RATES FOR ENGINEERS
MEMBERS OF LOCAL 793

WAGE SCHEDULE FOR KENT COUNTY

A-1 Operators of all Hydraulic Cranes, Clams, Shovels, 360 degree rotation hydraulic excavators 1/2 yard and greater, gradalls, mobile truck cranes and licensed tug boat operators, fine grader operators subject to employer designation.

	Wages	Vacation Pay	Training Fund	Pension Fund	Benefit Fund	Total Pkg.
May 1st, 2000	$22.05	$1.98	$0.19	$3.62	$1.99	$29.83
May 1st, 2001	$22.66	$2.03	$0.19	$3.82	$2.13	$30.83
May 1st, 2002	$23.23	$2.08	$0.19	$4.02	$2.31	$31.83
May 1st, 2003	$23.83	$2.13	$0.19	$4.22	$2.46	$32.83

A-2 - Operators of all dozers, scrapers, front end loaders and all similar equipment, 360 degree rotation hydraulic excavators less than 1/2 yard but greater than 1/4 yard, engineers operating batching plants, asphalt and concrete spreaders, paver operators, steam heating plants, operators of drilling and boaring machines, directional drills (except hand held), industrial tractors with excavating attachments, trenching machines, air tuggers,locomotive operators for tunnel work, heavy duty mechanics on job sites, power operated compactor with blade, paving and milling machine operators, unlicensed tugboat operators, curb machines.

	Wages	Vacation Pay	Training Fund	Pension Fund	Benefit Fund	Total Pkg.
May 1st, 2000	$21.77	$1.96	$0.19	$3.62	$1.99	$29.53
May 1st, 2001	$22.38	$2.01	$0.19	$3.82	$2.13	$30.53
May 1st, 2002	$22.96	$2.05	$0.19	$4.02	$2.31	$31.53
May 1st, 2003	$23.53	$2.13	$0.19	$4.22	$2.46	$32.53

A-3 - Engineers operating portable compressors of over 210 CFM, or two or more 100 CFM, pumpcrete pumps, well point systems, gas, diesel or steam driven portable generators, concrete mixers, one (1) yard capacity or more, 6" pumps and over, asphalt rollers, heavy duty mechanics at shop, blacksmiths, welders and boom trucks.

	Wages	Vacation Pay	Training Fund	Pension Fund	Benefit Fund	Total Pkg.
May 1st, 2000	$21.53	$1.94	$0.19	$3.62	$1.99	$29.27
May 1st, 2001	$22.14	$1.99	$0 19	$3.82	$2.13	$30.27
May 1st, 2002	$22.71	$2.04	$0.19	$4.02	$2.31	$31.27
May 1st, 2003	$23.31	$2.09	$0.19	$4.22	$2.46	$32.27

A-4 - Firemen for steam equipment, truck crane drivers, kubota, bobcat, skid steer type loaders, off/road unlicensed trucks, A- Frames, concrete mixers under one yard, pumps under 6", trenching machines under 6", loaders less than 65 horse power and greater than 40 horse power. Steeldrum roller, sheepsfoot compactor.

	Wages	Vacation Pay	Training Fund	Pension Fund	Benefit Fund	Total Pkg.
May 1ST, 2000	$20.87	$1.88	$0.19	$3.62	$1.99	$28.55
May 1ST, 2001	$21.48	$1.93	$0.19	$3.82	$2.13	$29.55
May 1ST, 2002	$22.05	$1.98	$0.19	$4.02	$2.31	$30.55
May 1ST, 2003	$22.65	$2.03	$0.19	$4.22	$2.46	$31.55

1. CONTRIBUTION INFORMATION

Each Employer shall remit Employer Contributions in respect of benefit, pension, training and labour relations trust funds in accordance with the Collective Agreement by the Fifteenth day of the month following the month in which the hours have been worked, together with all supporting information, inclusive of social insurance numbers, hours worked, initiation fees and hourly working dues on a reporting form as designated.

2. VACATION PAY

Shall be at the rate of nine percent (9%) to include four percent (4%) for vacation pay, five percent (5%) in lieu of statuary holidays and to be paid to each employee, weekly.

3. WELFARE BENEFITS AND PENSION

The amount of monies to be paid into the Benefit Plan by each employer shall be effective May 1st, 2000, One dollar and ninety-nine cents ($1.99) plus P.S.T. for each hour worked by each employee in its employ.

Effective May 1st, 2001 this amount shall be increased to Two Dollars and Thirteen cents ($2.13) plus P.S.T. per hour worked by each employee in its employ.

Effective May 1st, 2002 this amount shall be increased to Two Dollars and Thirty-One cents ($2.31) plus P.S.T. per hour worked by each employee in its employ.

Effective May 1st, 2003 this amount shall be increased to Two Dollars and Forty-Six cents ($2.46) plus P.S.T. per hour worked by each employee in its employ.

The amount of monies to be paid into the Pension Plan by each employer shall be, effective May 1st, 2000 Three Dollars and Sixty Two cent ($3.62) for each hour worked By each employee in its employ.

Effective May 1st, 2001, this amount shall be increased to Three Dollars and Eighty-Two cents ($3.82) for each hour worked by each employee in its employ.

Effective May 1st, 2002 this amount shall be increased to Four Dollars and Two cents ($4.02) for each hour worked by each employee in its employ.

Effective May 1st, 2003 this amount shall be increased to Four Dollars and Twenty Two cents ($4.22) for each hour worked by each employee in its employ.

In all cases these contributions shall be remitted for all hours worked by each Employee covered by this Agreement, and shall not be paid directly to the employee in any event.

4. TRAINING FUND

The Union and the Employer agree to maintain and recognize the I.U.O.E. Local 793 Training Fund (Training Fund). The Training Fund shall be jointly trusted by an equal number of Trustees appointed by employer organizations and the Union.

Apprentices shall be indentured to the Training Fund or an Employer and the Training Fund shall have full authority over the training, education and movement of all Apprentices and the Union shall accept as members of the Union all apprentices who are approved by the Training Fund and indentured to the Training Fund or an Employer.

The Training Fund shall be responsible for the training education and upgrading of all apprentice and Operating Engineers.

Each Employer shall contribute Nineteen Cents (.19) per hour worked effective May 1st, 2000 to the Training Fund for each hour worked by each employee in his employ, to be submitted with the Pension and Welfare Fund Training Fund for the purpose of developing and implementing programs established by the Training Fund.

Craining Apprentices

(a) Indentured apprentices shall be paid in accordance with the following schedule:
1st ...2,000 hours - 50% of Licensed Journeyman Base Rate
2nd...2,000 hours - 65% of Licensed Journeyman Base Rate
3rd....2,000 hours - 80% of Licensed Journeyman Base Rate

The length of term and qualifications required to progress the next term shall be determined by the Training Fund.

(b) All Apprentices must register at the appropriate Union District office in their area and also on the master list at the Training Centre.

(c) Employers shall request apprentices through the Union District Offices who, in turn, will notify the Training School at 30 Commercial Road, Toronto. All dispatching of Apprentices shall be done from the appropriate Union District Office under the direction of the Training Fund.

(d) Present Oiler-Drivers will remain and as additional personnel are required required indentured apprentices will be dispatched to Employers in accordance with item (c) above.

(e) Employers will make every effort to keep Apprentices on a steady basis in order to complete their Apprenticeship hours and all related training as specified in the Training standards of the Training Fund.

(f) Each Apprentice will, as a condition of employment be required to complete apprenticeship hours and all related training as specified in the Training Standards of the Training Fund.

(g) An Apprentice who:
(1) completes his hours of on-the-job training
(2) completes all related training
(3) successfully obtains his certificate of Qualification from the Ministry of Colleges and Universities will no longer be classified as an Apprentice and will then become a Junior Hoisting Engineer with the Employer under all the terms and conditions of the applicable schedule.

(h) All Apprentices must abide by the Rules and Regulations as spelled out in the Training Standards of the Training Fund .

Journeyman Trainee - Upgrade

Where a Journeyman wishes to upgrade himself to another machine or machines, and schooling is either not available or the employee does not wish to go to school, 1500 recorded log book hours of training are required and the employee shall be paid at the rate of 10% less than the rate for which the machine is classified.

Where a Journeyman wishes to upgrade himself to another machine or machines, and he does complete the training school for that machine or machines, 1200 recorded log book hours of training are required and the employee shall be paid at a rate of 5% less than the rate for which the machine is classified, subject to the Agreement between the Company and the Union.

In both cases the recorded hours are cumulated and will carry forward to other Employers if the employee moves.

Earthmoving Apprentices

(a) A new Apprentice entering the industry who has taken pre-employment training at the Training Institute will work for his first 1,000 hours at Fifty (50%) of the current base rate for the machine which he is operating.

(b) When an Apprentice has completed his first 1,000 hours plus all the related training provided for in the Training Standards of the Training Fund and after written assessment by the Employer and the Training Fund, each Trainee will be employed for the next 1,000 hours a Sixty (60%) of the current base rate for his classification.

(c) When an Apprentice has completed 2,000 hours plus all of the related training provided for in the Training Standards of the Training Fund , and after written assessments by the Employer and the Training Fund, each Apprentice will be employed for the next 1,000 hours at Seventy Five (75%) of the current rate for his classification.

(d) After completion of the 3,000 hours of on-the-job training and all related training as from time to time specified by the Training Fund the Apprentice will then fit into the work force at the rate provided in the Collective Agreement.

(e) Employers shall request Apprentices through the Union District Officers who, in turn will notify the Training Fund at P.O. Box 636, Morrisburg, Ontario KOC IXO. All dispatching of Apprentices shall be done from the appropriate Union District Office under the direction of the Training Fund.

RATIO OF APPRENTICES

The ratio of Apprentices employed by an Employer shall not be more than one (1) Apprentice up to five (5) Journeymen Operating Engineers or as authorized by the Union.

RECALL OF APPRENTICES

Apprentices laid off due to lack of work may be recalled by their respective Employer, through the Union District Office, at any time during a one year period provided the Apprentice was employed by the Employer for more than 90 working days and is available for work.

LOG BOOKS

Each Apprentice will be required to keep a daily work record with each Employer and a copy will be supplied to the Training Institute every 30 days. Failure to do so may result in disciplinary action by the Training Fund.

WORKING DUES

The Employer agrees to deduct from each employee in the bargaining unit, working dues at the rate of 2% on the straight time hourly rate for each hour worked by each employee.

EMPLOYER LABOUR RELATIONS FUND

Every Employer signatory to this Agreement shall pay to an Employer Labour Relations Fund, Five (5) cents per man worked plus all applicable taxes for all employees covered by this Agreement.

All the above contributions and deductions shall be submitted along with the information required on the proper forms to I.U.O.E. Local 793, Benefit Trust, Canadian Imperial Bank of Commerce, 180 Laird Drive, Toronto, Ontario M4G 3V7 by the fifteenth (15th) day of the month following the month for which the deductions were made.

The regular dues, fees and assessments so deducted shall be remitted on or before the fifteenth (15th) day of the month following the month in which such deductions were made.

AIR PRESSURE PREMIUMS FOR BOTH ESSEX AND KENT COUNTIES

Air Pressure premiums shall be as follows:
Above atmospheric:

But not more than	14 lbs.	$ 2.00	7.5	hours
over 14 not exceeding	20 lbs.	$ 4.00	6	hours
over 20 not exceeding	26 lbs.	$ 6.00	4	hours
over 26 not exceeding	32 lbs.	$ 8.00	2.75	hours
over 32 not exceeding	38 lbs.	$10.00	2	hours
over 38 not exceeding	44 lbs.	$12.00	1.5	hours
over 44 not exceeding	50 lbs.	$14.00	1	hour

If a tunnel bonus is to be instituted, the crane and compressor operator shall be guaranteed eight (8) hours pay with lunch period and in any event the Engineers Local 793 shall be consulted.

Equipment operators and/or crews shall not be replaced by working foremen, mechanics or those above the rank of working Foremen with purpose of overtime or reductions in crews unless voluntarily declined such work, in which case other regular operators or crews shall be given the first opportunity for such work, for production. In the event of a reduction in crews the company will apply the system as set out in the lay-off clause of this schedule.

CRAFT JURISDICTION

Mobile truck cranes, milling machine operators and pavers, Licensed tug boat operators, tug boat operators ,bargemen, skip hoist, skyway and climbing type cranes, locomotive cranes, derricks, A-Frame and boom trucks, pitman and the like, bullmoose and Austin Western type cranes, air tuggers, power hoists, all clams , shovels, backhoes, draglines, piledrivers, emcos, gradalls, mine hoists, chimney hoists, kubota-bobcat type excavators less than 65 horse power, kubota/bobcat type skid steer loader (all the attachments) less than 65 horse power, power operated sheeps foot compactors, overhead hoists and cranes, sidebooms, booms of all type mounted on tractors, trenching machines, self propelled drills, graders, scrapers, bulldozers, front-end loaders and similar types of equipment, rail engineers, dinky and the like, welding machines driven by internal combustion engines, mechanics, welders, serviceman on this type of equipment. Batching plants of all types , air compressors, temporary heating plants, well point systems, gas steam or diesel drive generators, and pumps of all kinds. Concrete pumps, mixers, mobiles, overhead loaders, asphalt spreaders, pneumatic propelled drills, compaction equipment, forklifts and ross carrier. Mucking machines, farm and industrial tractors with attachments. Oiler, truck crane drivers, mobile street sweepers, caisson boring machines,

asphalt rollers, firemen, tunnel boring machines. Dredges(suction and dipper) conveyors, regardless of motor power. Heating units such as Herman Nelson and Dravo, Rotary drills, tunnel motors, elevators of all types used in construction, temporary or permanent. Power driven jumbo from setters. Self-propelled tar pipelining machines, towblades, highline cableways. Deck engine, loaders, crushing plants, elevating pneumatic concrete placing machines, elevating grader. Highline cableway signal men, lift slab machine, motor patrols, pipebending machines, power screed, helicopter winch operators, survey crews (including Party Chief and those listed below the rank of Chief, truck drivers on/off road, haul maintenance. Serviceman helpers. All types of earth boaring equipment including directional drills, landscapers, traffic control, parts running warehouseman, scalemen, timekeepers and all other classifications of equipment as listed in the Union's Constitution.

No equipment shall be operated on a site by demonstrators without the Union being notified as a qualified Union Operator being present and paid for hours of said demonstration when the demonstration is for production work of more than two (2) days duration.

Where repairs are performed in the field by the Employer this Agreement shall apply and the Operator and the Apprentices of the equipment under repair will assist with the services and such repair on the job site. In the event it is not possible to employ the operator and the apprentices productively on such repairs they may be utilized on other work within the jurisdiction of this Agreement but they shall not replace another operator or apprentice.

HOISTING ENGINEERS - TOOLS REQUIRED

Hoisting Engineers will require to have in their possession the following list of tools:

1 tool box with lock and key
2 chisels, cold
1 hammer, ball peen medium or heavy
1 hack saw frame, 10" or adjustable
1 pliers, combination
2 punchers, pin or taper

2 screwdrivers, flat blade, medium or large
1 wrench, adjustable, crescent type, 10" or 12"
1 wrench, open end, set up to 1"

HEAVY DUTY MECHANICS

1 tool box (size to conform to departments' requirements
1 chisel, cold flat, set of 3 or more - up to 3/4"
1 drill, twist, set up to 1/4" - by 64ths.
1 gauge, thickness set
1 gauge spark plug set
1 hack saw frame 10" or adjustable
1 hammer, soft face
3 hammers, ball peen - light, medium and heavy
1 jackknife
1 pliers, diagonal cutting, 6"
1 pliers, battery
2 pliers, needle nose
1 pliers, brake spring
1 punch, centre
1 punch, taper,set
1 rule, steel 6"
1 scraper, carbon
1 screwdriver, flat blade, offset
1 screwdriver, flat blade, set of 6 – up to 12"
1 screwdriver, Phillips, set of 4 or 1 detachable head
1 tube cutter and flailing tool
1 wrench adjustable, crescent type 6"
1 wrench adjustable, crescent type, 12"
1 wrench, box end, starter and manifold
1 wrench, vise grip, 10"
1 wrench, pipe, 14"
1 wrench, socket, set, master, up to and including ½" sq.drive approximately 70 pieces.
1 wrench, socket,set,spark plug, approximately 6 pieces
1 wrench, open end, set 5/16" to 1-1/2"
1 wrench,box end, set 3/8" to 1-1/4"
1 wrench, tappet set approximately 6 pieces
1 wrench Allen Head, set, approximately 8 pieces
1 wrench, ignition, set, approximately 8 pieces
1 pliers, waterpump
1 punch, pin set

SURVEYORS

For all direct hiring encompassed by the following classifications this schedule shall apply, including all the appropriate articles outlined in the master portion of this Agreement.

ARTICLE 1 – CLASSIFICATIONS

1.1 Instrument Man – three (3) years experience minimum, including lay-out.

1.2 Sr. Rodman – two (2) years experience minimum , including construction lay-out.

1.3 Jr. Rodman – one (1) year experience minimum of survey practice.

1.4 Party Chief shall supervise a maximum of nine (9) men and this Party Chief will receive a maximum of $1.25 per hour above the rate of Instrument Man.

Article 2 - SURVEYOR'S SCOPE OF WORK

2.1 To collect by measurement all facts required for determining the same boundaries of, position of, shape of, contouring of, the job site.

2.2 The establishing and recording of all site limits, base lines, reference lines and datum lines required for all the establishment of all foundations, vessel, equipment, machinery, pipeline, pipe racks, monuments, bench marks and tie locations.

2.3 To lay-out (set out) on horizontal and verticle planes, all excavations, underground and above ground services, cast-in-place concrete, walls line, grid lines, batter boards, shims, centre and offset lines plumbing operations by use of transit, transfer of grade and/or lines requiring the use of transfer of grade and/or lines requiring the use of transit, transfer of grade and/or lines requiring the use of Dumpy level, automatic levels, laser equipment, electronic measuring devises, Theodolite and sonic measuring tapes.

2.4 Pre-engineering required to substantiate any existing locations or elevations.

2.5 Cross sectioning required for the establishments of quantities.

2.6 To check lines and grades prior to concrete pours including anchor bolts, imbedded items and inverts, subject to the provision set under the Classification.

2.7 To supply information for as-built drawings when required by survey methods.

ARTICLE 3 - DUTIES AND RESPONSIBILITIES

The following duties and responsibilities related thereto shall apply to all phases of survey work which the Employer undertakes to perform.

Party Chief – Shall take directions from the Employers assigned representative (s), shall be responsible for all survey work performed by his party including but not limited to, the field lay-outs on a horizontal and verticle lane, the proper location of formwork and imbedded items prior to replacement of concrete, the supervision and direction of all members of his survey party.

Instrument Man – Shall be able to perform lay-out under direction from the Employer's representative (s) and/or Party Chief. He shall be able to set up, operate and make minor adjustments to surveying instruments, read plans and sketches and keep surveying records.
He shall be able to perform the duties of Rodman or Chainman.

Sr. Rodman – One who assists Instrument Man, is able to operate survey rod, chain and instruments accurately and efficiently, have some blueprint reading ability and knowledge of survey practice and methods of setting grades and lines.

Jr. Rodman – One who assistes Sr. Rodman and Instrument Man and has knowledge of standard survey practice and methods.

ARTICLE 4 SURVEYOR'S WAGE RATES

ESSEX COUNTY

	WAGE RATE	VAC. PAY	TRAINING FUND	PENSION FUND	BENEFIT FUND	TOTAL PKG.
INSTRUMENTMAN – 85 % OF A-1 WAGE SCHEDULE FOR ESSEX COUNTY						
May 1st, 2000	$21.23	$1.91	$ 0.19	$3.62	$1.99	$28.94
May 1st, 2001	$21.75	$1.96	$ 0.19	$3.82	$2.13	$29.85
May 1st, 2002	$22.24	$2.00	$ 0.19	$4.02	$2.31	$30.76
May 1st, 2003	$22.75	$2.05	$ 0.19	$4.22	$2.46	$31.67

SENIOR RODMAN - 85 % of A-2 Wage Schedule for Essex County

May 1st, 2000	$20.73	$1.87	$0.19	$3.62	$1.99	$28.4O
May 1st, 2001	$21.25	$1.91	$0.19	$3.82	$2.13	$29.30
May 1st, 2002	$21.73	$1.96	$0.19	$4.02	$2.31	$30.21
May 1st, 2003	$22.24	$2.00	$0.19	$4.22	$2.46	$31.11

JUNIOR RODMAN - 55% of A-1-A Wage Schedule for Essex County

May 1ST, 2000	$13.99	$1.26	$0.19	$3.62	$1.99	$21.05
May 1st, 2001	$14.33	$1.29	$0.19	$3.82	$2.13	$21.76
May 1st, 2002	$14.64	$1.32	$0.19	$4.02	$2.31	$22.48
May 1st, 2003	$14.97	$1.35	$0.19	$4.22	$2.46	$23.19

Payments for Statuary Holidays and Vacation Pay shall be paid weekly as shown in Master Portion of the Collective Agreement.

PARTYCHIEF

Instrumentman Rate - Plus $1.25

ARTICLE 6 - SURVEYORS WAGE RATES

KENT COUNTY

	WAGE RATE	VAC. PAY	TRAINING FUND	PENSION FUND	BENEFIT FUND	TOTAL PKG.
INSTRUMENT MAN - 85% of A – 2 Wage Schedule for Kent County						
May 1st, 2000	$18.74	$1.69	$0.19	$3.62	$1.99	$26.33
May1st, 2001	$19.26	$1.73	$0.19	$3.82	$2.13	$27.13
May 1st, 2002	$19.75	$1.78	$0.19	$4.02	$2.31	$28.05
May 1st, 2003	$20.26	$1.82	$0.19	$4.22	$2.46	$28.95
SR. RODMAN - 85% of A - 2 Wage Schedule for Kent County						
May 1st 2000	$18.50	$1.67	$0.19	$3.62	$1.99	$25.97
May1st, 2001	$19.02	$1.71	$0.19	$3.82	$2.13	$26.87
May 1st, 2002	$19.50	$1.76	$0.19	$4.02	$2.31	$27.78
May 1st, 2003	$20.00	$1.80	$0.19	$4.22	$2.46	$28.67

JR. RODMAN - 50% of A – 2 Wage Schedule for Kent County

May 1st, 2000	$11.03	$0.99	$0.19	$3.62	$1.99	$17.82
May 1st, 2001	$11.33	$1.02	$0.19	$3.82	$2.13	$18.49
May 1st, 2002	$11.62	$1.05	$0.19	$4.02	$2.31	$19.19
May 1st, 2003	$12.92	$1.07	$0.19	$4.22	$2.46	$19.86

PARTYCHIEF

Instrument Man Rate - Plus $1.25

ARTICLE 7 - WAGES, OVERTIME, REPORTING ALLOWANCE, TRAVEL AND BOARD ALLOWANCE AND EMPLOYER LABOUR RELATIONS FUND CONTRIBUTIONS.

7.1 Overtime, reporting allowance, travel and board allowance and Employer Labour Relations Fund contributions shall be paid as set out in local area Schedule.

7.2 It is understood and agreed that the terms and conditions of the Schedule apply only to employees performing Survey Work for whom the Union holds or acquires bargaining rights

ACCEPTANCE OF AGREEMENT

BETWEEN : THE HEAVY CONSTRUCTION ASSOCIATION OF WINDSOR
(hereinafter referred to as the " COMPANY")

- AND -

INTERNATIONAL UNION OF OPERATING ENGINEERS, LOCAL 793
(hereinafter referred to as the " Union ")

1. The undersigned Company has read and hereby approves and accepts the Agreement entered into between the Heavy Construction Association of Windsor, and the International Union of Operating Engineers, Local 793, a copy of which is attached.

2. The undersigned Company further agrees to be bound by any amendments or results of negotiations leading to said amendments between the Heavy Construction Association of Windsor, and the International Union of Operating Engineers, local 793.

IN WITNESS WHEREOF, we the undersigned Parties, hereby attach our hands and seals

this 9 day of May 2001

SIGNED ON BEHALF OF	SIGNED ON BEHALF OF
FOR THE COMPANY	FOR THE UNION
Jim Lyons	
	Richard P. Kerr
	Jim O'Neill
	Robert B. McKee

LETTER OF UNDERSTANDING
(#1)

BETWEEN: THE HEAVY CONSTRUCTION ASSOCIATION OF WINDSOR
(hereinafter called the Employer of the first part.)

- AND -

INTERNATIONAL UNION OF OPERATING ENGINEERS, LOCAL 793
(hereinafter called the Union of the second part)

The parties hereby agree that with respect to Article 3, Union Security, sub-section 3.7 Union may , if contacted prior to bid closing give permission to use non-union specialty contractors. If relief is given, it will be given to only member contractors who reques through the Heavy Construction Association of Windsor prior to bid closing.

This letter of Understanding shall be in effect from May 1st, 2000 to April 30th, 2004 unle either party shall furnish the other with notice of termination or proposed revision of letter of Understanding within ninety (90) days before the 31st. day of March 2004 or in a period of any year thereafter.

Signed this 9 of May, 2001

Windsor, Ontario.

For the Employer	For the Union
Jim Lyons	[signature]
	Richard P. Kerr
	[signature]
	Robert R. McDuen

LETTER OF UNDERSTANDING
(#2)

BETWEEN: THE HEAVY CONSTRUCTION ASSOCIATION OF WINDSOR
(hereinafter called the Employer of the first part)

- AND -

INTERNATIONAL UNION OF OPERATING ENGINEERS, LOCAL 793
(hereinafter called the Union of the second part)

The parties hereby agree that the Employers will be permitted to name hire one emplo per company per year who is laid off and or terminated and is registered with the Wind Union Office.

This letter of Understanding shall be in effect from May 1st. 2000 to April 30th, 2004 unl either party shall furnish the other with notice of termination or proposed revision of t Letter of Understanding within ninety (90) days before the 30th. day of April 2004 or in a period thereafter.

Signed this 9 day of May 2001

at Windsor, Ontario.

FOR THE EMPLOYER	FOR THE UNION
Jim Lyons	[signature]
	Richard P. Kerr
	Kory O'Neill
	Robert B. McDuen

LETTER OF UNDERSTANDING

Were a particular clause or article in the Agreement poses a hardship on either pa during the term of this Agreement the parties may meet to consider an amendme additional or deletion.

The H.C.A. will contact the Union a minimum of three (3) days prior to the date submission of the tender. The Union may agree to the proposed change in spe circumstances such as a non-union general contractors and bidders.

Any amendments will not be less than the terms contained in the H.C.A. Agreement all circumstances proposed changes will be made at the sole discretion of the Union.

For the Employer	For the Union
Jim Lyons	[illegible]
	Richard P. Kerr
	Gary O'Neill
	Robert B. McDuen

INTERNATIONAL UNION OF
OPERATING ENGINEERS' APPENDIX

The amendments contained in the Statement of Settlement, dated May 19, 2000, have been incorporated into the Operating Engineers' Appendix in accordance with the "Term of Agreement" article contained in the Master Portion of this Agreement.

EPSCA / OPERATING ENGINEERS' APPENDIX

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INTERNATIONAL UNION OF OPERATING ENGINEERS' APPENDIX

to the Collective Agreement

by and between

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION
(hereinafter called "EPSCA")

and the

POWER COUNCIL OF UNIONS
(hereinafter called the "Council")

As provided in the "Appendices" article of the Master Portion of the Collective Agreement, EPSCA and the Council have agreed to the following conditions to apply to employees in classifications covered by this Appendix, subject to the following:

> The "Wages", "Shift Differential Rate", "Benefits" and "Overtime Rates" articles of this Appendix and the "Hours of Work" article of the Master Portion of this Agreement do not apply for driveway and parking lot construction and landscaping. When such work is undertaken, the wages, weekly hours of work, shift differential, benefits and overtime rates appropriate for the class and character of work shall be as established by the nearest influencing representative agreements between Local 793 of the Union and builders' exchanges, contractors' associations or contractors.

Article 1

CLASSIFICATIONS

1.1 Classifications for the electrical power systems sector shall be as set forth in the wage schedules, attached hereto.

1.2 If classifications are required that are not shown in the wage schedules they will be negotiated, as required.

1.3 Where the crew size is five (5) or less, the foreman may work with the tools on mutual agreement of the Employer and the Union.

Article 1.4 is applicable only to work covered by Addendum I - Modified Provisions

1.4 Working Foreman
When the crew size is five (5) or less, including the foreman, the foreman may be required to work with the tools of the trade.

Article 2

WAGES

2.1 The base hourly rate(s) of pay for employees in the classifications covered by this Appendix shall be as set forth in the wage schedules, attached hereto.

2.2 Employers whose primary function is structural steel erection and/or mechanical installations shall employ an equipment foreman for every ten (10) members on site. Such equipment foreman shall receive the base hourly rate(s) of pay contained in the appropriate wage schedule of the Foreman's Appendix.

2.3 The classification of subforeman shall be published in the wage schedules of this Appendix and the base hourly rates(s) shall $1.00 per hour above the base hourly rate(s) of the highest classification supervised.

2.4 **REV** Effective May 1, 2000 and until April 30, 2004 EPSCA will amend the wage schedules for the classifications referred to in Article 1 of this Appendix as set forth in the wage schedules, attached hereto.

2.5 **REV** The rates of pay for employees in the classifications set forth in the MARINE and TUNNELLING wage schedules, attached hereto, shall be as set out in such schedules and shall remain in effect until April 30, 2004.

2.6 Effective May 1, 1985 the base hourly rate(s) of pay for employees in the firefighter classifications set forth in the wage schedules, attached hereto, shall be established as follows:

Pickering Project

Firefighter - 0 to 6 mos.	-	Group 2(A) base hourly rate(s) of pay less $5.37 per hour
Firefighter - After 6 mos.	-	Group 2(A) base hourly rate(s) of pay less $4.49 per hour

Darlington, Bruce and Atikokan Projects

Firefighter - 0 to 6 mos.	-	Group 2(A) base hourly rate(s) of pay less $5.37 per hour
Firefighter - 6 to 12 mos.	-	Group 2(A) base hourly rate(s) of pay less $4.65 per hour
Firefighter - After 12 mos.	-	Group 2(A) base hourly rate(s) of pay less $3.91 per hour

Lakeview, Lambton, Nanticoke, Wesleyville and Thunder Bay Projects

Firefighter - 0 to 6 mos.	-	Group 2(A) base hourly rate(s) of pay less $5.37 per hour
Firefighter - After 6 mos.	-	Group 2(A) base hourly rate(s) of pay less $4.65 per hour

The wage rate differentials for firefighters, as set out above, have been established by the parties with due recognition of the existence of a wage rate relationship between firefighters and other classifications represented by the Union. During subsequent bargaining sessions, EPSCA and the Union will endeavour to ensure that this wage rate relativity, as it existed on May 1, 1984, will continue to be reflected in Operating Engineers' wage schedules.

Article 3

HOURS OF WORK
MISCELLANEOUS PROVISIONS

3.1 All employees of Employers whose primary function is structural steel erection who report for work at the beginning of a shift shall be provided with eight (8) hours' work per day. All employees of Employers whose primary function is mechanical installation who report for work at the beginning of a shift shall be provided with eight (8) hours of work per day, Monday to Thursday, and six (6) hours of work on Friday.

3.2 When overtime work is required as an extension of normal daily hours, a minimum of one-half (1/2) hour's work will be provided.

3.3 The weekly hours of work for operating engineers on tunnelling shall be forty (40) made up of five (5) days of eight (8) hours each, Monday to Friday.

3.4 Firefighters at Darlington GS will work a regular shift of twelve (12) hours in length, all paid at the straight-time rate; they will work an average of thirty-eight (38) hours per week over the schedule period. Firefighters at Darlington will have two (2) shifts per day, seven (7) days per week:

Day Shift Hours: 6:00 a.m. to 6:00 p.m.

Night Shift Hours: 6:00 p.m. to 6:00 a.m.

Article 4

SHIFT DIFFERENTIAL RATE

4.1 Employees required to work shift work, other than the regular day shift, shall receive a shift differential rate of one-seventh (1/7) times the base hourly rate(s) for normal scheduled shift hours worked, except as noted in 4.2 and 4.4 below.

4.2 Employees required to work shift work on the third shift of a three-shift operation shall receive a shift differential of one-fifth (1/5) for normal scheduled shift hours worked.

4.3 Shift scheduling for shift workers on boilers and pumps, tunnelling work and firefighters for normal scheduled shift hours worked on the second and third shifts will commence on Monday.

4.4 The shift differentials for all regular shift hours on the night shift (6:00 p.m. to 6:00 a.m.) for firefighters and stationary engineers (2nd and 3rd class) at Darlington Generating Station shall be fixed dollar amounts, as set forth in the wage schedules, attached hereto.

Article 5

OVERTIME RATES

5.1 Overtime rates are paid for work performed outside of normal hours as defined in the "Hours of Work" article of the Master Portion of this Agreement and for work performed on Saturday, Sunday and the Statutory Holidays listed in Article 15 of this Appendix.

When an employee is required to return to work without an eight-hour (8-hour) break, all work performed shall be paid for at the applicable overtime rate until such time as the employee receives an eight-hour (8-hour) break. This provision does not apply to a shift change.

5.2 Overtime rates of pay for employees in the classifications covered by this Appendix shall be as set forth in the wage schedules, attached hereto.

5.3 The overtime allotment system will provide for reasonable opportunity for union representatives as follows:

(a) overtime will first be offered to the operator of the machine required for overtime (for the purpose of interpreting Article 8.3 in the Master Portion for the Operating Engineers, the operator who normally works the specific piece of equipment through the week on the applicable shift is considered the crew);

(b) if the operator does not wish to work, where practical, overtime on a weekend shift will next be offered to a steward (Chief, if applicable), provided he is capable of performing the task;

(c) if the steward (Chief, if applicable), is not capable of performing the task or does not wish to work, another qualified job steward will be asked by management to work the overtime;

(d) if all the qualified job stewards decline the opportunity to work overtime, management has fulfilled the obligation to offer overtime work to Union Stewards and shall offer the overtime to any other capable operator.

Article 6

BENEFITS

6.1 The Employer agrees to pay into operative welfare, pension and supplementary unemployment benefit plans the amount specified for welfare, pension and supplementary unemployment benefits as set forth in the wage schedules, attached hereto, for employees covered by this Appendix during the time they are employed.

The Union agrees to supply the Employer with all information regarding the welfare, pension and supplementary unemployment benefit plans and also all administrative material that is required for the implementation of same.

6.2 Should the welfare, pension or supplementary unemployment benefit plan contributions recognized under this Agreement change during the term of this Agreement, which require an adjustment to the base rate, an adjustment will be made to the base rate. The total wage package will not be changed. Within three (3) weeks of receipt of an acceptable written notice of a change in the above-noted benefit plan contributions, the change will be implemented. The effective date will be the date of implementation.

6.3 In the event an Employer is more than fifteen (15) days in arrears of the requirement to forward contributions and/or deductions to the Trustees by the fifteenth of the month following, the Employer shall pay as liquidated damages and not as a penalty an amount equal to two (2%) percent (equivalent to 24% per annum) for each month or part thereof that the contributions and/or deductions are in default for greater than fifteen (15) days provided the Employer has received five (5) days' written notice to correct such default. The trustees may require a delinquent Employer to pay for the costs, legal or otherwise, of collecting the amount owing, as outlined in the operative benefit plan trust documents.

6.4 The Trustees of the Employee Benefit Plans referred to in this Collective Agreement shall promptly notify the Union of the failure by any Employer to pay any employee benefit contributions required to be made under this Collective Agreement and which are owed under the said plans in order that the program administrator of the Employee Wage Protection Plan may deem that there has been an assignment of compensation under the said program in compliance with the regulation to the *Employment Standards Amendment Act, 1991* in relation to the Employee Wage Protection Program.

Article 7

INCLEMENT WEATHER PAY

7.1 When an employee engaged in work on power systems construction, site preparation and earth dams, reports at the beginning of a shift, but is unable to commence work because weather conditions are unsuitable, he shall receive two (2) hours' pay at the base hourly rate(s), or at the shift rate if on shift, or at the premium rate if on overtime, plus travel or room and board allowance where applicable, if the employee remains for two (2) hours at his place of work.

Article 8

KEY TRADESMEN

8.1 Employers may transfer key tradesmen from one location to another to effectively utilize their special skills, having regard for the special requirements of thermal, nuclear or hydraulic generation and transmission and transformation construction.

8.2 The number of key tradesmen to be transferred will be jointly determined at a pre-job conference provided for in the "Advance Notice" article of the Master Portion of this Agreement.

Article 9

TRAVEL AND TRANSPORTATION

9.1 INITIAL EMPLOYMENT

On recruitment of tradesmen whose regular residence* or place of recruitment, whichever is closer to the project, is between 80 to 161 radius kilometers from the project, the Employer shall pay $25.00 for the initial trip to the Project.

* ***As defined in Article 17 or Article 18 of the Master Portion of this Agreement, whichever is applicable.***

9.2 ONTARIO RESIDENTS

On recruitment of tradesmen whose regular residence is beyond 161 radius kilometers from the project, the Employer shall pay mileage based on 25¢ per radius kilometer, plus an allowance for travel time equivalent to one (1) hour's pay for each 80 radius kilometers of travel to a maximum of eight (8) hours' pay for the initial trip to the project from the tradesman's regular residence or place of recruitment, whichever is closer to the project.

9.3 NON-ONTARIO RESIDENTS

On recruitment of tradesmen whose regular residence is beyond 161 radius kilometers from the project, the Employer shall pay the equivalent of the cost of public transportation, plus an allowance for travel time equivalent to one (1) hour's pay for each 80 radius kilometers of travel to a maximum of eight (8) hours' pay for the initial trip to the project from the tradesman's regular residence or place of recruitment, whichever is closer to the project.

9.4 To qualify for payment in 9.1, 9.2 or 9.3, the employee must remain at the project for a minimum of fifteen (15) working days or the duration of the job, whichever is lesser.

9.5 On termination of employment due to a reduction of staff, an employee entitled to payment under 9.1, 9.2 or 9.3 shall be entitled to return expenses calculated in the same manner as in 9.1, 9.2 or 9.3 above for the return trip from the project to the tradesman's regular residence or place of recruitment, whichever is closer to the project. An employee whose employment terminates for any reason other than reduction of staff shall not be eligible for return payment.

9.6 TRANSFER

When transferring employees, the Employer shall pay the equivalent of the cost of public transportation for the initial trip to the project from the employee's most recent work location. In addition, the Employer shall pay an allowance for travelling time equivalent to the straight-time rate up to a maximum of eight (8) hours.

9.7 When an employee works continuously on a project which is beyond 483 kilometers from the employee's regular residence, the employee shall receive the equivalent of one return air fare from the nearest airport to the project to the nearest airport to the employee's regular residence, every sixty (60) calendar days. This allowance will only be paid to qualifying employees of Employers whose primary function is structural steel erection and/or mechanical installations.

Article 10

TOOLS

10.1 In accordance with the "Tools and Clothing" article of the Master Portion of this Agreement, employees shall be required to provide themselves with the ordinary hand tools of their trade as specified in the tool list, attached hereto. Employees may provide themselves with further hand tools of their trade provided a listing of their tools showing the valuation is filed with the Employer. All personal hand tools shall be appropriately marked as to ownership. The Employer's liability shall be limited to the replacement value of the tools on the attached tool list and the tool list provided by the employee.

10.2 Employers may supply additional tools and equipment to employees. Employees receiving such tools or equipment shall be responsible for them in accordance with the "Tools and Clothing" article of the Master Portion of this Agreement. Employees will immediately report the loss of any Employer supplied tools or equipment.

10.3 Power tools, torque wrenches and other gang tools, referred to in the "Tools and Clothing" article of the Master Portion of this Agreement, are tools which are issued to a foreman and are used by one or more members of the crew. Such tools are not identified on trades tool lists, nor are they the tools and equipment identified in 10.1 and 10.2 of this article.

Article 11

PROTECTIVE CLOTHING AND EQUIPMENT

11.1 Employees are required to wear protective clothing and use protective equipment for the work being done. When in the opinion of the Employer it is required, wet weather clothing including rubber boots shall be supplied by the Employer, subject to the provisions of 11.2.

11.2 The protective clothing and equipment covered in 11.1 of this article that is provided by the Employer shall be charged out to the employee and the employee shall be responsible for the return of such clothing and equipment to his Employer.

11.3 Adequate shelter will be provided to protect employees exposed to excessive heat, cold or inclement weather where there is a need for such protection.

Article 12

APPRENTICESHIP AND TRAINING PROGRAMS

12.1 The Employer agrees to pay into operative apprenticeship or training funds the amounts specified for apprenticeship or training as set forth in the wage schedules, attached hereto, for employees covered by this Appendix during the time they are employed.

The Union agrees to supply EPSCA with all pertinent information regarding these funds including all administrative material that is required for their implementation.

12.2 It is recognized and agreed that the IUOE Local 793 Training Fund is the operative apprenticeship and training body recognized under this Collective Agreement.

12.3 The Union recognizes the Employer's right to establish training programs to provide employees with special skills which are required in the electrical power systems sector and which are not provided by the Training Fund. Such programs shall be funded in such amounts as determined by the Employer and the Trustees of the Training Fund.

Where apprentice mechanics are employed, there shall not be more than one (1) apprentice for every five (5) journeymen.

12.4 Employers whose primary function is structural steel erection and/or mechanical installations shall assign an apprentice, oiler or oiler-driver to each unit on all conventional truck mounted cranes with a manufacturers' rating of 25 tons capacity and over, all crawler cranes with a manufacturers' rating of 50 tons capacity and over, all truck mounted hydraulic cranes with a manufacturers' rating of 35 tons capacity and over, and all rough terrain type cranes with a manufacturers' rating of 65 tons capacity and over.

12.5 Craning apprentices working under the terms of this Collective Agreement shall be indentured to the Employer or to the Union and the Union shall accept into its membership all such indentured apprentices.

12.6 Craning Apprentices

(a) The craning apprenticeship program shall consist of three (3) work terms each being 2000 hours in length, or of such terms and duration as approved by the Director of Apprenticeship.

Base hourly rates of pay for craning apprentices shall be in accordance with the following schedule and set out in the wage schedule, attached hereto:

1st term - 50% of the licensed journeyman base hourly rate
2nd term - 65% of the licensed journeyman base hourly rate
3rd term - 80% of the licensed journeyman base hourly rate

(b) In order to expedite the apprentices' entrance into journeyman status, the following policy shall apply:

(i) The apprentice must apply to the Apprenticeship Branch to write his examination as soon as possible after he has reached his total hours less 300, but no later than reaching his total hours plus 300.

(ii) The Employer will commence paying the journeymen's rate of pay the day after the Apprentice completes the required hours of on-the-job training, all required training and has shown the Employer proof that he has successfully obtained his Certificate of Qualification from the Ministry of Colleges and Universities.

12.7 Recall of Apprentices

Apprentices laid off due to lack of work may be recalled by a former Employer provided the apprentice was employed by the Employer for more than 90 working days in the previous twelve (12) months and is available for work. Recalls shall be processed through the local Union District Office.

12.8 For the purposes of continued and/or varied training, and upon mutual agreement of the Employer and the Union, apprentices may be transferred to any work location suitable for that purpose.

Article 13

R.P.A. QUALIFICATION

13.1 *Construction Radiation Protection Assistant (R.P.A.)* is a Construction Trades Person who has achieved the full radiation qualification via the approved Ontario Power Generation Inc Training Program. This requires successful completion of the construction R.P.A. training and checkouts and the performance of R.P.A. functions while under supervision of a fully qualified Construction R.P.A. to the satisfaction of the Construction Site Safety Officer and the Station Health Physics Unit.

R.P.A. will be paid the appropriate equivalent foremen's rates when performing an R.P.A. function and will report to the Site Safety Unit. An R.P.A. is a "qualification" and not a "trade function" irrespective of union or trade affiliation.

13.2 In the case of a recall to work, Employers reserve the right to recall Green qualified Atomic Radiation Workers (R.P.A.) in sequence from the out-of-work list to the location from where they were laid off. Recalled Greenmen (R.P.A.) will perform sufficient Greenman work to maintain their skill level, or be laid off.

Article 14

VACATION PAY

14.1 The Vacation Pay rate shall be four (4) percent of vacationable gross earnings*. Payment shall be made weekly on the employee's regular pay cheque.

A three (3) week leave of absence for the purpose of taking an annual vacation will be granted in the calendar year in which the employee completes one year of continuous service with the Employer. In special circumstances, where the work schedule permits, additional time off may be granted an employee. The additional time off will not be unreasonably denied.

Article 15

STATUTORY HOLIDAYS

15.1 Statutory Holiday pay rate shall be six (6) percent of vacationable gross earnings. Payment shall be made weekly on the employee's regular pay cheque.

The Statutory Holidays recognized under this Agreement are:

New Year's Day	Civic Holiday
Good Friday	Labour Day
Easter Monday	Thanksgiving Day
Victoria Day	Christmas Day
Canada Day	Boxing Day

EPSCA agrees to recognize Heritage Day when proclaimed by legislation.

Recognized holidays falling on a Saturday or Sunday shall be observed on the following Monday. When Christmas Day falls on a Saturday or Sunday, it shall be observed on the following Monday and Boxing Day on the following Tuesday. When New Year's Day falls on a Saturday or Sunday, it shall be observed on either the preceding Friday or the following Monday.

For shiftworkers on boilers and pumps and firefighters, recognized holidays will be observed on the actual day on which the holiday occurs.

EPSCA reserves the right to change the day of observance of a Statutory Holiday when such a holiday falls on a Tuesday or Thursday.

* ***"Vacationable gross earnings" means pay for regular hours, overtime, premium pay, shift differential, lines and stations daily travel time, retroactive pay adjustments, reporting pay, inclement weather pay, call-in pay, Saturday and Sunday premiums and trade training, but does not include payment for initial and return travel.***

Article 16

RECALL

NEW

16.1 The employer may recall former regular employees through the Union Office who have been absent from the employer up to twelve (12) months.

Regular employees shall be defined as employees who have been on the employer's payroll for six (6) consecutive months or more.

The incorporated specific Statement of Settlement amendments to the International Union of Operating Engineers' Appendix of the Collective Agreement between The Electrical Power Systems Construction Association and The Power Council of Unions have been agreed to by the bargaining committees of the Operating Engineers and The Electrical Power Systems Construction Association. These proposed amendments are herewith recommended to the EPSCA Board of Directors and the Officers of the Council in accordance with Article 33.1 of the Master Portion of the Collective Agreement for approval and incorporation into the Operating Engineers' Appendix of the Collective Agreement.

Dated this *19th* day of *May* , 2000.

For: The Operating Engineer Bargaining Committee

Phil Bertrand

_____

For: The EPSCA Bargaining Committee

Barry Roberts

_____

Approved for incorporation into the Operating Engineers' Appendix effective this *10th* day of *April* , 2001.

For: **The Electrical Power Systems Construction Association**

Jim Coathup

_____

Joe Dotchin

_____

For: **The Power Council of Unions**

_____

Phil Bertrand

_____

Rick Weiss

_____

Claude Cournoyer

_____

ADDENDUM 1

MODIFIED PROVISIONS OF THIS CONSTRUCTION APPENDIX

These provisions will apply to:

(a) all work on Lines and Stations, and

(b) all work on existing generating sites except the construction of:

- a new facility which provides a new function
- a new (i.e. additional) generating unit

Definitions:

Facility	Something that is built composed of multi-systems which serves a specific function
Function	Examples - Generation, Administration, Warehousing, Heavy Water Production, Flue Gas Desulphurization, Tritium Removal, Site Services (e.g. Shops)

Dispute Resolution Process

A dispute as to whether the 'Modified Provisions of this Construction Agreement' apply to the construction of a new facility will be referred to the Executive Committee for resolution and the Executive Committee will meet within five (5) working days. If the Executive Committee is unable to resolve the dispute, the dispute will be referred to a single arbitrator within ten (10) working days for a final and binding resolution. The arbitrator shall give an oral decision within five (5) working days, and a written decision, if requested, within twenty (20) working days.

All terms of this appendix shall apply to work covered by Addendum 1, with the exception of Article 1.3.

INTERNATIONAL UNION OF OPERATING ENGINEERS' APPENDIX

TOOL LIST

OPERATING ENGINEERS

1 Tool Box with lock and key
2 Chisels, cold
1 Hammer, ball peen, medium or heavy
1 Hack Saw Frame, 250 mm or adjustable
1 Pliers, combination
2 Punches, pin or taper
2 Screwdrivers, flat blade, medium or large
1 Wrench, adjustable, Crescent type, 250 mm or 300 mm
* 1 Wrenches, open end, set - up to 1"

HEAVY DUTY MECHANICS

1 Tool Box (size to conform to Department's requirements
1 Chisels, cold, flat, set of 3 or more - 6mm, 12 mm and 18 mm
1 Drills, twist, from 1.5 mm to 6.5 mm in 0.5 mm steps
1 Gauges, thickness, set
1 Gauges, spark plug set
1 Hack Saw Frame, 250 mm or adjustable
1 Hammer, soft face
3 Hammers, ball peen - light, medium and heavy
1 Jackknife
1 Pliers, combination, 150 mm
1 Pliers, diagonal cutting, 150 mm
1 Pliers, waterpump
1 Pliers, battery
2 Pliers, needle nose
1 Pliers, brake spring
1 Punch, centre
1 Punches, taper, set
1 Punches, pin, set
* 1 Rule, steel, 2 m
1 Scraper, carbon
1 Screwdriver, flat blade, offset
1 Screwdrivers, flat blade, set of 6; 150 mm up to 300 mm

* *Measurement Sensitive*

HEAVY DUTY MECHANICS (continued)

	1	Screwdrivers, Phillips, set of 4 or 1 detachable head
*	1	Tape, rule, steel, 3 m
	1	Tube Cutter and Flaring Tool
	1	Wrench, adjustable, Crescent type, 150 mm
	1	Wrench, adjustable, Crescent type, 300 mm
	1	Wrench, box end, starter and manifold
	1	Wrench, vise grip, 250 mm
	1	Wrench, pipe, approximate length 350 mm
*	1	Wrenches, socket, set, master, up to and including 1/2" sq drive - approximately 70 pieces
	1	Wrenches, socket, set, spark plug - approximately 6 pieces
	1	Wrenches, open end, set - 5/16" to 1-1/2"
	1	Wrenches, box end, set - 3/8" to 1-1/4"
	1	Wrenches, tappet, set - approximately 6 pieces
	1	Wrenches, Allen Head, set - approximately 8 pieces
	1	Wrenches, ignition, set - approximately 8 pieces

* *Measurement Sensitive*

MEMORANDUM OF SETTLEMENT

BETWEEN

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION

AND

INTERNATIONAL UNION OF OPERATING ENGINEERS'

Dated this 25th day of June 2004

It is agreed that the existing agreement between the parties which expires April 30, 2004 will be renewed with the following amendments:

GENERAL

There is agreement to create a "free standing" collective agreement. Master Portion, Foreman's Appendix, O.E. Appendix and June 25, 2004 Memorandum of Settlement to be incorporated into one collective agreement.

Language to be modified where necessary - e.g. delete references to the "Power Council of Unions"

APPENDIX D — MODIFIED PROVISIONS

Modified Provisions to apply as follows:

Amend the agreement as necessary, e.g.

- Modified – Hours of Work to replace corresponding articles in main body of agreement (see changes below)
- Modified – Reporting Pay on 8 Hour and 10 Hour Shifts to replace corresponding articles in main body of agreement
- Modified – Meals on Overtime to replace corresponding articles in main body of agreement

ARTICLE 8 — UNION STEWARDS

Amend 8.1 as follows:

Add to the end of the first sentence: "(except as noted below)".

Add new paragraph:

> "In cases where the Chief Steward is an employee of OPG, Bruce Power L.P. or Hydro One, he shall not be considered the Steward for the purposes of owner-only contracts. The Union shall have the right to appoint a Steward on such contracts who shall be considered the Steward with respect to employees of employers on such contracts. All Operating Engineers shall report to the Chief Steward prior to commencing work for the purpose of verifying membership and clearance to the appropriate project and/or contractor"

ARTICLE 12 — UNION SECURITY

Add, where appropriate:

"Wage schedule, dues and remittance changes are to be provided in writing to EPSCA and changes shall only take place during the months of April and November of each calendar year. The effective date of such changed wage schedules, dues and remittances shall be the date of issuance."

Dues deduction amounts to be converted to a cents/hr amount and reflected on the wage schedule.

Union Dues for this Local are:

2% of the total wage package plus $20.25 per month effective July 1, 2003.
2% of the total wage package plus $20.75 per month effective July 1, 2005.

ARTICLE 14 — PAY PROCEDURE

Add:

"Direct deposit to be implemented at the Employer's option."

ARTICLE 17/ SECTION 1 — GENERATION PROJECTS DAILY TRAVEL ALLOWANCE AND ROOM AND BOARD

Travel rings and Board and Travel to be increased (and rounded to the nearest 5 cents) as follows:

- Upon signing – 4%
- May 1, 2005 – 2%
- May 1, 2006 – 2%
- May 1, 2007 – 4%
- May 1, 2008 – 2%
- May 1, 2009 – 2%

ARTICLE 18 — LINES AND STATIONS DAILY TRAVEL ALLOWANCE AND ROOM AND BOARD

Travel rings and Board to be increased as follows:

Travel:
Upon signing and in each subsequent year – 50 cents

Board:
Upon signing and in each subsequent year - $1.00

ARTICLE 20 — STANDOFF

Amend language to indicate that proof of board (proper receipts) must be shown in order for subsistence allowance to be paid to an employee for the Standoff period.

ARTICLE 26/ SECTION 2 — HOURS OF WORK

Amend 2nd paragraph of Article 26/Section 2.1 as follows:

(i) The weekly hours of work Monday to Friday inclusive shall consist of forty (40) hours for all employees of Employers covered by this agreement and working on a one (1) or two (2) shift operation.

The weekly hours of work may be arrived at by having the employees work either:

- four (4) consecutive ten-hour shifts, Monday to Thursday or;
- four (4) consecutive ten-hour shifts, Tuesday to Friday or;
- five (5) consecutive eight-hour shifts

but not concurrently on the same work program.*

Employees will not be moved from work program to work program to circumvent overtime. Disputes arising from this Article are subject to the grievance procedure.

Each Employer will notify the Local Union of the weekly hours of work for each work program* at the site.

Weekly hours of work will be established for a minimum period of two (2) weeks.

If an Employer intends to change the weekly hours of work, a minimum of seven (7) days written notice shall be sent to the Local Union.

**** For the purposes of this section, a work program may be defined as work taking place on a site that could include the following:***

- ***Outages,***
- ***Specific contracted scopes of work,***
- ***Various and different modifications in an operating plant where the owner dictates the hours of work, or***
- ***Subcontracts for a prime contractor where the prime contractor dictates the hours of work.***

(ii) Amend start time in 3rd paragraph of Section 2.1 to read 7:00 am.

(iii) The start time for the afternoon shift shall be immediately following the day shift or within two (2) hours either way of the end of the day shift.

ADD "When members of the Operating Engineers are assigned to fire watch duties, they may commence work after the start of the rest of the crew. In these cases, normal scheduled hours of work beyond the quit time of the rest of the crew will not be subject to overtime premiums."

ARTICLE 2 — WAGES

Upon signing	$1.20
May 1, 2005	$1.10
May 1, 2006	$1.10

ICI increase/date for next three years.

Additional ICI parity payment of 1/3rd in years 4, 5 and 6 of the agreement.

Amend Article 2.6 as follows:

Wage rates to reflect one classification for all firefighters. Rate in all locations to be Group 4 minus $1.00 base wage rate

WAGE SCHEDULES

Add the following classifications to the wage schedule:

Hydro Vac	Group 4
Self-erecting Cranes	Over 10 ton Group 2A Under 10 ton Group 2B

ARTICLE 33 TERM OF AGREEMENT

Duration – Amend to read as follows:

This Agreement shall become effective May 1, 2004 and will expire on April 30, 2010.

ADDITIONAL ITEMS

RST issue – signing of letter on hold pending confirmation from EPSCA advisors.

FOREMAN'S APPENDIX

Amend Article 5 as follows:

Foreman's differential: 10 cent increase per year

LETTER OF UNDERSTANDING

Between

THE ELECTRICAL POWER SYSTEMS
CONSTRUCTION ASSOCIATION

AND

INTERNATIONAL UNION OF OPERATING ENGINEERS'

RE: Employment Practices

The Parties agree that existing practices available to Employers in the Power Sector will be maintained.

Dated this 25th day of June, 2004.

EPSCA	O.E.

LETTER OF UNDERSTANDING

Between

THE ELECTRICAL POWER SYSTEMS
CONSTRUCTION ASSOCIATION

AND

INTERNATIONAL UNION OF OPERATING ENGINEERS'

RE: Lines and Stations Mobility allowance

In recognition of the mobility requirements of those individuals working in the following classifications on Lines and Stations Projects; Commander II, Radial Boom Derrick Driver and Puller Tensioner, these employees will receive an additional 50 cents in each year of the agreement that will be added to the Board allowance payment.

Dated this 25th day of June, 2004.

EPSCA

O.E.

This agreement is conditional upon ratification by EPSCA. All terms and conditions will become effective upon date of signing and shall form the new agreement between the Parties.

Dated this 25th day of June, 2004 at Toronto, Ontario.

For EPSCA	For the O.E.
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION

June 25, 2004

This will confirm our understanding, as discussed at EPSCA negotiations, that the current pay practice regarding shift differential and overtime will be maintained.

Ivars Starasts,
EPSCA General Manager

John Anderson,
Operating Engineers

OPERATING ENGINEERS
Local 793
Hamilton

EPSCA WAGE SCHEDULE FOR PROJECTS WITHIN THE GEOGRAPHIC AREA OF THIS LOCAL (52)

GRADE AND STEP	CLASSIFICATIONS, OCCUPATION CODES & EFFECTIVE DATES		BASE HOURLY RATE	VACATION & STAT. HOLIDAY	UNION FUNDS (2)	TOTAL WAGE PACKAGE	EPSCA ASSOC. FUND(1)
	FOREMEN - 420065						
	HEAVY DUTY MECHANIC FOREMAN - 437265 (Group 2(A) Only)						
51-9	GROUP 1(A)	2004-06-25	32.55	3.26	9.20	45.01	0.15
		2005-05-01	33.47	3.35	9.40	46.22	0.15
		2006-05-01	34.39	3.44	9.60	47.43	0.15
52-9	GROUP 1(B)	2004-06-25	32.10	3.21	9.20	44.51	0.15
		2005-05-01	33.02	3.30	9.40	45.72	0.15
		2006-05-01	33.94	3.39	9.60	46.93	0.15
53-9	GROUP 2(A)	2004-06-25	31.35	3.14	9.20	43.69	0.15
		2005-05-01	32.27	3.23	9.40	44.90	0.15
		2006-05-01	33.19	3.32	9.60	46.11	0.15
54-9	GROUP 2(B)	2004-06-25	30.87	3.09	9.20	43.16	0.15
		2005-05-01	31.79	3.18	9.40	44.37	0.15
		2006-05-01	32.71	3.27	9.60	45.58	0.15
55-9	GROUP 3	2004-06-25	30.40	3.04	9.20	42.64	0.15
		2005-05-01	31.32	3.13	9.40	43.85	0.15
		2006-05-01	32.24	3.22	9.60	45.06	0.15
56-9	GROUP 4	2004-06-25	30.24	3.02	9.20	42.46	0.15
		2005-05-01	31.15	3.12	9.40	43.67	0.15
		2006-05-01	32.07	3.21	9.60	44.88	0.15
57-9	GROUP 5	2004-06-25	27.90	2.79	9.20	39.89	0.15
		2005-05-01	28.82	2.88	9.40	41.10	0.15
		2006-05-01	29.74	2.97	9.60	42.31	0.15

(1) = per hour worked; (2) = per hour paid

OPERATING ENGINEERS
Local 793
Hamilton

EPSCA WAGE SCHEDULE FOR PROJECTS WITHIN THE GEOGRAPHIC AREA OF THIS LOCAL (52)

GRADE AND STEP	CLASSIFICATIONS, OCCUPATION CODES & EFFECTIVE DATES		BASE HOURLY RATE	VACATION & STAT. HOLIDAY	UNION FUNDS (2)	TOTAL WAGE PACKAGE	EPSCA ASSOC. FUND(1)
58-9	GROUP 6	2004-06-25	26.90	2.69	9.20	38.79	0.15
		2005-05-01	27.82	2.78	9.40	40.00	0.15
		2006-05-01	28.74	2.87	9.60	41.21	0.15
59-9	GROUP 7	2004-06-25	25.71	2.57	9.20	37.48	0.15
		2005-05-01	26.63	2.66	9.40	38.69	0.15
		2006-05-01	27.55	2.76	9.60	39.91	0.15
60-9	MISC GROUP 1(A)	2004-06-25	30.87	3.09	9.20	43.16	0.15
		2005-05-01	31.79	3.18	9.40	44.37	0.15
		2006-05-01	32.71	3.27	9.60	45.58	0.15
61-9	MISC GROUP 1(B)	2004-06-25	30.24	3.02	9.20	42.46	0.15
		2005-05-01	31.15	3.12	9.40	43.67	0.15
		2006-05-01	32.07	3.21	9.60	44.88	0.15
62-9	MISC GROUP 2	2004-06-25	31.35	3.14	9.20	43.69	0.15
		2005-05-01	32.27	3.23	9.40	44.90	0.15
		2006-05-01	33.19	3.32	9.60	46.11	0.15
63-9	MISC GROUP 3	2004-06-25	25.70	2.57	9.20	37.47	0.15
		2005-05-01	26.46	2.65	9.40	38.51	0.15
		2006-05-01	27.21	2.72	9.60	39.53	0.15
64-9	MISC GROUP 4	2004-06-25	27.90	2.79	9.20	39.89	0.15
		2005-05-01	28.82	2.88	9.40	41.10	0.15
		2006-05-01	29.74	2.97	9.60	42.31	0.15

(1) = per hour worked; (2) = per hour paid

OPERATING ENGINEERS
ocal 793
Hamilton

EPSCA WAGE SCHEDULE FOR PROJECTS WITHIN THE GEOGRAPHIC AREA OF THIS LOCAL (52)

GRADE AND STEP	CLASSIFICATIONS, OCCUPATION CODES & EFFECTIVE DATES		BASE HOURLY RATE	VACATION & STAT. HOLIDAY	UNION FUNDS (2)	TOTAL WAGE PACKAGE	EPSCA ASSOC. FUND(1)
	SUBFOREMEN - 420055						
	HEAVY DUTY MECHANIC SUBFOREMAN - 437255 (Group 2(A) Only)						
51-8	GROUP 1(A)	2004-06-25	30.45	3.05	9.20	42.70	0.15
		2005-05-01	31.27	3.13	9.40	43.80	0.15
		2006-05-01	32.09	3.21	9.60	44.90	0.15
52-8	GROUP 1(B)	2004-06-25	30.00	3.00	9.20	42.20	0.15
		2005-05-01	30.82	3.08	9.40	43.30	0.15
		2006-05-01	31.64	3.16	9.60	44.40	0.15
53-8	GROUP 2(A)	2004-06-25	29.25	2.93	9.20	41.38	0.15
		2005-05-01	30.07	3.01	9.40	42.48	0.15
		2006-05-01	30.89	3.09	9.60	43.58	0.15
54-8	GROUP 2(B)	2004-06-25	28.77	2.88	9.20	40.85	0.15
		2005-05-01	29.59	2.96	9.40	41.95	0.15
		2006-05-01	30.41	3.04	9.60	43.05	0.15
55-8	GROUP 3	2004-06-25	28.30	2.83	9.20	40.33	0.15
		2005-05-01	29.12	2.91	9.40	41.43	0.15
		2006-05-01	29.94	2.99	9.60	42.53	0.15
56-8	GROUP 4	2004-06-25	28.14	2.81	9.20	40.15	0.15
		2005-05-01	28.95	2.90	9.40	41.25	0.15
		2006-05-01	29.77	2.98	9.60	42.35	0.15
57-8	GROUP 5	2004-06-25	25.80	2.58	9.20	37.58	0.15
		2005-05-01	26.62	2.66	9.40	38.68	0.15
		2006-05-01	27.44	2.74	9.60	39.78	0.15

(1) = per hour worked; (2) = per hour paid

OPERATING ENGINEERS
Local 793
Hamilton

EPSCA WAGE SCHEDULE FOR PROJECTS WITHIN THE GEOGRAPHIC AREA OF THIS LOCAL (52)

GRADE AND STEP	CLASSIFICATIONS, OCCUPATION CODES & EFFECTIVE DATES		BASE HOURLY RATE	VACATION & STAT. HOLIDAY	UNION FUNDS (2)	TOTAL WAGE PACKAGE	EPSCA ASSOC. FUND(1)
58-8	GROUP 6	2004-06-25	24.80	2.48	9.20	36.48	0.15
		2005-05-01	25.62	2.56	9.40	37.58	0.15
		2006-05-01	26.44	2.64	9.60	38.68	0.15
59-8	GROUP 7	2004-06-25	23.61	2.36	9.20	35.17	0.15
		2005-05-01	24.43	2.44	9.40	36.27	0.15
		2006-05-01	25.25	2.53	9.60	37.38	0.15
60-8	MISC GROUP 1(A)	2004-06-25	28.77	2.88	9.20	40.85	0.15
		2005-05-01	29.59	2.96	9.40	41.95	0.15
		2006-05-01	30.41	3.04	9.60	43.05	0.15
61-8	MISC GROUP 1(B)	2004-06-25	28.14	2.81	9.20	40.15	0.15
		2005-05-01	28.95	2.90	9.40	41.25	0.15
		2006-05-01	29.77	2.98	9.60	42.35	0.15
62-8	MISC GROUP 2	2004-06-25	29.25	2.93	9.20	41.38	0.15
		2005-05-01	30.07	3.01	9.40	42.48	0.15
		2006-05-01	30.89	3.09	9.60	43.58	0.15
63-8	MISC GROUP 3	2004-06-25	23.60	2.36	9.20	35.16	0.15
		2005-05-01	24.26	2.43	9.40	36.09	0.15
		2006-05-01	24.91	2.49	9.60	37.00	0.15
54-8	MISC GROUP 4	2004-06-25	25.80	2.58	9.20	37.58	0.15
		2005-05-01	26.62	2.66	9.40	38.68	0.15
		2006-05-01	27.44	2.74	9.60	39.78	0.15

1) = per hour worked; (2) = per hour paid

OPERATING ENGINEERS
Local 793
Hamilton

EPSCA WAGE SCHEDULE FOR PROJECTS WITHIN THE GEOGRAPHIC AREA OF THIS LOCAL (52)

GRADE AND STEP	CLASSIFICATIONS, OCCUPATION CODES & EFFECTIVE DATES		BASE HOURLY RATE	VACATION & STAT. HOLIDAY	UNION FUNDS (2)	TOTAL WAGE PACKAGE	EPSCA ASSOC. FUND(1)
	OPERATING ENGINEER - 420035						
	HEAVY DUTY MECHANIC - 437235 (Group 2(A) Only)						
51-6	GROUP 1(A)	2004-06-25	29.45	2.95	9.20	41.60	0.15
		2005-05-01	30.27	3.03	9.40	42.70	0.15
		2006-05-01	31.09	3.11	9.60	43.80	0.15
52-6	GROUP 1(B)	2004-06-25	29.00	2.90	9.20	41.10	0.15
		2005-05-01	29.82	2.98	9.40	42.20	0.15
		2006-05-01	30.64	3.06	9.60	43.30	0.15
53-6	GROUP 2(A)	2004-06-25	28.25	2.83	9.20	40.28	0.15
		2005-05-01	29.07	2.91	9.40	41.38	0.15
		2006-05-01	29.89	2.99	9.60	42.48	0.15
54-6	GROUP 2(B)	2004-06-25	27.77	2.78	9.20	39.75	0.15
		2005-05-01	28.59	2.86	9.40	40.85	0.15
		2006-05-01	29.41	2.94	9.60	41.95	0.15
55-6	GROUP 3	2004-06-25	27.30	2.73	9.20	39.23	0.15
		2005-05-01	28.12	2.81	9.40	40.33	0.15
		2006-05-01	28.94	2.89	9.60	41.43	0.15
56-6	GROUP 4	2004-06-25	27.14	2.71	9.20	39.05	0.15
		2005-05-01	27.95	2.80	9.40	40.15	0.15
		2006-05-01	28.77	2.88	9.60	41.25	0.15
57-6	GROUP 5	2004-06-25	24.80	2.48	9.20	36.48	0.15
		2005-05-01	25.62	2.56	9.40	37.58	0.15
		2006-05-01	26.44	2.64	9.60	38.68	0.15

(1) = per hour worked; (2) = per hour paid

MAP CODE:
O-4

ISSUED:
DECEMBER 1, 2004

REVISED:
MAY 10, 2005

OPERATING ENGINEERS
Local 793
Hamilton

EPSCA WAGE SCHEDULE FOR PROJECTS WITHIN THE GEOGRAPHIC AREA OF THIS LOCAL (52)

GRADE AND STEP	CLASSIFICATIONS, OCCUPATION CODES & EFFECTIVE DATES		BASE HOURLY RATE	VACATION & STAT. HOLIDAY	UNION FUNDS (2)	TOTAL WAGE PACKAGE	EPSCA ASSOC. FUND(1)
58-6	GROUP 6	2004-06-25	23.80	2.38	9.20	35.38	0.15
		2005-05-01	24.62	2.46	9.40	36.48	0.15
		2006-05-01	25.44	2.54	9.60	37.58	0.15
59-6	GROUP 7	2004-06-25	22.61	2.26	9.20	34.07	0.15
		2005-05-01	23.43	2.34	9.40	35.17	0.15
		2006-05-01	24.25	2.42	9.60	36.27	0.15
59-1	GROUP 8	2004-06-25	20.85	2.08	9.20	32.13	0.15
		2005-05-01	21.66	2.17	9.40	33.23	0.15
		2006-05-01	22.48	2.25	9.60	34.33	0.15
59-0	GROUP 8 (A)	2004-06-25	18.72	1.87	9.20	29.79	0.15
		2005-05-01	19.54	1.95	9.40	30.89	0.15
		2006-05-01	20.35	2.04	9.60	31.99	0.15
60-6	MISC GROUP 1(A)	2004-06-25	27.77	2.78	9.20	39.75	0.15
		2005-05-01	28.59	2.86	9.40	40.85	0.15
		2006-05-01	29.41	2.94	9.60	41.95	0.15
61-6	MISC GROUP 1(B)	2004-06-25	27.14	2.71	9.20	39.05	0.15
		2005-05-01	27.95	2.80	9.40	40.15	0.15
		2006-05-01	28.77	2.88	9.60	41.25	0.15
52-6	MISC GROUP 2	2004-06-25	28.25	2.83	9.20	40.28	0.15
		2005-05-01	29.07	2.91	9.40	41.38	0.15
		2006-05-01	29.89	2.99	9.60	42.48	0.15

1) = per hour worked; (2) = per hour paid

OPERATING ENGINEERS
Local 793
Hamilton

EPSCA WAGE SCHEDULE FOR PROJECTS WITHIN THE GEOGRAPHIC AREA OF THIS LOCAL (52)

GRADE AND STEP	CLASSIFICATIONS, OCCUPATION CODES & EFFECTIVE DATES		BASE HOURLY RATE	VACATION & STAT. HOLIDAY	UNION FUNDS (2)	TOTAL WAGE PACKAGE	EPSCA ASSOC. FUND(1)
63-6	MISC GROUP 3	2004-06-25	22.60	2.26	9.20	34.06	0.15
		2005-05-01	23.26	2.33	9.40	34.99	0.15
		2006-05-01	23.91	2.39	9.60	35.90	0.15
64-6	MISC GROUP 4	2004-06-25	24.80	2.48	9.20	36.48	0.15
		2005-05-01	25.62	2.56	9.40	37.58	0.15
		2006-05-01	26.44	2.64	9.60	38.68	0.15
	HEAVY DUTY MECHANIC APPRENTICE - 437215						
53-0	1st Period	2004-06-25	14.13	1.41	9.20	24.74	0.15
		2005-05-01	14.54	1.45	9.40	25.39	0.15
		2006-05-01	14.95	1.50	9.60	26.05	0.15
53-1	2nd Period	2004-06-25	16.95	1.70	9.20	27.85	0.15
		2005-05-01	17.44	1.74	9.40	28.58	0.15
		2006-05-01	17.93	1.79	9.60	29.32	0.15
53-2	3rd Period	2004-06-25	19.78	1.98	9.20	30.96	0.15
		2005-05-01	20.35	2.04	9.40	31.79	0.15
		2006-05-01	20.92	2.09	9.60	32.61	0.15
53-3	4th Period	2004-06-25	22.60	2.26	9.20	34.06	0.15
		2005-05-01	23.26	2.33	9.40	34.99	0.15
		2006-05-01	23.91	2.39	9.60	35.90	0.15
53-4	5th Period	2004-06-25	25.43	2.54	9.20	37.17	0.15
		2005-05-01	26.16	2.62	9.40	38.18	0.15
		2006-05-01	26.90	2.69	9.60	39.19	0.15

(1) = per hour worked; (2) = per hour paid

OPERATING ENGINEERS
Local 793
Hamilton

EPSCA WAGE SCHEDULE FOR PROJECTS WITHIN THE GEOGRAPHIC AREA OF THIS LOCAL (52)

GRADE AND STEP	CLASSIFICATIONS, OCCUPATION CODES & EFFECTIVE DATES		BASE HOURLY RATE	VACATION & STAT. HOLIDAY	UNION FUNDS (2)	TOTAL WAGE PACKAGE	EPSCA ASSOC. FUND(1)
	CRANING APPRENTICE - 420015						
52-0	1st 2000 hrs	2004-06-25	14.13	1.41	9.20	24.74	0.15
		2005-05-01	14.54	1.45	9.40	25.39	0.15
		2006-05-01	14.95	1.50	9.60	26.05	0.15
52-1	2nd 2000 hrs	2004-06-25	18.36	1.84	9.20	29.40	0.15
		2005-05-01	18.90	1.89	9.40	30.19	0.15
		2006-05-01	19.43	1.94	9.60	30.97	0.15
52-2	3rd 2000 hrs	2004-06-25	22.60	2.26	9.20	34.06	0.15
		2005-05-01	23.26	2.33	9.40	34.99	0.15
		2006-05-01	23.91	2.39	9.60	35.90	0.15
	FIREFIGHTER FOREMAN - 460765 (NANTICOKE T.G.S.)						
75-9		2004-06-25	29.24	2.92	9.20	41.36	0.15
		2005-05-01	30.15	3.02	9.40	42.57	0.15
		2006-05-01	31.07	3.11	9.60	43.78	0.15
	FIREFIGHTER SUBFOREMAN - 460755						
75-8		2004-06-25	27.14	2.71	9.20	39.05	0.15
		2005-05-01	27.95	2.80	9.40	40.15	0.15
		2006-05-01	28.77	2.88	9.60	41.25	0.15
	FIREFIGHTERS - 460735						
75-6		2004-06-25	26.14	2.61	9.20	37.95	0.15
		2005-05-01	26.95	2.70	9.40	39.05	0.15
		2006-05-01	27.77	2.78	9.60	40.15	0.15

.) = per hour worked; (2) = per hour paid

'PERATING ENGINEERS
ocal 793
Hamilton

EPSCA WAGE SCHEDULE FOR PROJECTS WITHIN THE GEOGRAPHIC AREA OF THIS LOCAL (52)

GRADE AND STEP	CLASSIFICATIONS, OCCUPATION CODES & EFFECTIVE DATES	BASE HOURLY RATE	VACATION & STAT. HOLIDAY	UNION FUNDS (2)	TOTAL WAGE PACKAGE	EPSCA ASSOC. FUND(1)

Union Funds

Union Funds contain the following items:

Welfare* -	$2.66	per hour paid
	$2.86	per hour paid - effective May 1, 2005
	$3.06	per hour paid - effective May 1, 2006
Pension -	$6.04	per hour paid
	$6.04	per hour paid - effective May 1, 2005
	$6.04	per hour paid - effective May 1, 2006
Training -	$0.50	per hour paid
	$0.50	per hour paid - effective May 1, 2005
	$0.50	per hour paid - effective May 1, 2006

* Welfare amount includes $0.05 for Bill 162 benefits.

Benefits Administration

All deductions, contributions and union dues, excluding the EPSCA Association fund, are to be sent to the following location:

International Union of Operating Engineers - Local 793
30 Commercial Road
TORONTO, ON
M4G 1Z6

Union Dues

Union Dues are not included in Union Funds. Union Dues are to be deducted from the Base Hourly Rate. Union Dues for this Local are:

- 2% of the Total Wage Package plus $20.25 per month
- 2% of the Total Wage Package plus $20.75 per month - effective July 1, 2005

Union Dues are to be remitted to the same location as that for Benefits Administration.

OVERTIME RATE

Power Systems Construction, Site Preparation and Earth Dams:

Mon - Fri = 2x (except for oiling and greasing)
Sat = 2x
Sun & Hol = 2x

Shift Workers on Boilers and Pumps:

2x the base hourly rate for all hours worked outside of normal hours in any one scheduled day of work and for all hours worked on the Statutory Holidays listed in the Master Portion of the Agreement, for all hours worked on Easter Sunday and for the 6th and 7th consecutive shifts worked.
Relief work for shift workers on boilers and pumps is paid at 1x if following shift worker fails to report for work. No more than one relief shift to be worked per day; no more than two relief shifts to be worked per week.

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EPSCA WAGE SCHEDULE FOR PROJECTS WITHIN THE GEOGRAPHIC AREA OF THIS LOCAL (52)

GRADE AND STEP	CLASSIFICATIONS, OCCUPATION CODES & EFFECTIVE DATES	BASE HOURLY RATE	VACATION & STAT. HOLIDAY	UNION FUNDS (2)	TOTAL WAGE PACKAGE	EPSCA ASSOC. FUND(1)

Firefighters at Nanticoke T.G.S.:
2x for all hours worked outside normal hours, for the 6th and 7th consecutive shifts worked, for all hours worked on Easter Sunday and for the Statutory Holidays listed in the Master Portion of the Agreement.

GEOGRAPHIC AREA: Hamilton-Wentworth(RM); that portion of Halton(RM) lying west of Hwy 25 and Bronte Road Niagara(RM); Haldimand-Norfolk(RM); Waterloo(RM); Counties of Brant, Dufferin, Grey and Wellington

OPERATING ENGINEERS
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EPSCA WAGE SCHEDULE FOR TUNNELLING
FOR SPECIAL PROJECTS (54)

GRADE AND STEP	CLASSIFICATIONS, OCCUPATION CODES & EFFECTIVE DATES		BASE HOURLY RATE	VACATION & STAT. HOLIDAY	UNION FUNDS (2)	TOTAL WAGE PACKAGE	EPSCA ASSOC. FUND(1)
	FOREMAN - 420065						
	HEAVY DUTY MECHANIC FOREMAN - 437265 (Group 1(A) Only)						
61-9	GROUP 1 (A)	2004-06-25	29.49	2.95	9.20	41.64	0.15
		2005-05-01	30.41	3.04	9.40	42.85	0.15
		2006-05-01	31.33	3.13	9.60	44.06	0.15
62-9	GROUP 1 (B)	2004-06-25	29.01	2.90	9.20	41.11	0.15
		2005-05-01	29.93	2.99	9.40	42.32	0.15
		2006-05-01	30.85	3.09	9.60	43.54	0.15
63-9	GROUP 2 (A)	2004-06-25	28.71	2.87	9.20	40.78	0.15
		2005-05-01	29.63	2.96	9.40	41.99	0.15
		2006-05-01	30.55	3.06	9.60	43.21	0.15
64-9	GROUP 2 (B)	2004-06-25	28.55	2.86	9.20	40.61	0.15
		2005-05-01	29.46	2.95	9.40	41.81	0.15
		2006-05-01	30.38	3.04	9.60	43.02	0.15
65-9	GROUP 3 (A)	2004-06-25	26.39	2.64	9.20	38.23	0.15
		2005-05-01	27.31	2.73	9.40	39.44	0.15
		2006-05-01	28.23	2.82	9.60	40.65	0.15
66-9	GROUP 3 (B)	2004-06-25	25.39	2.54	9.20	37.13	0.15
		2005-05-01	26.31	2.63	9.40	38.34	0.15
		2006-05-01	27.23	2.72	9.60	39.55	0.15
67-9	GROUP 4 (A)	2004-06-25	24.20	2.42	9.20	35.82	0.15
		2005-05-01	25.12	2.51	9.40	37.03	0.15
		2006-05-01	26.04	2.60	9.60	38.24	0.15

(1) = per hour worked; (2) = per hour paid

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EPSCA WAGE SCHEDULE FOR TUNNELLING
FOR SPECIAL PROJECTS (54)

GRADE AND STEP	CLASSIFICATIONS, OCCUPATION CODES & EFFECTIVE DATES		BASE HOURLY RATE	VACATION & STAT. HOLIDAY	UNION FUNDS (2)	TOTAL WAGE PACKAGE	EPSCA ASSOC. FUND(1)
	SUBFOREMAN - 420055						
	HEAVY DUTY MECHANIC SUBFOREMAN - 437255 (Group 1(A) Only)						
61-8	GROUP 1 (A)	2004-06-25	27.39	2.74	9.20	39.33	0.15
		2005-05-01	28.21	2.82	9.40	40.43	0.15
		2006-05-01	29.03	2.90	9.60	41.53	0.15
62-8	GROUP 1 (B)	2004-06-25	26.91	2.69	9.20	38.80	0.15
		2005-05-01	27.73	2.77	9.40	39.90	0.15
		2006-05-01	28.55	2.86	9.60	41.01	0.15
63-8	GROUP 2 (A)	2004-06-25	26.61	2.66	9.20	38.47	0.15
		2005-05-01	27.43	2.74	9.40	39.57	0.15
		2006-05-01	28.25	2.83	9.60	40.68	0.15
64-8	GROUP 2 (B)	2004-06-25	26.45	2.65	9.20	38.30	0.15
		2005-05-01	27.26	2.73	9.40	39.39	0.15
		2006-05-01	28.08	2.81	9.60	40.49	0.15
65-8	GROUP 3 (A)	2004-06-25	24.29	2.43	9.20	35.92	0.15
		2005-05-01	25.11	2.51	9.40	37.02	0.15
		2006-05-01	25.93	2.59	9.60	38.12	0.15
66-8	GROUP 3 (B)	2004-06-25	23.29	2.33	9.20	34.82	0.15
		2005-05-01	24.11	2.41	9.40	35.92	0.15
		2006-05-01	24.93	2.49	9.60	37.02	0.15
67-8	GROUP 4 (A)	2004-06-25	22.10	2.21	9.20	33.51	0.15
		2005-05-01	22.92	2.29	9.40	34.61	0.15
		2006-05-01	23.74	2.37	9.60	35.71	0.15

(1) = per hour worked; (2) = per hour paid

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EPSCA WAGE SCHEDULE FOR TUNNELLING
FOR SPECIAL PROJECTS (54)

GRADE AND STEP	CLASSIFICATIONS, OCCUPATION CODES & EFFECTIVE DATES		BASE HOURLY RATE	VACATION & STAT. HOLIDAY	UNION FUNDS (2)	TOTAL WAGE PACKAGE	EPSCA ASSOC. FUND(1)
	OPERATING ENGINEER - 420035						
	HEAVY DUTY MECHANIC - 437235 (Group 1(A) Only)						
61-6	GROUP 1 (A)	2004-06-25	26.39	2.64	9.20	38.23	0.15
		2005-05-01	27.21	2.72	9.40	39.33	0.15
		2006-05-01	28.03	2.80	9.60	40.43	0.15
62-6	GROUP 1 (B)	2004-06-25	25.91	2.59	9.20	37.70	0.15
		2005-05-01	26.73	2.67	9.40	38.80	0.15
		2006-05-01	27.55	2.76	9.60	39.90	0.15
63-6	GROUP 2 (A)	2004-06-25	25.61	2.56	9.20	37.37	0.15
		2005-05-01	26.43	2.64	9.40	38.47	0.15
		2006-05-01	27.25	2.73	9.60	39.57	0.15
64-6	GROUP 2 (B)	2004-06-25	25.45	2.55	9.20	37.19	0.15
		2005-05-01	26.26	2.63	9.40	38.29	0.15
		2006-05-01	27.08	2.71	9.60	39.39	0.15
65-6	GROUP 3 (A)	2004-06-25	23.29	2.33	9.20	34.82	0.15
		2005-05-01	24.11	2.41	9.40	35.92	0.15
		2006-05-01	24.93	2.49	9.60	37.02	0.15
66-6	GROUP 3 (B)	2004-06-25	22.29	2.23	9.20	33.72	0.15
		2005-05-01	23.11	2.31	9.40	34.82	0.15
		2006-05-01	23.93	2.39	9.60	35.92	0.15
67-6	GROUP 4 (A)	2004-06-25	21.10	2.11	9.20	32.41	0.15
		2005-05-01	21.92	2.19	9.40	33.51	0.15
		2006-05-01	22.74	2.27	9.60	34.61	0.15

(1) = per hour worked; (2) = per hour paid

OPERATING ENGINEERS
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EPSCA WAGE SCHEDULE FOR TUNNELLING
FOR SPECIAL PROJECTS (54)

GRADE AND STEP	CLASSIFICATIONS, OCCUPATION CODES & EFFECTIVE DATES	BASE HOURLY RATE	VACATION & STAT. HOLIDAY	UNION FUNDS (2)	TOTAL WAGE PACKAGE	EPSCA ASSOC. FUND(1)

Union Funds

Union Funds contain the following items:

Welfare* -	$2.66	per hour paid
	$2.86	per hour paid - effective May 1, 2005
	$3.06	per hour paid - effective May 1, 2006
Pension -	$6.04	per hour paid
	$6.04	per hour paid - effective May 1, 2005
	$6.04	per hour paid - effective May 1, 2006
Training -	$0.50	per hour paid
	$0.50	per hour paid - effective May 1, 2005
	$0.50	per hour paid - effective May 1, 2006

* Welfare amount includes $0.05 for Bill 162 benefits.

Benefits Administration

All deductions, contributions and union dues, excluding the EPSCA Association fund, are to be sent to the following location:

International Union of Operating Engineers - Local 793
30 Commercial Road
TORONTO, ON
M4G 1Z6

Union Dues

Union Dues are not included in Union Funds. Union Dues are to be deducted from the Base Hourly Rate.
Union Dues for this Local are:

- 2% of the Total Wage Package plus $20.25 per month
- 2% of the Total Wage Package plus $20.75 per month - effective July 1, 2005

Union Dues are to be remitted to the same location as that for Benefits Administration.

OVERTIME RATE

Mon - Fri = 1-1/2x 1st 2 hrs; then 2x
Sat = 2x
Sun & Hol = 2x

GEOGRAPHIC AREA: Province of Ontario

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EPSCA WAGE SCHEDULE FOR SITE PREPARATION AND EARTH DAMS, FOR MARINE WORK, FOR SPECIAL PROJECTS (52), (57), (62), (66), (70) & (82)

GRADE AND STEP	CLASSIFICATIONS, OCCUPATION CODES & EFFECTIVE DATES		BASE HOURLY RATE	VACATION & STAT. HOLIDAY	UNION FUNDS (2)	TOTAL WAGE PACKAGE	EPSCA ASSOC. FUND(1)
	FOREMAN - 420065						
	GROUP 1						
66-9	**Windsor (52)**	**2004-06-25**	30.34	3.03	9.20	42.57	0.15
		2005-05-01	31.25	3.13	9.40	43.78	0.15
		2006-05-01	32.17	3.22	9.60	44.99	0.15
66-9	**Sarnia (52)**	**2004-06-25**	31.22	3.12	9.20	43.54	0.15
		2005-05-01	32.14	3.21	9.40	44.75	0.15
		2006-05-01	33.05	3.31	9.60	45.96	0.15
66-9	**London (52)**	**2004-06-25**	30.21	3.02	9.20	42.43	0.15
	Bruce (70)	**2005-05-01**	31.13	3.11	9.40	43.64	0.15
		2006-05-01	32.05	3.21	9.60	44.86	0.15
66-9	**Hamilton (52)**	**2004-06-25**	30.99	3.10	9.20	43.29	0.15
		2005-05-01	31.91	3.19	9.40	44.50	0.15
		2006-05-01	32.83	3.28	9.60	45.71	0.15
66-9	**Toronto (OLRB Area #8) (52)**						
	Lakeview (57)	**2004-06-25**	31.90	3.19	9.20	44.29	0.15
	Pickering (62)	**2005-05-01**	32.82	3.28	9.40	45.50	0.15
		2006-05-01	33.74	3.37	9.60	46.71	0.15
66-9	**Toronto (Outside OLRB Area #8) (52)**						
	Wesleyville(66)	**2004-06-25**	30.99	3.10	9.20	43.29	0.15
	Darlington(82)	**2005-05-01**	31.91	3.19	9.40	44.50	0.15
		2006-05-01	32.83	3.28	9.60	45.71	0.15
66-9	**Ottawa (52)**	**2004-06-25**	30.30	3.03	9.20	42.53	0.15
		2005-05-01	31.22	3.12	9.40	43.74	0.15
		2006-05-01	32.14	3.21	9.60	44.95	0.15

(1) = per hour worked; (2) = per hour paid

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EPSCA WAGE SCHEDULE FOR SITE PREPARATION AND EARTH DAMS, FOR MARINE WORK, FOR SPECIAL PROJECTS (52), (57), (62), (66), (70) & (82)

GRADE AND STEP	CLASSIFICATIONS, OCCUPATION CODES & EFFECTIVE DATES		BASE HOURLY RATE	VACATION & STAT. HOLIDAY	UNION FUNDS (2)	TOTAL WAGE PACKAGE	EPSCA ASSOC. FUND(1)
66-9	Sudbury (52)	2004-06-25	30.41	3.04	9.20	42.65	0.15
		2005-05-01	31.33	3.13	9.40	43.86	0.15
		2006-05-01	32.25	3.23	9.60	45.08	0.15
66-9	Thunder Bay (52)	2004-06-25	30.08	3.01	9.20	42.29	0.15
		2005-05-01	31.00	3.10	9.40	43.50	0.15
		2006-05-01	31.92	3.19	9.60	44.71	0.15
66-9	Sault Ste. Marie (52)	2004-06-25	30.07	3.01	9.20	42.28	0.15
		2005-05-01	30.99	3.10	9.40	43.49	0.15
		2006-05-01	31.91	3.19	9.60	44.70	0.15
	ALL AREAS						
67-9	GROUP 2	2004-06-25	26.51	2.65	9.20	38.36	0.15
		2005-05-01	27.43	2.74	9.40	39.57	0.15
		2006-05-01	28.35	2.84	9.60	40.79	0.15
68-9	GROUP 3	2004-06-25	25.64	2.56	9.20	37.40	0.15
		2005-05-01	26.55	2.66	9.40	38.61	0.15
		2006-05-01	27.47	2.75	9.60	39.82	0.15
69-9	GROUP 4	2004-06-25	24.94	2.49	9.20	36.63	0.15
		2005-05-01	25.85	2.59	9.40	37.84	0.15
		2006-05-01	26.77	2.68	9.60	39.05	0.15
70-9	GROUP 5	2004-06-25	23.55	2.36	9.20	35.11	0.15
		2005-05-01	24.47	2.45	9.40	36.32	0.15
		2006-05-01	25.39	2.54	9.60	37.53	0.15

(1) = per hour worked; (2) = per hour paid

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EPSCA WAGE SCHEDULE FOR SITE PREPARATION AND EARTH DAMS, FOR MARINE WORK, FOR SPECIAL PROJECTS (52), (57), (62), (66), (70) & (82)

GRADE AND STEP	CLASSIFICATIONS, OCCUPATION CODES & EFFECTIVE DATES		BASE HOURLY RATE	VACATION & STAT. HOLIDAY	UNION FUNDS (2)	TOTAL WAGE PACKAGE	EPSCA ASSOC. FUND(1)
71-9	GROUP 6	2004-06-25	21.57	2.16	9.20	32.93	0.15
		2005-05-01	22.49	2.25	9.40	34.14	0.15
		2006-05-01	23.41	2.34	9.60	35.35	0.15
	SUBFOREMAN - 420055						
	GROUP 1						
66-8	Windsor (52)	2004-06-25	28.24	2.82	9.20	40.26	0.15
		2005-05-01	29.05	2.91	9.40	41.36	0.15
		2006-05-01	29.87	2.99	9.60	42.46	0.15
66-8	Sarnia (52)	2004-06-25	29.12	2.91	9.20	41.23	0.15
		2005-05-01	29.94	2.99	9.40	42.33	0.15
		2006-05-01	30.75	3.08	9.60	43.43	0.15
66-8	London (52)	2004-06-25	28.11	2.81	9.20	40.12	0.15
	Bruce (70)	2005-05-01	28.93	2.89	9.40	41.22	0.15
		2006-05-01	29.75	2.98	9.60	42.33	0.15
66-8	Hamilton (52)	2004-06-25	28.89	2.89	9.20	40.98	0.15
		2005-05-01	29.71	2.97	9.40	42.08	0.15
		2006-05-01	30.53	3.05	9.60	43.18	0.15
66-8	Toronto (OLRB Area #8) (52)						
	Lakeview (57)	2004-06-25	29.80	2.98	9.20	41.98	0.15
	Pickering (62)	2005-05-01	30.62	3.06	9.40	43.08	0.15
		2006-05-01	31.44	3.14	9.60	44.18	0.15
66-8	Toronto (Outside OLRB Area #8) (52)						
	Wesleyv'le(66)	2004-06-25	28.89	2.89	9.20	40.98	0.15
	Darlington(82)	2005-05-01	29.71	2.97	9.40	42.08	0.15
		2006-05-01	30.53	3.05	9.60	43.18	0.15

(1) = per hour worked; (2) = per hour paid

OPERATING ENGINEERS
Local 793
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EPSCA WAGE SCHEDULE FOR SITE PREPARATION AND EARTH DAMS, FOR MARINE WORK, FOR SPECIAL PROJECTS (52), (57), (62), (66), (70) & (82)

GRADE AND STEP	CLASSIFICATIONS, OCCUPATION CODES & EFFECTIVE DATES		BASE HOURLY RATE	VACATION & STAT. HOLIDAY	UNION FUNDS (2)	TOTAL WAGE PACKAGE	EPSCA ASSOC. FUND(1)
66-8	Ottawa (52)	2004-06-25	28.20	2.82	9.20	40.22	0.15
		2005-05-01	29.02	2.90	9.40	41.32	0.15
		2006-05-01	29.84	2.98	9.60	42.42	0.15
66-8	Sudbury (52)	2004-06-25	28.31	2.83	9.20	40.34	0.15
		2005-05-01	29.13	2.91	9.40	41.44	0.15
		2006-05-01	29.95	3.00	9.60	42.55	0.15
66-8	Thunder Bay (52)	2004-06-25	27.98	2.80	9.20	39.98	0.15
		2005-05-01	28.80	2.88	9.40	41.08	0.15
		2006-05-01	29.62	2.96	9.60	42.18	0.15
66-8	Sault Ste. Marie (52)	2004-06-25	27.97	2.80	9.20	39.97	0.15
		2005-05-01	28.79	2.88	9.40	41.07	0.15
		2006-05-01	29.61	2.96	9.60	42.17	0.15
	ALL AREAS						
67-8	GROUP 2	2004-06-25	24.41	2.44	9.20	36.05	0.15
		2005-05-01	25.23	2.52	9.40	37.15	0.15
		2006-05-01	26.05	2.61	9.60	38.26	0.15
68-8	GROUP 3	2004-06-25	23.54	2.35	9.20	35.09	0.15
		2005-05-01	24.35	2.44	9.40	36.19	0.15
		2006-05-01	25.17	2.52	9.60	37.29	0.15
69-8	GROUP 4	2004-06-25	22.84	2.28	9.20	34.32	0.15
		2005-05-01	23.65	2.37	9.40	35.42	0.15
		2006-05-01	24.47	2.45	9.60	36.52	0.15

(1) = per hour worked; (2) = per hour paid

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Local 793
Province of Ontario

EPSCA WAGE SCHEDULE FOR SITE PREPARATION AND EARTH DAMS, FOR MARINE WORK, FOR SPECIAL PROJECTS (52), (57), (62), (66), (70) & (82)

GRADE AND STEP	CLASSIFICATIONS, OCCUPATION CODES & EFFECTIVE DATES		BASE HOURLY RATE	VACATION & STAT. HOLIDAY	UNION FUNDS (2)	TOTAL WAGE PACKAGE	EPSCA ASSOC. FUND(1)
70-8	GROUP 5	2004-06-25	21.45	2.15	9.20	32.80	0.15
		2005-05-01	22.27	2.23	9.40	33.90	0.15
		2006-05-01	23.09	2.31	9.60	35.00	0.15
71-8	GROUP 6	2004-06-25	19.47	1.95	9.20	30.62	0.15
		2005-05-01	20.29	2.03	9.40	31.72	0.15
		2006-05-01	21.11	2.11	9.60	32.82	0.15
	GROUP I - OPERATING ENGINEER - 420035						
66-6	Windsor (52)	2004-06-25	27.24	2.72	9.20	39.16	0.15
		2005-05-01	28.05	2.81	9.40	40.26	0.15
		2006-05-01	28.87	2.89	9.60	41.36	0.15
66-6	Sarnia (52)	2004-06-25	28.12	2.81	9.20	40.13	0.15
		2005-05-01	28.94	2.89	9.40	41.23	0.15
		2006-05-01	29.75	2.98	9.60	42.33	0.15
66-6	London (52)	2004-06-25	27.11	2.71	9.20	39.02	0.15
	Bruce (70)	2005-05-01	27.93	2.79	9.40	40.12	0.15
		2006-05-01	28.75	2.88	9.60	41.22	0.15
66-6	Hamilton (52)	2004-06-25	27.89	2.79	9.20	39.88	0.15
		2005-05-01	28.71	2.87	9.40	40.98	0.15
		2006-05-01	29.53	2.95	9.60	42.08	0.15
66-6	Toronto (OLRB Area #8) (52)						
	Lakeview (57)	2004-06-25	28.80	2.88	9.20	40.88	0.15
	Pickering (62)	2005-05-01	29.62	2.96	9.40	41.98	0.15
		2006-05-01	30.44	3.04	9.60	43.08	0.15

(1) = per hour worked; (2) = per hour paid

OPERATING ENGINEERS
Local 793
Province of Ontario

EPSCA WAGE SCHEDULE FOR SITE PREPARATION AND EARTH DAMS, FOR MARINE WORK, FOR SPECIAL PROJECTS (52), (57), (62), (66), (70) & (82)

GRADE AND STEP	CLASSIFICATIONS, OCCUPATION CODES & EFFECTIVE DATES		BASE HOURLY RATE	VACATION & STAT. HOLIDAY	UNION FUNDS (2)	TOTAL WAGE PACKAGE	EPSCA ASSOC. FUND(1)
66-6	Toronto (Outside OLRB Area #8) (52)						
	Wesleyville(66) Darlington(82)	2004-06-25	27.89	2.79	9.20	39.88	0.15
		2005-05-01	28.71	2.87	9.40	40.98	0.15
		2006-05-01	29.53	2.95	9.60	42.08	0.15
66-6	Ottawa (52)	2004-06-25	27.20	2.72	9.20	39.12	0.15
		2005-05-01	28.02	2.80	9.40	40.22	0.15
		2006-05-01	28.84	2.88	9.60	41.32	0.15
66-6	Sudbury (52)	2004-06-25	27.31	2.73	9.20	39.24	0.15
		2005-05-01	28.13	2.81	9.40	40.34	0.15
		2006-05-01	28.95	2.90	9.60	41.44	0.15
66-6	Thunder Bay (52)	2004-06-25	26.98	2.70	9.20	38.88	0.15
		2005-05-01	27.80	2.78	9.40	39.98	0.15
		2006-05-01	28.62	2.86	9.60	41.08	0.15
66-6	Sault Ste. Marie (52)	2004-06-25	26.97	2.70	9.20	38.87	0.15
		2005-05-01	27.79	2.78	9.40	39.97	0.15
		2006-05-01	28.61	2.86	9.60	41.07	0.15
	ALL AREAS						
67-6	GROUP 2	2004-06-25	23.41	2.34	9.20	34.95	0.15
		2005-05-01	24.23	2.42	9.40	36.05	0.15
		2006-05-01	25.05	2.51	9.60	37.15	0.15
68-6	GROUP 3	2004-06-25	22.54	2.25	9.20	33.99	0.15
		2005-05-01	23.35	2.34	9.40	35.09	0.15
		2006-05-01	24.17	2.42	9.60	36.19	0.15

(1) = per hour worked; (2) = per hour paid

OPERATING ENGINEERS
Local 793
Province of Ontario

EPSCA WAGE SCHEDULE FOR SITE PREPARATION AND EARTH DAMS, FOR MARINE WORK, FOR SPECIAL PROJECTS (52), (57), (62), (66), (70) & (82)

GRADE AND STEP	CLASSIFICATIONS, OCCUPATION CODES & EFFECTIVE DATES		BASE HOURLY RATE	VACATION & STAT. HOLIDAY	UNION FUNDS (2)	TOTAL WAGE PACKAGE	EPSCA ASSOC. FUND(1)
69-6	GROUP 4	2004-06-25	21.84	2.18	9.20	33.22	0.15
		2005-05-01	22.65	2.27	9.40	34.32	0.15
		2006-05-01	23.47	2.35	9.60	35.42	0.15
70-6	GROUP 5	2004-06-25	20.45	2.05	9.20	31.70	0.15
		2005-05-01	21.27	2.13	9.40	32.80	0.15
		2006-05-01	22.09	2.21	9.60	33.90	0.15
71-6	GROUP 6	2004-06-25	18.47	1.85	9.20	29.52	0.15
		2005-05-01	19.29	1.93	9.40	30.62	0.15
		2006-05-01	20.11	2.01	9.60	31.72	0.15

(1) = per hour worked; (2) = per hour paid

Union Funds

Union Funds contain the following items:

Welfare* -	$2.66	per hour paid
	$2.86	per hour paid - effective May 1, 2005
	$3.06	per hour paid - effective May 1, 2006
Pension -	$6.04	per hour paid
	$6.04	per hour paid - effective May 1, 2005
	$6.04	per hour paid - effective May 1, 2006
Training -	$0.50	per hour paid
	$0.50	per hour paid - effective May 1, 2005
	$0.50	per hour paid - effective May 1, 2006

* Welfare amount includes $0.05 for Bill 162 benefits.

OPERATING ENGINEERS
Local 793
Province of Ontario

EPSCA WAGE SCHEDULE FOR SITE PREPARATION AND EARTH DAMS, FOR MARINE WORK, FOR SPECIAL PROJECTS (52), (57), (62), (66), (70) & (82)

GRADE AND STEP	CLASSIFICATIONS, OCCUPATION CODES & EFFECTIVE DATES	BASE HOURLY RATE	VACATION & STAT. HOLIDAY	UNION FUNDS (2)	TOTAL WAGE PACKAGE	EPSCA ASSOC. FUND(1)

Benefits Administration

All deductions, contributions and union dues, excluding the EPSCA Association fund, are to be sent to the following location:

International Union of Operating Engineers - Local 793
30 Commercial Road
TORONTO, ON
M4G 1Z6

Union Dues

Union Dues are not included in Union Funds. Union Dues are to be deducted from the Base Hourly Rate.
Union Dues for this Local are:

- 2% of the Total Wage Package plus $20.25 per month
- 2% of the Total Wage Package plus $20.75 per month - effective July 1, 2005

Union Dues are to be remitted to the same location as that for Benefits Administration.

OVERTIME RATE

Windsor & Ottawa

Mon - Fri = 1-1/2x 1st 2 hrs; then 2x
Sat = 2x
Sun & Hol = 2x

Toronto (OLRB Area #8 & Balance of Toronto Local Area)

Mon - Fri = 1-1/2x 1st 1 hr; then 2x
Sat = 2x
Sun & Hol = 2x

All Other Areas:

Mon - Fri = 2x
Sat = 2x
Sun & Hol = 2x

GEOGRAPHIC AREA: Province of Ontario

Teamsters

INTERNATIONAL BROTHERHOOD OF TEAMSTERS' APPENDIX

The amendments contained in the Statement of Settlement, dated January 28, 1999, have been incorporated into the Teamsters' Appendix in accordance with the "Term of Agreement" article contained in the Master Portion of this Agreement.

EPSCA / TEAMSTER APPENDIX

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INTERNATIONAL BROTHERHOOD OF TEAMSTERS' APPENDIX

to the

Collective Agreement

by and between

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION (hereinafter called "EPSCA")

and the

ONTARIO ALLIED CONSTRUCTION TRADES COUNCIL (hereinafter called the "Council")

As provided in the "Appendices" article of the Master Portion of the Collective Agreement, EPSCA and the Council have agreed to the following conditions to apply to employees in classifications listed in Article 1 of this Appendix, subject to the following:

The "Wages", "Benefits", "Shift Differential Rate" and "Overtime Rates" articles of this Appendix and the "Hours of Work" article of the Master Portion of this Agreement do not apply for driveway and parking lot construction. When such work is undertaken, the wages, benefits, weekly hours of work, shift differential rate and overtime rates appropriate for this work shall be as established by the nearest influencing representative agreements between locals of the Union and contractors' associations or contractors for construction work of a related nature.

Article 1

CLASSIFICATIONS

1.1 The Teamster classifications covered by this Appendix are divided into three groups as set out below:

GROUP 1

Driver
- all vehicles except as listed in Groups 2 and 3 below
- bus
- farm tractor
- forklift up to and including 8 tons

Outboard Motor Boatman
Inboard Motor Boatman under 24 feet
Material Checker - Blanket Stores and Weigh Scales
Serviceman
Warehouseman to Start
Helper
Dispatcher

GROUP 2

Driver
- fully equipped line truck
- self-loading/off-loading boom or A-frame equipped truck
- truck with tag-along float
- truck with pole trailer
- cross-country vehicle (tracked and rubber tired articulated frame, such as Nodwell, Go-Tract, Foremost, Bombardier, Treefarmer)
- single unit, Euclid-Type excavation truck
- forklift over 8 tons
- truck with T3 pole trailer
- redi-mix

Warehouseman after 12 months

GROUP 3

Driver
- float
- tractor, semi-trailer
- belly-dump type, such as Euclid, DW20, DW21
- truck with T5 pole trailer
- Self-loading/off-loading Boom Truck (8 tons and over boom capacity)

Inboard Motor Boatman - 24 feet and over
Articulated Dump Truck

Note: Drivers operating a vehicle or a boat carrying explosives shall be paid the appropriate rate for vehicle/ boat being operated, but in no case less than the Group 1 rate.

1.2 The Warehouseman classifications covered by this Appendix are as set out below:

Warehouseman after 12 months
Warehouseman to start
Helper

1.3 The Subforeman classification covered by this Appendix is as set out below:

Teamster Subforeman

Article 1.4 is applicable only to work covered by Addendum I - Modified Provisions

1.4 Working Foreman
When the crew size is five (5) or less, including the foreman, the foreman may be required to work with the tools of the trade.

Article 2

WAGES

2.1 REV Wage rates for employees in the classifications listed in Article 1 of this Appendix shall be as set forth in the wage schedules, attached hereto, and will remain in effect until April 30, 2000.

2.2 Differentials for Teamster Groups are as follows:

Group 1	-	Base rate
Group 2	-	Group 1 base rate plus 35¢ per hour
Group 3	-	Group 1 base rate plus 60¢ per hour
Subforeman	-	Group 2 rate plus 50% of Foreman's differential

Article 3

SHIFT DIFFERENTIAL RATE

3.1 Employees required to work shifts other than the regular day shift shall receive a shift differential of one-seventh (1/7) or normal scheduled shift hours worked.

Employees required to work on the third shift of a three-shift operation shall receive a shift differential of one-fifth (1/5) for normal scheduled shift hours worked.

Article 4

OVERTIME RATES

4.1 REV Overtime rates are paid for work performed outside of normal hours as defined in the "Hours of Work" article of the Master Portion of this Agreement and for work performed on Saturday, Sunday and the Statutory Holidays listed in Article 13 of this Appendix.

4.2 Overtime rates of pay for employees in the classifications listed in Article 1 of this Appendix shall be as set forth in the wage schedules, attached hereto.

4.3 EPSCA will provide the Council with current wage schedules.

4.4 Stewards must be given the first opportunity to work overtime in accordance with Article 8.3 of the Master Portion.

Article 5

BENEFITS

5.1 All Employers agree to pay welfare and pension contributions on behalf of their employees to the operative benefit plans as designated by the Union. The amount(s) of welfare and pension contributions to be paid will be set out in the wage schedules, attached hereto.

5.2 The Union agrees to supply the Employer with all information regarding these welfare and pension plans and also all administrative material that is required for implementation of these payments.

5.3 Any changes in the welfare or pension plan contributions recognized under this Agreement will be confirmed, in writing, by the Union to EPSCA before such changes are to be put into effect. Within three (3) weeks of receipt of an acceptable written notice, such changes will be implemented. The effective date will be the date of implementation. Should welfare or pension plan contributions change during the term of this Agreement, then an adjustment may be made to the base rate. The total wage package will not be changed.

5.4 In the event an Employer is more than fifteen (15) days in arrears of the requirement to forward contributions and/or deductions to the Trustees by the fifteenth of the month following, the Employer shall pay as liquidated damages and not as a penalty an amount equal to two (2 %) percent (equivalent to 24 % per annum) for each month or part thereof that the contributions and/or deductions are in default for greater than fifteen (15) days provided the Employer has received five (5) days' written notice to correct such default. The trustees may require a delinquent Employer to pay for the costs, legal or otherwise, of collecting the amount owing, as outlined in the operative benefit plan trust documents.

5.5 The Trustees of the Employee Benefit Plans referred to in this Collective Agreement shall promptly notify the Union of the failure by any Employer to pay any employee benefit contributions required to be made under this Collective Agreement and which are owed under the said plans in order that the program administrator of the Employee Wage Protection Plan may deem that there has been an assignment of compensation under the said program in compliance with the regulation to the *Employment Standards Amendment Act, 1991* in relation to the Employee Wage Protection Program.

Article 6

INCLEMENT WEATHER PAY

6.1 An employee who reports for work at the beginning of a shift and is unable to commence work due to inclement weather, will receive two (2) hours' pay at the applicable rate. To qualify, the employee must remain on the job site for two (2) hours unless excused earlier by an authorized representative of the Employer.

6.2 An employee who reports for and commences work but is unable to continue work due to inclement weather, shall receive two (2) hours' pay at the applicable rate or pay for the actual time worked for that shift, whichever is greater.

6.3 An employee who qualifies for inclement weather pay shall also receive travel or board allowance, if applicable.

Article 7

KEY EMPLOYEES

7.1 Employers reserve the right to transfer employees from one location to another to effectively utilize their special skills, having regard for the special requirements of thermal, nuclear or hydraulic generation and transmission and transformation construction.

7.2 The number of key employees to be transferred will be jointly determined at a pre-job conference provided for in the Master Portion.

Article 8

TRAVEL AND TRANSPORTATION

8.1 INITIAL EMPLOYMENT

On recruitment of tradesmen whose regular residence or place of recruitment, whichever is closer to the project, is between 81 to 161 radius kilometers from the project, the Employer shall pay $25.00 for the initial trip to the project.

8.2 ONTARIO RESIDENTS

On recruitment of tradesmen whose regular residence is beyond 161 radius kilometers from the project, the Employer shall pay mileage based on 25¢ per radius kilometer plus an allowance for travel time based on one (1) hour's pay for each 80 radius kilometers of travel to a maximum of eight (8) hours' pay for the initial trip to the project from the tradesman's regular residence or place of recruitment, whichever is closer to the project.

8.3 NON-ONTARIO RESIDENTS

On recruitment of tradesmen whose regular residence is beyond 161 radius kilometers from the project, the Employer shall pay the equivalent of the cost of public transportation plus an allowance for travel time based on one (1) hour's pay for each 80 radius kilometers of travel to a maximum of eight (8) hours' pay for the initial trip to the project from the tradesman's regular residence or place of recruitment, whichever is closer to the project.

8.4 To qualify for payment in 8.1, 8.2 or 8.3, the employee must remain at the project for a minimum of fifteen (15) working days or the duration of the job, whichever is lesser.

8.5 On termination of employment due to a reduction of staff, an employee entitled to payment under 8.1, 8.2, or 8.3 shall be entitled to return expenses calculated in the same manner as in 8.1, 8.2, or 8.3 above for the return trip from the project to the tradesman's regular residence or place of recruitment, whichever is closer to the project. An employee whose employment terminates for any reason other than reduction of staff shall not be eligible for return payment.

8.6 TRANSFER

When transferring employees the Employer shall pay the equivalent of the cost of public transportation for the initial trip to the project from the employee's most recent work location. In addition, the Employer shall pay an allowance for travelling time at straight-time rates up to a maximum of eight (8) hours.

Article 9

TOOLS

9.1 Employers may supply tools and equipment to employees. Employees receiving such tools or equipment shall be responsible for them in accordance with the "Tools and Clothing" article of the Master Portion of this Agreement. Employees will be charged for tools which are lost and not reported immediately.

Article 10

PROTECTIVE CLOTHING AND EQUIPMENT

10.1 Employees are required to wear protective clothing and use protective equipment, as determined by the Employer, for the work being done.

When in the opinion of the Employer it is required, wet weather clothing including rubber boots will be supplied by the Employer subject to the provisions of 10.2. This shall not be unreasonably withheld.

10.2 The protective clothing and equipment, covered in 10.1 of this article, that is provided by the Employer will be charged out to the employee and the employee shall be responsible for the return of such clothing and equipment to his Employer.

Article 11

LAYOFF PROCEDURE

11.1 The layoff of employees covered by this Agreement shall, in general, be governed by the following:

(a) For the purpose of this article, there shall be three (3) groups of employees:

(i) Drivers

(ii) Warehousemen

(iii) Helpers

(b) Seniority will be based on the length of continuous service with the Employer.

(c) In a layoff situation, seniority will only apply at the project or within the zone.

(d) In the event of a reduction of staff, the most junior employee in their respective group (Drivers, Warehousemen, Helpers) having the surplus will be laid off, assuming those remaining are capable and have the necessary skills and ability to satisfactorily perform the work to be done.

(e) Subforeman shall be laid off in their respective classifications (drivers, warehousemen or helpers).

Article 12

VACATION PAY

NEW

12.1 The Vacation Pay rate shall be four (4) percent of vacationable gross earnings*. Payment shall be made weekly on the employee's regular pay cheque.

A three (3) week leave of absence for the purpose of taking an annual vacation will be granted in the calendar year in which the employee completes one year of continuous service with the Employer. In special circumstances, where the work schedule permits, additional time off may be granted an employee. The additional time off will not be unreasonably denied.

Article 13

STATUTORY HOLIDAYS

NEW

13.1 The Statutory Holiday pay rate shall be six (6) percent of vacationable gross earnings. Payment shall be made weekly on the employee's regular pay cheque.

The Statutory Holidays recognized under this Agreement are:

New Year's Day	Civic Holiday
Good Friday	Labour Day
Easter Monday	Thanksgiving Day
Victoria Day	Christmas Day
Canada Day	Boxing Day

EPSCA agrees to recognize Heritage Day when proclaimed by legislation.

Recognized holidays falling on a Saturday or Sunday shall be observed on the following Monday. When Christmas Day falls on a Saturday or Sunday, it shall be observed on the following Monday and Boxing Day on the following Tuesday. When New Year's Day falls on a Saturday or Sunday, it shall be observed on either the preceding Friday or the following Monday.

EPSCA reserves the right to change the day of observance of a Statutory Holiday when such a holiday falls on a Tuesday or Thursday.

* ***"Vacationable gross earnings" means pay for regular hours, overtime, premium pay, shift differential, lines and stations daily travel time, retroactive pay adjustments, reporting pay, inclement weather pay, call-in pay, Saturday and Sunday premiums and trade training, but does not include payment for initial and return travel.***

The incorporated specific Statement of Settlement amendments to the International Brotherhood of Teamsters' Appendix of the Collective Agreement between The Electrical Power Systems Construction Association and The Ontario Allied Construction Trades Council have been agreed to by the bargaining committees of the Teamsters and The Electrical Power Systems Construction Association. These proposed amendments are herewith recommended to the EPSCA Board of Directors and the Officers of the Council in accordance with Articles 34.4 and 34.5 of the Master Portion of the Collective Agreement for approval and incorporation into the Teamsters' Appendix of the Collective Agreement.

Dated this 28th day of January, 1999.

Ron Burns	*Neil Donnelly*
Matt Elliot	
for the Teamsters	**for the EPSCA**

Approved for incorporation into the Teamsters' Appendix
effective this *16th* day of *August* , 1999.

For: The Electrical Power Systems Construction Association	For: **The Ontario Allied Construction Trades Council**
Joe Dotchin	*Matthew Elliot*
Barry Roberts	*Bryon Black*

ADDENDUM 1

MODIFIED PROVISIONS OF THIS CONSTRUCTION APPENDIX

These provisions will apply to:

(a) all work on Lines and Stations, and

(b) all work on existing generating sites except the construction of:

- a new facility which provides a new function
- a new (i.e. additional) generating unit

Definitions:

Facility Something that is built composed of multi-systems which serves a specific function

Function Examples - Generation, Administration, Warehousing, Heavy Water Production, Flue Gas Desulphurization, Tritium Removal, Site Services (e.g. Shops)

Dispute Resolution Process

A dispute as to whether the 'Modified Provisions of this Construction Agreement' apply to the construction of a new facility will be referred to the Executive Committee for resolution and the Executive Committee will meet within five (5) working days. If the Executive Committee is unable to resolve the dispute, the dispute will be referred to a single arbitrator within ten (10) working days for a final and binding resolution. The arbitrator shall give an oral decision within five (5) working days, and a written decision, if requested, within twenty (20) working days.

All terms of this appendix shall apply to work covered by Addendum 1.

MEMORANDUM OF SETTLEMENT

Between

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION

And

INTERNATIONAL BROTHERHOOD OF TEAMSTERS

Dated this 10th day of July, 2000

The following are amendments agreed to by the Bargaining Committees of the International Brotherhood of Teamsters and the Electrical Power Systems Construction Association for the renewal of the Collective Agreement between the parties, which expires on April 30, 2000. The renewed collective agreement is effective the date of ratification.

HOUSEKEEPING

Amend various references to Ontario Hydro and Ontario Allied Construction Trades Council.

ARTICLE 10 WORK ASSIGNMENT

Add the following new paragraph to 10.2 (b):

"In the Electricity Production Zones when work falls within this criteria the EPSCA Office will send out a "Notification of Work" along with a copy of the original minutes of mark-up meeting(s) to the Local Unions prior to work commencing. This procedure shall not preclude the Union's right to contest previously assigned work, if the work is in a Local Union jurisdiction other than the one it was marked up in."

Amend the asterisked footnote to read as follows:

- For the purposes of this Article, Nanticoke, Lambton, Lakeview/Hearn, BNPD, Pickering, Darlington, Lines and Stations and the 5 Electricity Production Zones are each considered individual project sites.

ARTICLE 14 PAY PROCEDURE

Add:

"the employer may implement direct deposit pay by mutual agreement."

ARTICLE 16 REPORTING PAY

Insert the following information:

Article 16 is applicable to work at Existing Generating Sites where work involves construction of a new facility (new function) and/or new (additional) generating unit(s) and at New Generating Sites (ie: Greenfield Work).

For work at Existing Generating Sites <u>excluding</u> work involving construction of a new facility (new function) and/or new (additional) generating unit(s) please refer to Section 3 – Modified Provisions of this Construction Agreement.

ARTICLE 17 GENERATION PROJECTS DAILY TRAVEL ALLOWANCE AND ROOM AND BOARD

Amend Article 17.1 as follows:

June 1, 2000 - increase each travel ring by $1.00
May 1, 2001 - increase each travel ring by $0.50
May 1, 2002 - increase each travel ring by $0.50
May 1, 2003 - increase each travel ring by $0.50

Amend Article 17.2 (b) as follows:

June 1, 2000 - increase allowances by $2.00
May 1, 2001 - increase allowances by $2.00
May 1, 2002 - increase allowances by $2.00
May 1, 2003 - increase allowances by $2.00

Amend Article 17.2 (c) as follows:

June 1, 2000 - increase allowance by $2.00
May 1, 2001 - increase allowance by $2.00
May 1, 2002 - increase allowance by $2.00
May 1, 2003 - increase allowance by $2.00

Amend Article 17.2 (d) as follows:

June 1, 2000 - increase allowance by $3.45
May 1, 2001 - increase allowance by $3.00
May 1, 2002 - increase allowance by $3.00
May 1, 2003 - increase allowance by $3.00

ARTICLE 18 LINES AND STATIONS CONSTRUCTION DAILY TRAVEL ALLOWANCE AND ROOM AND BOARD

Amend Article 18.1 as follows:

June 1, 2000 - increase each travel ring by $1.00
May 1, 2001 - increase each travel ring by $0.50
May 1, 2002 - increase each travel ring by $0.50
May 1, 2003 - increase each travel ring by $0.50

Amend Article 18.3 (b) and 18.3 (c) as follows:

June 1, 2000 - increase allowance by $2.00
May 1, 2001 - increase allowance by $2.00
May 1, 2002 - increase allowance by $2.00
May 1, 2003 - increase allowance by $2.00

Add new Article 18.3 (d):

"When an employee's regular residence is more than five hundred (500) radius kilometers from the project, and the job or project is worked on a four ten (4x10) hour work week, the employee shall receive room and board allowance on a five day basis for a regular work week. If the employee is required to work an additional ten (10) hour shift beyond the normal four ten (4x10) hour shift, the employee will be entitled to room and board allowance for an additional ten (10) hour shift worked to a maximum of seven (7) days room and board in a week."

ARTICLE 23 MEALS ON OVERTIME

Insert the following information:

Article 23 is applicable to work at Existing Generating Sites where work involves construction of a new facility (new function) and/or new (additional) generating unit(s) and at New Generating Sites (ie: Greenfield Work).

For work at Existing Generating Sites excluding work involving construction of a new facility (new function) and/or new (additional) generating unit(s) please refer to Section 4 – Modified Provisions of this Construction Agreement.

ARTICLE 33 MODIFIED PROVISIONS OF THIS CONSTRUCTION AGREEMENT

Make the following changes to this Article then delete this Article and move language to the new "Appendix D for Modified Provisions of this Construction Agreement".

Amend Article 33.4 to read:

"All terms of this collective agreement shall apply to work covered by this Appendix, with the exception of Article 16 – Reporting Pay, Article 17 – Generation Projects Daily Travel Allowance and Room and Board, Article 23 – Meals on Overtime and Article 26 – Hours of Work."

Make the following changes to Article 33.5 and then move to the new "Appendix D for Modified Provisions of this Construction Agreement" and re-title as Section 1 – Generation Projects Daily Travel Allowance and Room and Board.

Amend Article 33.5.1 as follows:

Daily Travel Allowance

June 1, 2000 - increase each travel ring by $1.00
May 1, 2001 - increase each travel ring by $0.50
May 1, 2002 - increase each travel ring by $0.50
May 1, 2003 - increase each travel ring by $0.50

Amend Article 33.5.2 as follows:

Room and Board

Article 33.5.2 (b) and (c) :

June 1, 2000 – increase allowances by $2.00
May 1, 2001 – increase allowances by $2.00
May 1, 2002 – increase allowances by $2.00
May 1, 2003 – increase allowances by $2.00
Article 33.5.2 (d):

June 1, 2000 – increase allowance by $3.45
May 1, 2001 – increase allowance by $3.00
May 1, 2002 – increase allowance by $3.00
May 1, 2003 – increase allowance by $3.00

Make the following changes to Article 33.6 and then move to the new "Appendix D for Modified Provisions of this Construction Agreement" and re-title as Section 2 – Hours of Work.

Delete first paragraph of 33.6

Amend second paragraph of 33.6.1 to read:

"The weekly hours of work for all employees may be arrived at by having the employees work four (4) consecutive ten-hour shifts, either Monday –Thursday or Tuesday – Friday but not concurrently on the same project, or by having the employees work five (5) consecutive eight-hour shifts. Weekly hours of work will be established for a minimum period of thirty (30) days. If an employer, with the approval of the owner, intends to change the weekly hours of work, a minimum of fifteen (15) days written notice shall be sent to the Local Union."

Amend third paragraph of 33.6.1 to read:

"The start time for the day shift shall be 8:00 a.m. with a possible one (1) hour variance either way. The start time for the afternoon shift shall be immediately following the day shift or within one (1) hour either way to coincide with the end of the day shift."

Add New:

APPENDIX D

MODIFIED PROVISIONS OF THIS CONSTRUCTION AGREEMENT

Move existing Article 33.1, 33.2, 33.3, 33.4 language to this Appendix.

Re-number and re-title existing Article 33.5 to read Section 1 – Generation Projects Daily Travel Allowance and Room and Board.

Re-number and re-title existing Article 33.6 to read Section 2 – Hours of Work.

Add new:

SECTION 3 – Reporting Pay on 8 Hour and 10 Hour Shifts.

"An employee who reports for work, unless directed not to report the previous day by his Employer, shall receive a minimum of a half shifts pay (4 hours or 5 hours) at the applicable rate when he reports for work, but is given no opportunity to work because none is available. This allowance will be paid to an employee if he is requested to report for any part of the first half of a shift and an additional half shifts pay (4 hours or 5 hours) will also be paid if he is requested to report for work for any part of the second half of the same shift. It is not intended by this Section that an employee receive a reporting pay allowance greater than his pay for normal daily hours.

An employee in receipt of reporting pay shall also receive travel or board allowance, if applicable.

Notwithstanding that work is available and an employee is able to commence or continue work, the Employer may shut down a job to avoid the possible loss of human life because of an emergency situation such as H2S leaks, bomb threats, fire, etc., that could endanger the life and safety of an employee. In such cases, employees will be compensated only for the actual time worked."

Add new:

SECTION 4 – MEALS ON OVERTIME

Scheduled Eight (8) Hour Shifts

When an employee has not been notified the previous day that he will be required to work for more than two (2) hours beyond the normal quitting time of the first or second shifts or for more than three and one half (3 ½) hours beyond the normal quitting time of the third shift, he shall be provided with a meal and be allowed thirty (30) minutes to consume same and the employee shall be paid at the base hourly rate of pay. This meal break will be taken following the first two (2) hours of overtime worked. After each additional four (4) is worked and when work is required beyond that four (4) hour period, the employee shall be allowed thirty (30) minutes to eat and be paid at the base hourly rate of pay and he shall be provided with a meal. The Employer will supply a hot meal when possible. Where an employee has been notified the previous day, no meal will be provided after the first two (2) hours of overtime worked, but the employee will be allowed thirty (30) minutes to eat and be paid at the base hourly rate of pay. After each additional four (4) hours is worked and when work is required beyond that four (4) hour period, the employee shall be allowed thirty (30) minutes to eat and be paid at the base hourly rate of pay and he shall be provided with a meal.

When a paid meal period overlaps a rest period, the paid meal period will supplant the rest period.

The above-noted is not applicable to the first eight (8) hours worked on Saturdays, Sundays or Recognized Holidays for employees who normally work the first or second shifts.

The above-noted is not applicable to the first six and one half (6 ½) hours worked on Saturdays, Sundays or Recognized Holidays for employees who normally work the third shift.

Scheduled Ten (10) Hour Shifts

When an employee has not been notified the previous day that he will be required to work beyond his normal quitting time, prior to commencing the overtime work, he shall be provided with a meal and be allowed thirty (30) minutes to consume same and the employee shall be paid at the base hourly rate of pay. After each additional four (4) hours is worked and when work is required beyond that four (4) hour period, the employee shall be allowed thirty (30) minutes to eat and be paid at the base hourly rate of pay and he shall be provided with a meal. The Employer will supply a hot meal when possible. Where an employee has been notified the previous day, no meal will be provided prior to commencement of overtime work, but the employee will be allowed thirty (30) minutes to eat and be paid at the base hourly rate of pay. After each additional four (4) hours is worked and when work is required beyond that four (4) hour period, the employee shall be allowed thirty (30) minutes to eat and be paid at the base hourly rate of pay and he shall be provided with a meal.

The above-noted is not applicable to the first ten (10) hours worked on Saturdays, Sundays or Recognized Holidays for employees who normally work the first and second shifts.

When a paid meal period overlaps a rest period, the paid meal period will supplant the rest period.

ARTICLE 34 TERM OF AGREEMENT

Amend Article 34.1 to read:

"This Agreement shall continue in full force and effect from May 1, 2000 until April 30, 2004 inclusive, and thereafter it shall be considered automatically renewed for successive periods of two (2) years unless at least sixty (60) days prior to the end of any two (2) year period, either party serves written notice upon the other that it desires termination, revision or modification of any provision or provisions of this Agreement."

Delete the balance of Article 34.

Re-number Article 34 to be Article 33.

APPENDIX B - 7 DAY COVERAGE - NUCLEAR SITES

Amend second paragraph to read:

These provisions would only apply to work performed on a Nuclear Facility and the work must be covered by the "Modified Provisions of this Construction Agreement".

FOREMAN APPENDIX

Amend Article 5.1 (a) (i) to read: "$3.00 per hour above the journeyman rate."

WAGES

The following wage increases will be reflected as follows:

June 1, 2000 - $0.50
May 1, 2001 - $0.90
May 1, 2002 - $0.90
May 1, 2003 - $0.95

NEW ARTICLE: RADIATION PROTECTION

Construction Radiation Protection Assistant (R.P.A.) is a Construction Trades Person who has achieved the full radiation qualification (Green) via the approved Ontario Hydro Training Program, plus has successfully completed the construction R.P.A. training and checkouts, also has performed R.P.A. functions while under supervision of a fully qualified Construction R.P.A. to the satisfaction of the Construction Site Safety Officer and the Station Health Physics Unit.

R.P.A. will be paid the appropriate equivalent foreman's rate when performing an R.P.A. function and will report to the Site Safety Unit. R.P.A. is a "qualification" and not a "trade function" irrespective of union or trade affiliation.

NEW ARTICLE: GREENMAN RECALL

In the case of a recall to work, Employers reserve the right to recall Green qualified Atomic Radiation Workers in sequence from the out of work list to the location from which they were laid off. Recalled Greenmen will perform only Greenman work and will not work with the tools as a Teamster.

ADD NEW SENTENCE TO ARTICLE 1.4:

"The foreman, if not already eligible to act as a working foreman during the normal scheduled hours of work, will not act as a working foreman on overtime."

* A crew is defined as a foreman and the total number of tradespersons directly supervised

NEW ARTICLE: RECALL

The Employer may recall former employees who had previously been on the payroll of the Employer.

A member, at date of recall, must be in good standing in the Union and be registered as unemployed with the local union having jurisdiction where the work is to be performed. Before commencing work, the member must be given a referral slip. To qualify for recall a former employee must be requested within six (6) calendar months of termination. The former employee must have been on the payroll of the Employer for at least thirty (30) calendar days in order to be eligible for recall. In order to use this Recall article, an Employer must have previously worked under this Collective Agreement.

A new collective agreement will be comprised of the 1998 - 2000 OACTC Master Portion Collective Agreement, Teamsters' Appendix and Foreman Appendix as amended by this Memorandum of Settlement.

This settlement represents all outstanding issues and amendments between the parties and this Memorandum of Settlement will be presented by the parties to their respective principals with a unanimous recommendation for ratification.

All monetary items are effective June, 1, 2000.

Dated at Toronto this 10th day of July, 2000

Signing for the Teamsters	Signing for EPSCA
E. Hawrysh	*B. Roberts*
G. Kitchen	*H. Viveiros*
E. Milley	*R. Rioux*
R. Burns	

STATEMENT OF UNDERSTANDING

Between

THE ELECTRICAL POWER SYSTEMS
CONSTRUCTION ASSOCIATION

And

INTERNATIONAL BROTHERHOOD OF TEAMSTERS

EMPLOYMENT REFERRALS

It is agreed by the Parties to this understanding, that prior to any member being referred for employment under this agreement, the member must submit to a security check. Only members who successfully obtain security clearance will be referred for employment. Once a member has been hired on, they will receive an allowance of $50.00 on their first weeks pay cheque, in consideration of their time spent filling out the security clearance forms.

The union will be notified, as soon as possible, whether or not an individual has successfully obtained security clearance. This pre-clearance does not prohibit the Union from filing a grievance against the Employer on behalf of any member who is refused employment due to his/her failure to obtain security clearance.

Dated at Toronto, this 10th day of July, 2000.

E. Hawrysh	*B. Roberts*
Teamsters	EPSCA

G. Kitchen
E. Milley
R. Burns

STATEMENT OF UNDERSTANDING

Between

THE ELECTRICAL POWER SYSTEMS
CONSTRUCTION ASSOCIATION

And

INTERNATIONAL BROTHERHOOD OF TEAMSTERS

HIRING AND MOBILITY REOPENER

The Union agrees that, in the event of legislation being introduced in the ICI sector that would put EPSCA at a disadvantage regarding hiring and mobility, they would reopen negotiations to deal with these issues. If the parties are unable to come to an agreement on hiring and mobility, EPSCA will be afforded the same hiring and mobility provisions that are provided in the ICI agreements.

Dated at Toronto, this 10th day of July, 2000.

E. Hawrysh	*B. Roberts*
Teamsters	EPSCA

G. Kitchen
E. Milley
R. Burns

TEAMSTER
Local 230
St. Catharines

EPSCA WAGE SCHEDULE FOR HYDRO ONE PROJECTS WITHIN THE GEOGRAPHIC AREA OF THIS LOCAL (52) - FOR HYDRO ONE EMPLOYEES ONLY

GRADE AND STEP	CLASSIFICATIONS, OCCUPATION CODES & EFFECTIVE DATES		BASE HOURLY RATE	VACATION & STAT. HOLIDAYS	UNION FUNDS (1)	TOTAL WAGE PACKAGE	EPSCA ASSOC. FUND(1)
	TEAMSTER FOREMAN 455465						
46-9	GROUP 1	00-06-01	26.08	2.61	4.43	33.12	0.15
		01-05-01	26.54	2.65	4.83	34.02	0.15
		02-05-01	26.99	2.70	5.23	34.92	0.15
		03-05-01	27.95	2.80	5.63	36.38	0.15
47-9	GROUP 2	00-06-01	26.43	2.64	4.43	33.50	0.15
		01-05-01	26.89	2.69	4.83	34.41	0.15
		02-05-01	27.34	2.73	5.23	35.30	0.15
		03-05-01	28.30	2.83	5.63	36.76	0.15
48-9	GROUP 3	00-06-01	26.68	2.67	4.43	33.78	0.15
		01-05-01	27.14	2.71	4.83	34.68	0.15
		02-05-01	27.59	2.76	5.23	35.58	0.15
		03-05-01	28.55	2.86	5.63	37.04	0.15
	TEAMSTER SUBFOREMAN 455455						
47-8		00-06-01	24.93	2.49	4.43	31.85	0.15
		01-05-01	25.39	2.54	4.83	32.76	0.15
		02-05-01	25.84	2.58	5.23	33.65	0.15
		03-05-01	26.80	2.68	5.63	35.11	0.15
	TEAMSTERS 455435						
46-6	GROUP 1	00-06-01	23.08	2.31	4.43	29.82	0.15
		01-05-01	23.54	2.35	4.83	30.72	0.15
		02-05-01	23.99	2.40	5.23	31.62	0.15
		03-05-01	24.95	2.49	5.63	33.07	0.15
47-6	GROUP 2	00-06-01	23.43	2.34	4.43	30.20	0.15
		01-05-01	23.89	2.39	4.83	31.11	0.15
		02-05-01	24.34	2.43	5.23	32.00	0.15
		03-05-01	25.30	2.53	5.63	33.46	0.15
48-6	GROUP 3	00-06-01	23.68	2.37	4.43	30.48	0.15
		01-05-01	24.14	2.41	4.83	31.38	0.15
		02-05-01	24.59	2.46	5.23	32.28	0.15
		03-05-01	25.55	2.56	5.63	33.74	0.15

(1) = per hour worked; (2) = per hour paid

TEAMSTER
Local 230
St. Catharines

EPSCA WAGE SCHEDULE FOR HYDRO ONE PROJECTS WITHIN THE GEOGRAPHIC AREA OF THIS LOCAL (52) - FOR HYDRO ONE EMPLOYEES ONLY

GRADE AND STEP	CLASSIFICATIONS, OCCUPATION CODES & EFFECTIVE DATES	BASE HOURLY RATE	VACATION & STAT. HOLIDAYS	UNION FUNDS (1)	TOTAL WAGE PACKAGE	EPSCA ASSOC. FUND(1)

OVERTIME:

Mon - Fri = 1 1/2 x
Sat = 1 1/2 x
Sun & Hol = 2x

UNION FUNDS:

Union Funds include the following items:

Welfare - $ 2.06 per hour worked
- $ 2.16 per hour worked - May 1, 2002
Pension - $ 2.12 per hour worked
- $ 2.37 per hour worked - May 1, 2001
- $ 2.57 per hour worked - May 1, 2002
- $ 2.92 per hour worked - May 1, 2003
Canadian Training - $ 0.05 per hour worked - May 1, 2003

Training - $ 0.15 per hour worked
- $ 0.20 per hour worked - May 1, 2001
- $ 0.25 per hour worked - May 1, 2002
Service - $ 0.10 per hour worked - June 1, 2000
- $ 0.20 per hour worked - May 1, 2001
- $ 0.25 per hour worked - May 1, 2002

Union Funds contain $ 0.05 for Bill 162 benefits.

BENEFITS ADMINISTRATION:

All contributions, excluding Union Dues and the EPSCA Association Fund, are to be sent to the following locations:

Welfare contributions should be sent to:
Global Benefit Plan Consultants
545 Wilson Ave.
TORONTO, ON
M3H 1V2

Pension contributions should be sent to:
Benefit Plan Administrators
135 Queens Plate Drive
ETOBICOKE, ON
M9W 7A3

Training Fund(s) contributions should be sent to:
O.T.C. Training Fund
P.O. Box 126, Station 'O'
TORONTO, ON
M4A 2M8

Service Fund contributions should be sent to:
O.T.C. Service Fund
2107 Danforth Ave.
P.O. Box 202
TORONTO, ON
M4C 1K1

UNION DUES

Local Union Dues Checkoff - 2 times the Base Hourly Rate plus $ 7.00 per month per employee - May 1, 2001
Local Union Dues Checkoff - 2.5 times the Base Hourly Rate plus $ 7.00 per month per employee - July 1, 2002
Union Dues are not included in Union Funds.
Union Dues are to be deducted from the Base Hourly Rate
Union Dues should be forwarded to:
Teamsters Union Local 230
55 Nugget Ave., Suite 214
SCARBOROUGH, ON
M1S 3L1

GEOGRAPHIC AREA: In Haldimand-Norfolk(RM) that portion east of a line drawn southeasterly along the road from Hartford past Varency and continuing onto the shores of Lake Erie and Niagara(RM)

MAP CODE: T-3

ISSUED: NOVEMBER 30, 2004

REVISED: FEBRUARY 15, 2005

TEAMSTER
Local 230
Toronto

EPSCA WAGE SCHEDULE FOR PROJECTS WITHIN THE GEOGRAPHIC AREA OF THIS LOCAL (57) (62)

GRADE AND STEP	CLASSIFICATIONS, OCCUPATION CODES & EFFECTIVE DATES		BASE HOURLY RATE	VACATION & STAT. HOLIDAYS	UNION FUNDS (1)	TOTAL WAGE PACKAGE	EPSCA ASSOC. FUND(1)
	TEAMSTER FOREMAN 455465						
46-9	GROUP 1	2004-09-01	30.17	3.02	6.33	39.52	0.15
		2005-05-01	30.63	3.06	6.93	40.62	0.15
		2006-05-01	31.08	3.11	7.53	41.72	0.15
47-9	GROUP 2	2004-09-01	30.52	3.05	6.33	39.90	0.15
		2005-05-01	30.98	3.10	6.93	41.01	0.15
		2006-05-01	31.43	3.14	7.53	42.10	0.15
48-9	GROUP 3	2004-09-01	30.77	3.08	6.33	40.18	0.15
		2005-05-01	31.23	3.12	6.93	41.28	0.15
		2006-05-01	31.68	3.17	7.53	42.38	0.15
	TEAMSTER SUBFOREMAN 455455						
47-8		2004-09-01	29.02	2.90	6.33	38.25	0.15
		2005-05-01	29.48	2.95	6.93	39.36	0.15
		2006-05-01	29.93	2.99	7.53	40.45	0.15
	TEAMSTERS 455435						
46-6	GROUP 1	2004-09-01	27.17	2.72	6.33	36.22	0.15
		2005-05-01	27.63	2.76	6.93	37.32	0.15
		2006-05-01	28.08	2.81	7.53	38.42	0.15
47-6	GROUP 2	2004-09-01	27.52	2.75	6.33	36.60	0.15
		2005-05-01	27.98	2.80	6.93	37.71	0.15
		2006-05-01	28.43	2.84	7.53	38.80	0.15
48-6	GROUP 3	2004-09-01	27.77	2.78	6.33	36.88	0.15
		2005-05-01	28.23	2.82	6.93	37.98	0.15
		2006-05-01	28.68	2.87	7.53	39.08	0.15

(1) = per hour worked; (2) = per hour paid

Mon - Fri = 1 1/2 x
Sat = 2 x
Sun & Hol = 2x

UNION FUNDS:

Union Funds include the following items:

Welfare -	$2.26	per hour worked
	$2.31	per hour worked - effective May 1, 2005
	$2.36	per hour worked - effective May 1, 2006
Pension -	$3.52	per hour worked
	$4.07	per hour worked - effective May 1, 2005
	$4.62	per hour worked - effective May 1, 2006
Training -	$0.25	per hour worked
Service -	$0.25	per hour worked
Canadian Training -	$0.05	per hour worked

Union Funds contain $ 0.05 for Bill 162 benefits.

BENEFITS ADMINISTRATION:

All contributions, excluding Union Dues and the EPSCA Association Fund, are to be sent to the following

Welfare contributions should be sent to:

Teamsters Local Union 230's Members Benefit Plan Trust Fund
c/o Benefit Plan Administrators
PO Box 6020 Station B
135 Queens Plate Drive #200
ETOBICOKE, ON M9W 7A3

Pension contributions should be sent to:

The Teamsters Canadian Pension Plan
c/o Benefit Plan Administrators
PO Box 6020 Station B
135 Queens Plate Drive
ETOBICOKE, ON
M9W 7A3

Training Fund(s) contributions should be sent to:

Ontario Teamsters Training Fund
P.O. Box 126, Station 'O'
TORONTO, ON
M4A 2M8

Service Fund contributions should be sent to:

Ontario Teamsters Construction Council Service Fund
2107 Danforth Avenue
P.O. Box 202
TORONTO, ON
M4C 1K1

TEAMSTER
Local 230
Toronto

EPSCA WAGE SCHEDULE FOR PROJECTS WITHIN THE GEOGRAPHIC AREA OF THIS LOCAL (57) (62)

Canadian Training Fund contributions should be sent to:
Teamsters Canada Training/Service Fund
c/o Pierre Pichet, Comptroller
2540 Daniel Johnson Blvd., #804
LAVAL QUEBEC
H7T 2S3

UNION DUES

Local Union Dues Checkoff - 2.5 times the Base Hourly Rate plus $ 7.00 per month per employee
Union Dues are not included in Union Funds.
Union Dues are to be deducted from the Base Hourly Rate
Union Dues should be forwarded to:
Teamsters Union Local 230
55 Nugget Ave., Suite 214
SCARBOROUGH, ON
M1S 3L1

GEOGRAPHIC AREA: In Halton(RM) that portion lying northeast of Bronte Road and Hwy 25; Peel(RM),

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TEAMSTER
Local 230
Oshawa

EPSCA WAGE SCHEDULE FOR PROJECTS WITHIN THE GEOGRAPHIC AREA OF THIS LOCAL (66) (82)

GRADE AND STEP	CLASSIFICATIONS, OCCUPATION CODES & EFFECTIVE DATES		BASE HOURLY RATE	VACATION & STAT. HOLIDAYS	UNION FUNDS (1)	TOTAL WAGE PACKAGE	EPSCA ASSOC. FUND(1)
	TEAMSTER FOREMAN 455465						
46-9	GROUP 1	2004-09-01	27.88	2.79	6.33	37.00	0.15
		2005-05-01	28.34	2.83	6.93	38.10	0.15
		2006-05-01	28.79	2.88	7.53	39.20	0.15
47-9	GROUP 2	2004-09-01	28.23	2.82	6.33	37.38	0.15
		2005-05-01	28.69	2.87	6.93	38.49	0.15
		2006-05-01	29.14	2.91	7.53	39.58	0.15
48-9	GROUP 3	2004-09-01	28.48	2.85	6.33	37.66	0.15
		2005-05-01	28.94	2.89	6.93	38.76	0.15
		2006-05-01	29.39	2.94	7.53	39.86	0.15
	TEAMSTER SUBFOREMAN 455455						
47-8		2004-09-01	26.73	2.67	6.33	35.73	0.15
		2005-05-01	27.19	2.72	6.93	36.84	0.15
		2006-05-01	27.64	2.76	7.53	37.93	0.15
	TEAMSTERS 455435						
46-6	GROUP 1	2004-09-01	24.88	2.49	6.33	33.70	0.15
		2005-05-01	25.34	2.53	6.93	34.80	0.15
		2006-05-01	25.79	2.58	7.53	35.90	0.15
47-6	GROUP 2	2004-09-01	25.23	2.52	6.33	34.08	0.15
		2005-05-01	25.69	2.57	6.93	35.19	0.15
		2006-05-01	26.14	2.61	7.53	36.28	0.15
48-6	GROUP 3	2004-09-01	25.48	2.55	6.33	34.36	0.15
		2005-05-01	25.94	2.59	6.93	35.46	0.15
		2006-05-01	26.39	2.64	7.53	36.56	0.15

(1) = per hour worked; (2) = per hour paid

TEAMSTER
Local 230
Oshawa

EPSCA WAGE SCHEDULE FOR PROJECTS WITHIN THE GEOGRAPHIC AREA OF THIS LOCAL (66) (82)

OVERTIME:

Mon - Fri = 1 1/2 x for 1st 2 hours; then 2 x
Sat = 2 x
Sun & Hol = 2x

UNION FUNDS:

Union Funds include the following items:

Welfare -	$2.26	per hour worked
	$2.31	per hour worked - effective May 1, 2005
	$2.36	per hour worked - effective May 1, 2006
Pension -	$3.52	per hour worked
	$4.07	per hour worked - effective May 1, 2005
	$4.62	per hour worked - effective May 1, 2006
Training -	$0.25	per hour worked
Service -	$0.25	per hour worked
Canadian Training -	$0.05	per hour worked

Union Funds contain $ 0.05 for Bill 162 benefits.

BENEFITS ADMINISTRATION:

All contributions, excluding Union Dues and the EPSCA Association Fund, are to be sent to the following locations:

Welfare contributions should be sent to:
Teamsters Local Union 230's Members Benefit Plan Trust Fund
c/o Benefit Plan Administrators
PO Box 6020 Station B
135 Queens Plate Drive #200
ETOBICOKE, ON M9W 7A3

Pension contributions should be sent to:
The Teamsters Canadian Pension Plan
c/o Benefit Plan Administrators
PO Box 6020 Station B
135 Queens Plate Drive
ETOBICOKE, ON
M9W 7A3

Training Fund(s) contributions should be sent to:
Ontario Teamsters Training Fund
P.O. Box 126, Station 'O'
TORONTO, ON
M4A 2M8

Service Fund contributions should be sent to:
Ontario Teamsters Construction Council Service Fund
2107 Danforth Avenue
P.O. Box 202
TORONTO, ON
M4C 1K1

TEAMSTER
Local 230
Oshawa

EPSCA WAGE SCHEDULE FOR PROJECTS WITHIN THE GEOGRAPHIC AREA OF THIS LOCAL (66) (82)

Canadian Training Fund contributions should be sent to:
Teamsters Canada Training/Service Fund
c/o Pierre Pichet, Comptroller
2540 Daniel Johnson Blvd., #804
LAVAL QUEBEC
H7T 2S3

UNION DUES

Local Union Dues Checkoff - 2.5 times the Base Hourly Rate plus $ 7.00 per month per employee
Union Dues are not included in Union Funds.
Union Dues are to be deducted from the Base Hourly Rate
Union Dues should be forwarded to:
Teamsters Union Local 230
55 Nugget Ave., Suite 214
SCARBOROUGH, ON
M1S 3L1

GEOGRAPHIC AREA: Durham(RM) except the Towns of Ajax and Pickering; in Simcoe County the Townships of Rama and Mara; in Victoria County the Township of Manvers; in Peterborough County the Township of Cavan; in Northumberland County the Townships of Hope,

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TEAMSTER
Local 230
Bruce County

EPSCA WAGE SCHEDULE FOR PROJECTS WITHIN THE GEOGRAPHIC AREA OF THIS LOCAL (70)

GRADE AND STEP	CLASSIFICATIONS, OCCUPATION CODES & EFFECTIVE DATES		BASE HOURLY RATE	VACATION & STAT. HOLIDAYS	UNION FUNDS (1)	TOTAL WAGE PACKAGE	EPSCA ASSOC. FUND(1)
	TEAMSTER FOREMAN 455465						
46-9	**GROUP 1**	**2004-09-01**	27.95	2.80	6.33	37.08	0.15
		2005-05-01	28.40	2.84	6.93	38.17	0.15
		2006-05-01	28.85	2.89	7.53	39.27	0.15
47-9	**GROUP 2**	**2004-09-01**	28.30	2.83	6.33	37.46	0.15
		2005-05-01	28.75	2.88	6.93	38.56	0.15
		2006-05-01	29.20	2.92	7.53	39.65	0.15
48-9	**GROUP 3**	**2004-09-01**	28.55	2.86	6.33	37.74	0.15
		2005-05-01	29.00	2.90	6.93	38.83	0.15
		2006-05-01	29.45	2.95	7.53	39.93	0.15
	TEAMSTER SUBFOREMAN 455455						
47-8		**2004-09-01**	26.80	2.68	6.33	35.81	0.15
		2005-05-01	27.25	2.73	6.93	36.91	0.15
		2006-05-01	27.70	2.77	7.53	38.00	0.15
	TEAMSTERS 455435						
46-6	**GROUP 1**	**2004-09-01**	24.95	2.49	6.33	33.77	0.15
		2005-05-01	25.40	2.54	6.93	34.87	0.15
		2006-05-01	25.85	2.59	7.53	35.97	0.15
47-6	**GROUP 2**	**2004-09-01**	25.30	2.53	6.33	34.16	0.15
		2005-05-01	25.75	2.58	6.93	35.26	0.15
		2006-05-01	26.20	2.62	7.53	36.35	0.15
48-6	**GROUP 3**	**2004-09-01**	25.55	2.56	6.33	34.44	0.15
		2005-05-01	26.00	2.60	6.93	35.53	0.15
		2006-05-01	26.45	2.65	7.53	36.63	0.15

(1) = per hour worked; (2) = per hour paid

TEAMSTER
Local 230
Bruce County

EPSCA WAGE SCHEDULE FOR PROJECTS WITHIN THE GEOGRAPHIC AREA OF THIS LOCAL (70)

OVERTIME:

Mon - Fri = 2 x
Sat = 2 x
Sun & Hol = 2x

UNION FUNDS:

Union Funds include the following items:

Welfare -	$2.26	per hour worked
	$2.31	per hour worked - effective May 1, 2005
	$2.36	per hour worked - effective May 1, 2006
Pension -	$3.52	per hour worked
	$4.07	per hour worked - effective May 1, 2005
	$4.62	per hour worked - effective May 1, 2006
Training -	$0.25	per hour worked
Service -	$0.25	per hour worked
Canadian Training -	$0.05	per hour worked

Union Funds contain $ 0.05 for Bill 162 benefits.

BENEFITS ADMINISTRATION:

All contributions, excluding Union Dues and the EPSCA Association Fund, are to be sent to the following locations:

Welfare contributions should be sent to:
Teamsters Local Union 230's Members Benefit Plan Trust Fund
c/o Benefit Plan Administrators
PO Box 6020 Station B
135 Queens Plate Drive #200
ETOBICOKE, ON M9W 7A3

Pension contributions should be sent to:
The Teamsters Canadian Pension Plan
c/o Benefit Plan Administrators
PO Box 6020 Station B
135 Queens Plate Drive
ETOBICOKE, ON
M9W 7A3

Training Fund(s) contributions should be sent to:
Ontario Teamsters Training Fund
P.O. Box 126, Station 'O'
TORONTO, ON
M4A 2M8

Service Fund contributions should be sent to:
Ontario Teamsters Construction Council Service Fund
2107 Danforth Avenue
P.O. Box 202
TORONTO, ON
M4C 1K1

TEAMSTER
Local 230
Bruce County

EPSCA WAGE SCHEDULE FOR PROJECTS WITHIN THE GEOGRAPHIC AREA OF THIS LOCAL (70)

Canadian Training Fund contributions should be sent to:
Teamsters Canada Training/Service Fund
c/o Pierre Pichet, Comptroller
2540 Daniel Johnson Blvd., #804
LAVAL QUEBEC
H7T 2S3

UNION DUES

Local Union Dues Checkoff - 2.5 times the base hourly rate plus $7.00 per month per employee
Union Dues are not included in Union Funds.
Union Dues are to be deducted from the Base Hourly Rate
Union Dues should be forwarded to:
Teamsters Union Local 230
55 Nugget Ave, Suite 214
SCARBOROUGH, ON
M1S 3L1

GEOGRAPHIC AREA: Counties of Middlesex, Huron, Bruce, Perth, Oxford and Elgin; in Halton(RM) that portion lying southwest of Bronte Road and Hwy 25; and Hamilton-Wentworth(RM).

Operative Plasterers and Cement Masons

OPERATIVE PLASTERERS' AND CEMENT MASONS' INTERNATIONAL ASSOCIATION OF THE UNITED STATES AND CANADA APPENDIX

The amendments contained in the Statement of Settlement, dated January 28, 1999 have been incorporated into the Cement Masons' Appendix in accordance with the "Term of Agreement" article contained in the Master Portion of this Agreement.

EPSCA / CEMENT MASONS

GENERAL NOTE

This Appendix distinguishes between two broad categories of work; namely, work that is covered by the *"modified provisions"* of this Appendix and work that is not. *"Modified provisions"* apply to all work on Lines & Stations and most work on existing generating sites. Following is a more detailed explanation:

The *"Modified Provisions"* of this Appendix will apply to:

(a) all work on Lines and Stations, and

(b) all work on existing generating sites except the construction of:
- **a new facility which provides a new function**
- **a new (i.e. additional) generating unit**

Addendum 1 contains the *"Modified Provisions of this Construction Appendix"*. All terms of this appendix shall apply to work covered by Addendum 1, with the exception of Article 1 - Classifications, Article 4 - Overtime Rates, Article 8 - Key Tradesmen, Article 13 - Layoff Procedure and Article 14 - Union Stewards. The above Articles 1, 4, 8, 13 and 14 do not apply when working under the terms and conditions of the *"modified provisions"*, as these Articles are replaced by Sections 1 through 5 of Addendum 1.

When work does not fall within the scope of Addendum 1, all terms of this appendix, with the exception of Addendum 1, apply.

A chart to illustrate the above applications follows:

Lines & Stations - Existing and New Sites	Generating - Existing Sites - Excluding construction of new facility (new function) &/or new (additional) generating unit(s)	Generating - Existing Sites - Involving construction of new facility (new function) & /or new (additional) generating unit(s)	Generating - New Sites (i.e. Greenfield Work)
Use Addendum 1 - Modified Provisions for Classifications, Overtime Rates and Key Tradesmen.	*Use Addendum 1 - Modified Provisions* for Classifications, Overtime Rates and Key Tradesmen.	Use all the provisions of the appendix, *except* Addendum 1.	Use all the provisions of the appendix, *except* Addendum 1.

EPSCA / CEMENT MASONS' APPENDIX

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OPERATIVE PLASTERERS' AND CEMENT MASONS' INTERNATIONAL ASSOCIATION OF THE UNITED STATES AND CANADA APPENDIX

to the

Collective Agreement

by and between

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION
(hereinafter called "EPSCA")

and the

ONTARIO ALLIED CONSTRUCTION TRADES COUNCIL
(hereinafter called the "Council")

As provided in the "Appendices" article of the Master Portion of the Collective Agreement, EPSCA and the Council have agreed to the following conditions to apply to employees in classifications listed in Article 1 of this Appendix.

Article 1

CLASSIFICATIONS

1.1 (a) The following is a list of Cement Mason classifications covered by this Appendix:

Cement Mason Subforeman
Cement Mason
Apprentice

(b) The following is a list of Plasterer classifications covered by this Appendix:

Plasterer Subforeman
Plasterer
Apprentice

(c) The following is a list of Masonry Restoration classifications covered by this Appendix:

Masonry Restoration Subforeman
Masonry Restoration Journeyman
Masonry Restoration Apprentice
Masonry Restoration Improver

1.2 The classifications referred to in Section 1.1 do not establish craft jurisdiction. Such jurisdiction is established in accordance with Articles 10 and 11 of the Master Portion of the Collective Agreement.

1.3 If additional classifications are required, they will be negotiated as appropriate for work in the electrical power systems sector.

1.4 Working Foreman
Where the crew size is five (5) or less, the foreman may work with the tools on mutual agreement of EPSCA and the local Business Manager.

Article 2

WAGES

2.1 **REV** Effective January 28, 1999 and until April 30, 2000 the rates of pay for employees in the classifications listed in Article 1 of this Appendix shall be as set forth in the wage schedules, attached hereto.

EPSCA shall provide the Council with the current wage schedules.

2.2 The rate for subforemen covered by this Appendix shall be the appropriate journeyman rate plus $1.20 per hour.

Article 3

SHIFT DIFFERENTIAL RATE

3.1 Employees required to work shift work, other than the regular day shift, shall receive a shift differential of one-seventh (1/7) for normal scheduled shift hours worked.

Employees required to work shift work on the third shift of a three shift operation shall receive a shift differential of one-fifth (1/5) for normal scheduled shift hours worked.

Article 4

OVERTIME RATES

4.1 REV Overtime rates are paid for work performed outside of normal hours as defined in the "Hours of Work" article of the Master Portion of this Agreement and for work performed on Saturday, Sunday and Statutory Holidays listed in Article 16 of this Appendix.

4.2 REV Overtime shall be paid at (1 1/2) times the basic hourly rate for the first two (2) hours of work performed outside of normal hours Monday to Friday as defined in the "Hours of Work". Overtime work performed in excess of the first two (2) hours Monday to Friday shall be paid at (2) times the basic hourly rate. Work performed on Saturday, Sunday and the Statutory Holidays listed in Article 16 of this Appendix shall be paid at (2) times the basic hourly rate.

4.3 When overtime work is required, a minimum of one-half (1/2) hour's work will be provided.

Article 5

BENEFITS

5.1 The Employer agrees to pay into operative welfare, pension and supplementary unemployment benefit plans, whether in addition to the wage rates or deducted from the wage rates, for employees covered by this Appendix. The amounts shall be as set out in the wage schedules, attached hereto.

5.2 The Union agrees to supply the Employer with all information regarding the welfare, pension and supplementary unemployment benefit plans and also all administrative material that is required for the implementation of them.

5.3 Any changes in welfare, pension plan or S.U.B. contributions recognized under this Agreement will be confirmed in writing by the Union to EPSCA before such changes are put into effect. Within three (3) weeks of receipt of an acceptable written notice, such changes will be implemented. The effective date will be the date of implementation. Should the welfare or pension plan contributions change during the term of this Agreement, then an adjustment may be made to the base rate. The total wage package will not be changed.

5.4 In the event an Employer is more than fifteen (15) days in arrears of the requirement to forward contributions and/or deductions to the Trustees by the fifteenth of the month following, the Employer shall pay as liquidated damages and not as a penalty an amount equal to two (2%) percent (equivalent to 24% per annum) for each month or part thereof that the contributions and/or deductions are in default for greater than fifteen (15) days provided the Employer has received five (5) days' written notice to correct such fault. The Trustees may require a delinquent Employer to pay for the costs, legal or otherwise, of collecting the amount owing, as outlined in the operative benefit plan trust documents.

5.5 The Trustees of the Employee Benefit Plans referred to in this Collective Agreement shall promptly notify the Union of the failure by any Employer to pay any employee contributions required to be made under this Collective Agreement and which are owed under the said plans in order that the program administrator of the Employee Wage Protection Plan may deem that there has been an assignment of compensation under the said program in compliance with the regulation to *the Employment Standards Amendment Act, 1991* in relation to the Employee Wage Protection Program.

Article 6

INCLEMENT WEATHER PAY

6.1 When an employee reports for work at the beginning of a shift and inclement weather is declared, an employee shall be entitled to the following payment unless notified not to report by his Employer:

(a) If not put to work, a minimum of two (2) hours' pay at the appropriate rate, providing he remains at his place of work for two (2) hours unless given his Employer's permission to leave;

OR

(b) If put to work, a minimum of four (4) hours' pay at the appropriate rate.

6.2 If inclement weather is declared during the shift, an employee shall receive a minimum of two (2) hours' pay at the appropriate rate,

OR

pay for the actual time worked for that shift, whichever is the greater.

Article 7

PREMIUMS

7.1 When an employee is required to work from a bosun chair or swing stage, more than ten (10) feet above a fixed, safe surface, the employee will receive an additional one dollar ($1.00) per hour for each hour worked.

7.2 *Construction Radiation Protection Assistant (R.P.A.)* is a Construction Trades Person who has achieved the full radiation qualification (Green) via the approved Ontario Hydro Training Program, plus has successfully completed the construction R.P.A. training and checkouts, also has performed R.P.A. functions while under supervision of a fully qualified Construction R.P.A. to the satisfaction of the Construction Site Safety Officer and the Station Health Physics Unit.

R.P.A. will be paid the appropriate equivalent foreman's rate when performing an R.P.A. function and will report to the Site Safety Unit. R.P.A. is a "qualification" and not a "trade function" irrespective of union or trade affiliation.

Article 8

KEY TRADESMEN

8.1 Employers reserve the right to transfer tradesmen from one location to another to effectively utilize their special skills, having regard for the special requirements of thermal, nuclear and hydraulic generation and transmission and transformation construction.

8.2 The number of key tradesmen to be transferred shall be determined at a pre-job conference identified in the "Advance Notice" article of the Master Portion.

8.3 Key tradesmen shall have the option to accept or reject a transfer.

8.4 In the case of a recall to work, Employers reserve the right to recall Green qualified Atomic Radiation Workers in sequence from the out of work list to the location from where they were laid off. Recalled Greenmen will perform sufficient Greenman work to maintain their skill level, or be laid off.

Article 9

TRAVEL AND TRANSPORTATION

9.1 ONTARIO RESIDENTS

On recruitment of tradesmen who live in Ontario but beyond 162 radius kilometers from the project, the Employer shall pay 20¢ per radius kilometer plus an allowance for travel time equivalent to one hour's pay for each 81 radius kilometers of travel to a maximum of 8 hours' pay for the initial trip to the project from where the tradesman lives or place of recruitment, whichever is closer to the project.

9.2 NON-ONTARIO RESIDENTS

On recruitment of tradesmen who live outside Ontario and beyond 162 radius kilometers from the project, the Employer shall pay the equivalent of the cost of public transportation plus an allowance for travel time equivalent to one hour's pay for each 81 radius kilometers of travel to a maximum of 8 hours' pay for the initial trip to the project from where the tradesmen live or place of recruitment whichever is closer to the project.

9.3 To qualify for payment in 9.1, and 9.2, the employee must remain at the project for a minimum of fifteen (15) working days or the duration of his job, whichever is lesser.

9.4 On termination of employment due to a reduction of staff, an employee entitled to payment under 9.1, and 9.2, will be entitled to return expenses calculated in the same manner as in 9.1, and 9.2, above, for the return trip from the project. An employee whose employment terminates for any reason other than reduction of staff will not be eligible for return payment.

9.5 TRANSFER

When transferring employees, the Employer will pay the equivalent of the cost of public transportation for the initial trip to the project from the employee's most recent work location. In addition the Employer will pay an allowance for travelling time at straight-time rates up to a maximum of 8 hours.

Article 10

TOOLS

10.1 In accordance with the "Tools and Clothing" article of the Master Portion of this Agreement, employees shall be required to provide themselves with the ordinary hand tools of their trade as specified in the Tool List, attached hereto.

10.2 Employers may supply additional tools and equipment to employees. Employees receiving such tools or equipment shall be responsible for loss or damages to such tools. Employees will immediately report any losses or damages to the Employer and the Employer shall assess the merits of each case prior to charging employees for such losses and damages.

10.3 Gang tools, referred to in the "Tools and Clothing" article of the Master Portion of this Agreement, are tools which are issued to a foreman and are used by one or more members of the crew. Such tools are not identified on trades tool lists, nor are they the tools and equipment identified in Sections 10.1 and 10.2 of this Article.

Article 11

PROTECTIVE CLOTHING AND EQUIPMENT

11.1 Employees are required to wear protective clothing and use protective equipment appropriate for the work being done. Where deemed necessary by the Employer on abnormally dirty work or for the safe performance of work, coveralls and gloves will be supplied.

11.2 Protective clothing and equipment and rainwear that is provided by the Employer will be charged out to an employee and the employee shall be responsible for the return of such clothing and equipment to his Employer.

Article 12

APPRENTICESHIP AND TRAINING PROGRAMS

12.1 The Employer agrees to pay into operative apprenticeship or training funds the amounts specified for apprenticeship or training as set forth in the wage schedules, attached hereto, for employees covered by this Appendix during the time they are employed.

12.2 The Union agrees to supply EPSCA with all pertinent information regarding these funds.

12.3 Training programs established by the Employer to provide skills required in the electrical power systems section shall be funded by reducing the Employer's contribution to the training fund in the specific locality where the training is taking place by an amount of money equivalent to the cost of such programs.

12.4 When employing apprentices, the provisions of the Ontario Apprenticeship and Tradesman Qualification Act pertaining to Cement Masons shall apply.

12.5 The Union agrees that for purposes of continuity of employment, the Employer may transfer apprentices to any work location or Project.

Article 13

LAYOFF PROCEDURE

13.1 New employees will be subject to a 60-day probationary period during which time their work performance and capability will be assessed. The Employer may terminate the employment of any probationary employee whose work performance and capability is deemed unsatisfactory. The provisions of 13.2 below will not apply during this 60-day probationary period.

13.2 The retention of employees covered by this Agreement shall be governed by the following, if capability and performance (including attendance and punctuality) are approximately equal:

(a) Availability of employment in their respective trade at the Project or work location.

(b) Length of continuous service with the Employer.

Article 14

UNION STEWARDS

14.1 Accredited Union Representatives shall inform the appropriate EPSCA Representative and the Employer of the steward in writing of the names of all stewards, one of whom shall be designated Chief Steward, as they are appointed and when they cease to act as stewards. A steward, other than a Chief Steward, shall exercise his duties only in respect to employees of his Employer. A Chief Steward, in order to carry out his duties in respect to employees of other than his Employer, shall first involve the EPSCA Representative.

A steward shall obtain permission from his immediate supervisor before leaving his work area for union business. Such permission shall not be unreasonably denied.

14.2 The appropriate Union shall receive written notice before the employment of a steward is terminated by his Employer, and provided the steward is able to perform the work required, he will be the last employee to be retained by his Employer in a layoff situation.

14.3 Where practical and when an additional person is required for a crew, the Chief Steward shall be given the first opportunity to work overtime providing he is qualified to perform the work. When the Chief Steward declines the opportunity to work overtime, he will appoint an acting union steward from the workers assigned to work the overtime.

14.4 No foreman or subforeman shall be permitted to act as a steward.

Article 15

VACATION PAY

NEW

15.1 The Vacation Pay rate shall be four (4) percent of vacationable gross earnings*. Payment shall be made weekly on the employee's regular pay cheque.

A three (3) week leave of absence for the purpose of taking an annual vacation will be granted in the calendar year in which the employee completes one year of continuous service with the Employer. In special circumstances, where the work schedule permits, additional time off may be granted an employee. The additional time off will not be unreasonably denied.

Article 16

STATUTORY HOLIDAYS

NEW

16.1 The Statutory Holiday pay rate shall be six (6) percent of vacationable gross earnings. Payment shall be made weekly on the employee's regular pay cheque.

The Statutory Holidays recognized under this Agreement are:

New Year's Day	Civic Holiday
Good Friday	Labour Day
Easter Monday	Thanksgiving Day
Victoria Day	Christmas Day
Canada Day	Boxing Day

EPSCA agrees to recognize Heritage Day when proclaimed by legislation.

Recognized holidays falling on a Saturday or Sunday shall be observed on the following Monday. When Christmas Day falls on a Saturday or Sunday, it shall be observed on the following Monday and Boxing Day on the following Tuesday. When New Year's Day falls on a Saturday or Sunday, it shall be observed on either the preceding Friday or the following Monday.

EPSCA reserves the right to change the day of observance of a Statutory Holiday when such a holiday falls on a Tuesday or Thursday.

* ***"Vacationable gross earnings" means pay for regular hours, overtime, premium pay, shift differential, lines and stations daily travel time, retroactive pay adjustments, reporting pay, inclement weather pay, call-in pay, Saturday and Sunday premiums and trade training, but does not include payment for initial and return travel.***

The incorporated specific Statement of Settlement amendments to the Operative Plasterers' and Cement Masons' International Association of the United States and Canada Appendix of the Collective Agreement between The Electrical Power Systems Construction Association and The Ontario Allied Construction Trades Council have been agreed to by the bargaining committees of the Cement Masons' and The Electrical Power Systems Construction Association. These proposed amendments are herewith recommended to the EPSCA Board of Directors and the Officers of the Council in accordance with Articles 34.4 and 34.5 of the Master Portion of the Collective Agreement for approval and incorporation into the Cement Masons' Appendix of the Collective Agreement.

Dated this 28th day of January, 1999.

Carlos Catarino	*Neil Donnelly*
for the Cement Masons	**for the EPSCA**

Approved for incorporation into the Cement Masons' Appendix
effective this *16th* day of *August*, 1999.

For: The Electrical Power Systems Construction Association	For: **The Ontario Allied Construction Trades Council**
Joe Dotchin	*Matthew Elliot*
Barry Roberts	*Bryon Black*

ADDENDUM 1

MODIFIED PROVISIONS OF THIS CONSTRUCTION APPENDIX

These provisions will apply to:

(a) all work on Lines and Stations, and

(b) all work on existing generating sites except the construction of:

- a new facility which provides a new function
- a new (i.e. additional) generating unit

Definitions:

Facility Something that is built composed of multi-systems which serves a specific function

Function Examples - Generation, Administration, Warehousing, Heavy Water Production, Flue Gas Desulphurization, Tritium Removal, Site Services (e.g. Shops)

Dispute Resolution Process

A dispute as to whether the 'Modified Provisions of this Construction Agreement' apply to the construction of a new facility will be referred to the Executive Committee for resolution and the Executive Committee will meet within five (5) working days. If the Executive Committee is unable to resolve the dispute, the dispute will be referred to a single arbitrator within ten (10) working days for a final and binding resolution. The arbitrator shall give an oral decision within five (5) working days, and a written decision, if requested, within twenty (20) working days.

All terms of this appendix shall apply to work covered by Addendum 1, with the exception of Article 1 - Classifications, Article 4 - Overtime Rates, Article 8 - Key Tradesmen, Article 13 - Layoff Procedure and Article 14 - Union Stewards.

EPSCA/CEMENT MASONS' APPENDIX

ADDENDUM 1

MODIFIED PROVISIONS

OF THIS CONSTRUCTION APPENDIX

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Section 1

CLASSIFICATIONS

1.1 (a) The following is a list of Cement Mason classifications covered by this Addendum:

Cement Mason Subforeman
Cement Mason
Apprentice

(b) The following is a list of Plasterer classifications covered by this Addendum:

Plasterer Subforeman
Plasterer
Apprentice

(c) The following is a list of Masonry Restoration classifications covered by this Appendix:

Masonry Restoration Subforeman
Masonry Restoration Journeyman
Masonry Restoration Apprentice
Masonry Restoration Improver

1.2 The classifications referred to in Section 1.1 do not establish craft jurisdiction. Such jurisdiction is established in accordance with Articles 10 and 11 of the Master Portion of the Collective Agreement.

1.3 If additional classifications are required, they will be negotiated as appropriate for work in the electrical power systems sector.

1.4 Working Foreman
Where the crew size is six (6) or less, including the foreman, the foreman may be required to work with the tools of the trade.

Section 2

OVERTIME RATES

2.1 On Monday to Friday inclusive, overtime work shall be paid at one and one-half (1-1/2) times the basic hourly rate for all hours worked beyond the normal daily scheduled number of hours up to maximum of 12 hours per day. All hours in excess of 12 hours per day shall be paid at two (2) times the base hourly rate.

2.2 REV Overtime work performed on Saturday, Sunday and the Statutory Holidays listed in Article 16 of this Appendix shall be paid at two (2) times the basic hourly rate.

2.3 When overtime work is required, a minimum of one-half (1/2) hour's work will be provided.

2.4 Where practical and when an additional person is required for a crew, the Chief Steward shall be given the first opportunity to work overtime providing he is qualified to perform the work. When the Chief Steward declines the opportunity to work overtime, he will appoint an acting union steward from the workers assigned to work the overtime.

Section 3

KEY TRADESMEN

3.1 Employers reserve the right to transfer tradesmen from one location to another to effectively utilize their special skills, having regard for the special requirements of thermal, nuclear and hydraulic generation and transmission and transformation construction.

3.2 Key tradesmen shall have the option to accept or reject a transfer.

3.3 In the case of a recall to work, Employers reserve the right to recall Green qualified Atomic Radiation Workers in sequence from the out of work list to the location from where they were laid off. Recalled Greenmen will perform sufficient Greenman work to maintain their skill level, or be laid off.

Section 4

EMPLOYMENT REQUESTS

4.1 The Employer shall have the right to request Union members from that Local having jurisdiction for the geographic area by name, in writing, who shall be issued a referral slip by the Local Union. The number of employees so requested shall not exceed fifty percent (50%) of the employees supplied to the job the by Local Union, subject to the availability of the requested individuals.

Section 5

PROBATIONARY EMPLOYEES

5.1 New employees will be subject to a 60-day probationary period during which time their work performance and capability will be assessed. The Employer may terminate the employment of any probationary employee whose work performance and capability is deemed unsatisfactory.

OPERATIVE PLASTERERS' AND CEMENT MASONS' INTERNATIONAL ASSOCIATION OF THE UNITED STATES AND CANADA APPENDIX

TOOL LIST

Tools listed below must be supplied by the tradesman as required to perform assigned tasks.

CEMENT MASONS

1 Chalk line
1 Tool box
1 Set Kneeling pads
1 Set socket wrenches
1 Cutting pliers (bull nose)
1 1/8" radius fine edger
1 Sidewalk jointer
1 Sidewalk edger
* 1 Rubbing stone (carborundum)
* 2 Brushes (1 fine, 1 coarse)
* 1 Chipping hammer
1 Bush hammer
* 1 Pointing trowel
1 8" screwdriver
2 Cold chisels
1 Round nose chisel
* 1 Wooden float
* 1 Sponge or cork float
* 1 Metal float
* 1 Set of steel trowels (10-1/2", 12", and 14")

* Employer to replace when worn out on job.

CEMENT MASONS' APPENDIX
TOOL LIST (continued)

PLASTERERS

1 Browning trowel
1 Finishing trowel
1 Gauging trowel
* 1 Pointing trowel
1 Hawk
1 Float
1 Paddle
1 Proper finishing brush
1 Set mitre tools
1 Set small tools containing a set of joint rods, a pointing tool, and a tool brush
1 Hammer
1 Chalk line
1 Level
1 Snips
1 Saw
1 Square
1 Rule
1 Axe
1 Set of broad knives
1 Gyproc knife
1 Tool bag or box

MASONRY RESTORERS

1 Club hammer
1 Brick trowel
1 Steel Float
1 2" Square Trowel
1 Pointing trowel
1 Tape measure
1 Wood Float
1 of each slick 1/4", 3/8", 1/2", 5/8", 3/4"

* Employer to replace when worn out on job.

MEMORANDUM OF SETTLEMENT

BETWEEN

THE ELECTRICAL POWER SYSTEMS
CONSTRUCTION ASSOCIATION
(EPSCA)

AND

OPERATIVE PLASTERERS' AND CEMENT MASONS,
INTERNATIONAL ASSOCIATION OF THE
UNITED STATES AND CANADA
PLASTERERS LOCAL 124

Dated this 21st day of July 2004

It is agreed that the existing agreement between the parties which expired April 30, 2004 will be renewed with the following amendments:

GENERAL

There is agreement to create a "free standing" collective agreement between EPSCA and the Operative Plasterers' and Cement Masons' International Association of the United States and Canada, Plasterers Local 124 The Master Portion, Foreman's Appendix, Cement Mason/Plasterer Appendix, June 12, 2000 Memorandum of Settlement and July 21, 2004 Memorandum of Settlement will be incorporated into this one collective agreement.

Language to be modified where necessary e.g. delete references to the "Ontario Allied Construction Trades Council" and other unions (eg International Union of Operating Engineers).

Appendix D — MODIFIED PROVISIONS

Modified Provisions to apply to all work.

Amend the agreement as necessary. Replace corresponding articles in main body with Modified Provisions as follows:

- Delete General Note
- Generation Projects Daily Travel Allowance and Room and Board
- Hours of Work
- Reporting Pay on 8 Hour and 10 Hour Shifts
- Meals on Overtime

ARTICLE 12 — UNION SECURITY

Add, where appropriate:

"Dues deductions to be based on cents per hour worked"

Add, where appropriate:

"Wage schedule, dues and remittance changes are to be provided in writing to EPSCA and changes shall only take place during the months of April and November of each calendar year. The effective date of such changed wage schedules, dues and remittances shall be the date of issuance."

Note: see Attached Statement of Understanding for clarification.

ARTICLE 14 PAY PROCEDURE

Add:

" "Direct Hire" employees of the three owners (Bruce Power, Ontario Power Generation and Hydro One) to be paid weekly or bi-weekly at the Employer's option. Employees of contractors will continue to be paid weekly.

"For Direct Hire" employees of the three owners (Bruce Power, Ontario Power Generation and Hydro One) direct deposit to be implemented at the Employer's option.

ARTICLE 20 STANDOFF

(i) Amend 2nd paragraph of Article 20 as follows:

"The Employer reserves the right to Standoff its employees without pay up to a maximum of ten (10) consecutive working days. Notification of Standoff will be made by the Employer during normal working hours. A Record of Employment will be issued upon the commencement of the Standoff. No travel will be paid to an employee for the Standoff period. Subsistence allowance will only be paid if the employee is specifically directed by the employer to maintain existing accommodation near the work location."

(ii) Modify 20.2 per the above paragraph

(iii) Modify last sentence of Article 20.3 per the above paragraph

ARTICLE 17/Appendix D — **GENERATION PROJECTS DAILY TRAVEL ALLOWANCE AND ROOM AND BOARD**

Travel rings and Board and Travel to be increased (and rounded to the nearest 5 cents) as follows:

• May 1, 2004 – 4%	• May 1, 2007 – 4%
• May 1, 2005 – 2%	• May 1, 2008 – 2%
• May 1, 2006 – 2%	• May 1, 2009 – 2%

ARTICLE 26/ App D Sect 2 — **HOURS OF WORK**

Amend 2nd and 3rd paragraph of Section 2.1 as follows:

(i) Amend 2nd and 3rd paragraph of Section 2.1 as follows:

"The weekly hours of work for all employees may be arrived at by having the employees work four (4) consecutive ten-hour shifts, either Monday – Thursday or Tuesday – Friday, or by having the employees work five (5) consecutive eight-hour shifts. Weekly hours of work will be established for a minimum period of two (2) weeks. The Employer will notify the Local Union of the weekly hours of work for each work program at the site. If an employer, with the approval of the owner, intends to change the weekly hours of work, a minimum of seven (7) days written notice shall be sent to the Local Union."

The start time for the day shift shall be between the hours of 7:00 am to 9:00 am. The start time for the afternoon shift shall be immediately following the day shift or within two (2) hours either way of the end of the day shift. The Employer will notify the Local Union of its start times in advance of the work commencing."

ADD "Trades assigned to fire watch duties may commence work after the start of the rest of the crew. In these cases, normal scheduled hours of work beyond the quit time of the rest of the crew will not be subject to overtime premiums."

ADD "Shift differential will not be paid on overtime hours."

ARTICLE 31 RADIATION WORK

(i) Add the following:

Construction Radiation Protection Assistant (R.P.A.) is a Construction Trades Person (Greenman) who has achieved the full radiation qualification via (i) the approved Ontario Power Generation Inc. and/or Bruce Power Training Program, (ii) has successfully completed the construction R.P.A. training and checkouts, and (iii) has performed R.P.A. functions while under supervision of a fully qualified Construction R.P.A. to the satisfaction of the Construction Site Safety Officer and the Station Health Physics Unit.

The Employer will select for Greenman training only those employees who are members of the Local Union for the Project.

R.P.A. will be paid the appropriate equivalent foreman's rate when performing an R.P.A. function. An R.P.A. is a "qualification" and not a "trade function" irrespective of union or trade affiliation.

In the case of a recall to work, Employers reserve the right to recall qualified Greenmen in sequence from the out-of-work list to the location from where they were laid off. Recalled Greenmen will perform sufficient Greenman work to maintain their skill level.

ARTICLE 34 TERM OF AGREEMENT

Duration – Amend to read as follows:

This Agreement shall become effective May 1, 2004 and will expire on April 30, 2010.

WAGES

- Upon Ratification $1.20
- May 1, 2005 $1.10
- May 1, 2006 $1.10

ICI increase/date for years 4, 5 and 6.

Classifications

The following classifications will be added to the Wage Schedules:

- Fireproofer
- Drywall Taper/Finisher

Article 13 HIRING AND MOBILITY

The Employer shall have the right to request up to fifty (50) per cent name hire from the Local Union Hall.

Employers shall have the right to move existing staff from site to site across the province.

The parties agree that the "fan out" provisions in Article 13.6 (b) require the local union to prioritize the referral of qualified members on the basis of proximity to the work site. Those who live closest are referred first. Members referred from outside the geographic area of the local union are not eligible for Board allowance, unless they have been name hired or transferred at the request of an employer.

July21, 2004

Statement of Understanding

This letter will clarify the intent and understanding behind the application of Article 12, where in the Memorandum of Settlement dated July 21, 2004 the parties have agreed to "remittance windows" for notifying EPSCA of remittance changes (see Article 12, Section).

The timing of the windows was with a view to attempting to implement changes as close as possible to January 1st (November window) and May 1 (April window). EPSCA will make every attempt to implement requested changes on these dates. The parties recognize that the earlier in the window that changes are requested, the greater the likelihood of meeting these timelines.

Dated this _____, 2004.

For: ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION

FOR: OPERATIVE PLASTERS' and CEMENT MASONS' INTERNATIONAL ASSOCIATION of the UNITED STATES and CANADA, PLASTERERS LOCAL 124

_____ _____

_____ _____

The parties agree to recommend this settlement for ratification.

Dated this 21ST Day of July, 2004 at Ottawa, Ontario.

For: **ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION**

FOR: **OPERATIVE PLASTERS' and CEMENT MASONS' INTERNATIONAL ASSOCIATION of the UNITED STATES and CANADA, PLASTERERS LOCAL 124**

MAP CODE: CM-4

ISSUED: APRIL 30, 2004

REVISED: FEBRUARY 25, 2005

CEMENT MASONS
Local 598
Hamilton

EPSCA WAGE SCHEDULE FOR PROJECTS WITHIN THE GEOGRAPHIC AREA OF THIS LOCAL (52)

GRADE AND STEP	CLASSIFICATION OCC CODES & EFFECTIVE DATES	BASE HOURLY RATE	VACATION & STAT. HOLIDAY	UNION FUNDS (1)	TOTAL WAGE PACKAGE	WORKING DUES (1)	EMPLOYEE BARGAINING FUND EBF (1)	EPSCA ASSOC. FUND (1)
	FOREMAN - 430065							
16-9	2004-09-14	31.14	3.11	3.91	38.16	1.03	0.06	0.15
	2005-01-01	31.14	3.11	3.91	38.16	1.41	0.06	0.15
	2005-05-01	31.82	3.18	4.16	39.16	1.45	0.06	0.15
	2006-05-01	32.59	3.26	4.41	40.26	1.49	0.06	0.15
	SUBFOREMAN - 430055							
16-8	2004-09-14	29.64	2.96	3.91	36.51	0.98	0.06	0.15
	2005-01-01	29.64	2.96	3.91	36.51	1.35	0.06	0.15
	2005-05-01	30.32	3.03	4.16	37.51	1.39	0.06	0.15
	2006-05-01	31.09	3.11	4.41	38.61	1.43	0.06	0.15
	CEMENT MASON - 430035							
16-6	2004-09-14	28.14	2.81	3.91	34.86	0.93	0.06	0.15
	2005-01-01	28.14	2.81	3.91	34.86	1.29	0.06	0.15
	2005-05-01	28.82	2.88	4.16	35.86	1.33	0.06	0.15
	2006-05-01	29.59	2.96	4.41	36.96	1.37	0.06	0.15
	APPRENTICE - 430015							
	1st Term of 2000 hrs ** - 65% of Journeyman rate							
16-0	2004-09-14	18.29	1.83	1.70	21.82	0.60	0.06	0.15
	2005-01-01	18.29	1.83	1.70	21.82	0.81	0.06	0.15
	2005-05-01	18.73	1.87	1.95	22.55	0.83	0.06	0.15
	2006-05-01	19.23	1.92	2.20	23.35	0.86	0.06	0.15
	2nd Term of 2000 hrs - 75% of Journeyman rate							
16-1	2004-09-14	21.11	2.11	3.91	27.13	0.70	0.06	0.15
	2005-01-01	21.11	2.11	3.91	27.13	1.00	0.06	0.15
	2005-05-01	21.62	2.16	4.16	27.94	1.03	0.06	0.15
	2006-05-01	22.19	2.22	4.41	28.82	1.07	0.06	0.15
	3rd Term of 2000 hrs - 90% of Journeyman rate							
16-2	2004-09-14	25.33	2.53	3.91	31.77	0.84	0.06	0.15
	2005-01-01	25.33	2.53	3.91	31.77	1.18	0.06	0.15
	2005-05-01	25.94	2.59	4.16	32.69	1.21	0.06	0.15
	2006-05-01	26.63	2.66	4.41	33.70	1.25	0.06	0.15

(1) = per hour worked; (2) = per hour paid

** - No pension funds for 1st Term Apprentices

CEMENT MASONS
Local 598
Hamilton

EPSCA WAGE SCHEDULE FOR PROJECTS WITHIN THE GEOGRAPHIC AREA OF THIS LOCAL (52)

Overtime Rate

Mon-Fri - Scheduled Work Days - 1 1/2x for all hours worked beyond the daily scheduled hours of work up to 12 consecutive hours in a day; 2x for all hours worked beyond 12 consecutive hours in a day.
Non-Scheduled Work Days - 1 1/2x for all hours worked up to 12 c

Sat - 2x
Sun & Recognized Holidays - 2x

Union Funds - Employer Contributions for Remittance Purposes

Welfare -	$1.46	per hour worked
	$1.71	per hour worked - effective May 1, 2005
	$1.96	per hour worked - effective May 1, 2006
Pension -	$2.21	per hour worked
Training -	$0.24	per hour worked

(Note: Pension contributions are not applicable to 1st Term Apprentices)

Union Dues - Employee Deductions for Remittance Purposes by Employer

Hourly Union Dues Checkoff:
- 3% of Gross Earnings (Base Hourly rate plus Vacation Pay) to December 31, 2004.
- 3.7% of Total Wage Package excluding EBF, effective January 1, 2005.

Employee Bargaining Fund (EBF) - $0.06 per hour worked; includes $0.01 Ontario Construction Secretariat.

Benefits

All remittances (employer contributions, employee deductions and dues), excluding the EPSCA Association Fund are to be sent to:

Cement Masons Local 598 Benefit Trust Fund
c/o Manion, Wilkins & Associates
222 Rowntree Dairy Road, Unit #4 (3rd. Floor)
WOODBRIDGE, ON
L4L 9T2 Fax: (905) 264-6344

GEOGRAPHIC AREA: County of Halton, excluding Board Area 8 as set out by The Ontario Labour Relations Board Construction Industry Division, Hamilton-Wentworth(RM), Haldimand, Lincoln, Welland, Brant and Norfolk.

Iron Workers

COLLECTIVE AGREEMENT

between

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION

and the

INTERNATIONAL ASSOCIATION OF BRIDGE, STRUCTURAL, ORNAMENTAL AND REINFORCING IRON WORKERS

May 1, 2004 - April 30, 2010

EPSCA / IRON WORKER COLLECTIVE AGREEMENT

GENERAL NOTE

This Collective Agreement distinguishes between two broad categories of work; namely, work that is covered by the *"modified provisions"* of this construction agreement and work that is not. *"Modified provisions"* apply to all work on Lines & Stations and most work on existing generating sites. Following is a more detailed explanation:

The *"Modified Provisions"* of this Construction Agreements will apply to:

(a) all work on Lines and Stations, and

(b) all work on existing generating sites except the construction of:
- a new facility which provides a new function
- a new (ie. additional) generating unit

Article 41 - contains the *"Modified Provisions of this Construction Agreement"*. All terms of this collective agreement shall apply to work covered by Article 41, with the exception of Article 23 - Overtime Rates. Article 23 does not apply when working under the terms and conditions of the *"modified provisions"*, as it is replaced by Article 41.4.

When work does not fall within the jurisdiction of Article 41, all terms of this agreement, with the exception of Article 41, apply.

A chart to illustrate the above applications follows:

Lines & Stations - Existing and New Sites	Generating - Existing Sites Excluding construction of new facility (new function) &/or new (additional) generating unit(s)	Generating - Existing Sites Involving construction of new facility (new function) & /or new (additional) generating unit(s)	Generating - New Sites (ie. Greenfield Work)
Use Article 41 - Modified Provisions for Overtime Rates	Use Article 41 - Modified Provisions for Overtime Rates	Use Article 23 for Overtime Rates	Use Article 23 for Overtime Rates

EPSCA/IRON WORKERS COLLECTIVE AGREEMENT

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COLLECTIVE AGREEMENT

by and between

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION

(hereinafter called EPSCA)

and the

INTERNATIONAL ASSOCIATION OF BRIDGE,
STRUCTURAL, ORNAMENTAL AND REINFORCING IRON WORKERS

(hereinafter called the Union)

* * * * *

WITNESSETH

WHEREAS EPSCA is an Association formed to represent all Employers engaged in construction industry work in the electrical power systems sector in collective bargaining and on their behalf enter into collective agreements covering those of their employees in the bargaining unit as hereinafter defined; and

WHEREAS the Union is affiliated with the American Federation of Labour - Congress of Industrial Organizations and has in its membership competent, skilled and qualified journeymen and apprentices to perform work coming within the trade and craft jurisdiction; and

WHEREAS the Association and the Union desire to mutually establish and stabilize wages, hours and working conditions for journeymen and apprentices employed by Employers within the electrical power systems sector of the construction industry, and further, to encourage closer cooperation and understanding between the Association and the Union to the end that a satisfactory, continuous and harmonious relationship will exist between the parties to this Agreement;

NOW THEREFORE, the Association and the Union mutually agree that the working conditions as set out below shall be applicable throughout the Province of Ontario.

Article 1

RECOGNITION

1.1 EPSCA recognizes the Union as the exclusive bargaining agency for a bargaining unit as defined in Section 1.4 engaged in

(i) all construction industry work under the responsibility of Design and Construction Branch (including Generation Projects Division and Transmission Systems Division),

(ii) all Major* construction industry work which is tendered/contracted for other than the Design and Construction Branch and,

REV (iii) work performed by the Design and Construction Branch for any Operations branch of Ontario Power Generation Inc (OPGI), Bruce Power LP and Ontario Hydro Services Company (OHSC) [formerly Ontario Hydro] where it has been determined by that Operations branch that there does not exist internally the expertise or the current staff to perform the work.

REV This work shall be performed in the Province of Ontario on Ontario Power Generation Inc (OPGI), Bruce Power LP and Ontario Hydro Services Company (OHSC) property [formerly Ontario Hydro] for the bulk power system, save and except the building of commercial-type office facilities at urban locations remote from operating facilities. The work encompasses:

- construction of new facilities
- additions to existing facilities
  - modifications
  - rehabilitation
  - reconstruction of existing facilities

For the purpose of clarity, the bulk power system comprises generating stations, hydraulic works, heavy water facilities, transmission lines (voltages over 50 kV) and transmission stations, microwave and repeater stations.

1.2 The Union recognizes EPSCA as the sole and exclusive collective bargaining agency for all of the Employers covered by this Agreement, and in all matters pertaining to the administration of this Collective Agreement.

* ***The definition of Major described in (ii) above and any issues arising out of the interpretation of Major shall be dealt with in an attached Letter of Understanding.***

1.3 The term "employee" shall include all employees of the Employers in the classifications as set out in Section 1.4 below.

1.4 The bargaining unit under this Agreement shall comprise the following classifications:

IRON WORKERS
Foreman
Subforeman
*Journeyman Iron Worker***
Rigger
Industrial Door Mechanic

1.5 The term "Employers" shall include individual members of EPSCA and any company, partnership, sole proprietorship, joint venture, contractor, subcontractor or any person who is bound by the terms and conditions of this Agreement.

1.6 The classifications referred to in Section 1.4 do not establish craft jurisdiction. Such jurisdiction is established in accordance with Article 6 of this Collective Agreement.

** ***This classification includes, but not limited to, the following job titles:***

Machinery Mover
Window Mechanic
Precast Erector
Pile Driver
Ornamental Miscellaneous Steel Erector
Tower Crane Erector
Finisher (Window and Curtain Wall) Installer
Sheeter
Layout Man
Field Fabricator
Structural Erector
Instrument Surveyor
Welder
Apprentice
Fence Erector
Fence Erector Helper A
Fence Erector Helper B

excepting those described hereunder:

(i) Employees as set out in Section 1.4 above, employed by an Employer signatory to the National Agreement for Canada, Stacks - Chimneys - Silos, when performing work covered by the scope of that Agreement.

Article 2

EXECUTIVE COMMITTEE

2.1 To advance harmonious relations between EPSCA, the Employers, the Union, and the employees, the parties shall each appoint an Executive Committee. The Committees shall meet together at least annually to review matters associated with the administration of this Collective Agreement with the intent of achieving uniformity of application of this Agreement wherever employees are working in the Province. This Committee shall consist of not more than six (6) members from each party.

Article 3

ACCREDITED UNION REPRESENTATIVES

3.1 The Senior Representative of the Union will designate Local Union representatives as Accredited Union Representatives to handle the day-to-day administration of this Agreement on the basis of not more than two (2) representatives from the Union for each Project and suitable number for each Lines and Stations Construction Zone. The Union will notify the General Manager of EPSCA in writing of the names of such Union representatives, or alternates in the event of illness or unavailability, so that they may be issued identification cards to permit entry to the site. Upon entering the job site, such representatives after identifying themselves to the EPSCA representative and the authorized representative of the Employer, will be free to observe the progress and conduct of the work and to conduct normal Union business. The Union undertakes that these representatives will not hinder or interfere in any way with the said work.

Article 4

UNION STEWARDS

4.1 The Accredited Union Representative shall inform the appropriate EPSCA Representative in writing of the names of all stewards as they are appointed and when they cease to act as stewards. There shall not be more than one (1) steward per Employer unless the Employer and Union mutually agree that more stewards are required. A steward shall exercise his duties only in respect to employees of his Employer. A steward shall obtain permission from his immediate supervisor before leaving his work area for Union business. Such permission shall not be unreasonably denied. No Foreman or Subforeman shall be permitted to act as a Steward.

The Accredited Union Representative shall inform the appropriate EPSCA Representative in writing of the name of one (1) steward who will represent the Union at stewards' meetings.

4.2 The steward shall be supplied by his Employer with a list of employees hired, discharged and to be laid off.

4.3 In the event of a work stoppage or threat of a work stoppage, or any other employee activity prohibited by this Agreement, affected stewards, in keeping with their responsibilities, as it is incumbent upon all Union representatives, shall immediately do all in their power to ensure that the prohibited action of the employees is prevented or stopped.

4.4 The Union shall be given written notice before a steward is released by the Employer, and under normal conditions, the steward will be the last employee retained by the Employer in a layoff situation, provided the steward is able to perform the work required.

4.5 A Union steward will not be transferred to another project unless mutually agreed to by the Employer and the Accredited Union Representative.

4.6 A steward shall be given the first opportunity to work overtime. When a crew not containing a steward is required to work overtime, one (1) member of the crew will be replaced by a steward in order that a steward may be present for overtime hours worked.

Article 5

ADVANCE NOTICES

5.1 EPSCA will advise the Union of all new construction work coming under the scope of this Agreement for the construction field forces of the Employers.

Upon the request of the Union, EPSCA will convene a pre-job conference before work commences to discuss the preliminary details of the proposed work to be performed and to establish conditions in accordance with this Agreement for the Project.

Article 6

WORK ASSIGNMENT

6.1 The Jurisdiction of the Unions shall be that jurisdiction established by agreements between International Unions claiming the work or Decisions of Record recognized by the AFL-CIO for the various classifications and the character of work performed, having regard for the special requirements of thermal, nuclear or hydraulic generation and transmission and transformation construction.

6.2 A markup process will be utilized when an Employer intends to perform work on a project site*. The purpose of this markup process is to indicate to the Union the work which is planned to be carried out by the Employer in order to minimize the potential for jurisdictional disputes. In the Electricity Production zones when work falls within this criteria the EPSCA Office will send out a "Notification of Work" along with a copy of the original minutes of mark-up meeting(s) to the Local Unions prior to work commencing. This procedure shall not preclude the Unions' right to contest previously assigned work, if the work is in a Local Union jurisdiction other than the one it was marked up in.

When work is to be performed on a project site and it meets the following criteria; same employer, same work, same project site, the markup process will not be required.

When an Employer has work that is less than a three (3) week duration and there are ten (10) or fewer employees covered by EPSCA Collective Agreements employed on this specific work, the Union will be notified of the scope of work and the Employer's proposed work assignments. The Union will have two (2) weeks from the date of notification to submit jurisdictional claims and supporting evidence to the Employer for consideration. The Employer will notify the Union of the final work assignments prior to the commencement of the work.

All work that does not meet the criteria set out in paragraph 2, will be reviewed and assigned at a markup meeting.

EPSCA will provide written notice to the Union (International Office and Local Union Office) as far in advance as possible of markup meetings. The Union may attend these markup meetings, and every effort will be made to settle questions of jurisdiction before the work is expected to commence.

*** For the purposes of this Article, Nanticoke, Lambton, Bruce Nuclear Power Development (BNPD), Darlington, Pickering, Lines and Stations and the six (6) Electricity Production Zones are each considered one project site.**

The Employer who has the responsibility for the new work shall make a proposed assignment of the work involved. The Employer shall be responsible for providing copies of proposed assignments to the Union (International Office and Local Union Office). The Employer will specify a time limit for the Union to submit evidence supporting its claims. The Employer will evaluate all evidence submitted and make a final assignment of the work involved. This final assignment will be in accordance with the procedural rules established by the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry. The Employer will advise the Union of the final assignments prior to the work commencing.

The EPSCA representative will record the proposed assignments and jurisdictional claims and forward a copy of them within fifteen (15) working days to the Union (International Office and Local Union Office).

The parties recognize that circumstances may arise, particularly with discovery and emergency work, where the process set out above may not be practical or possible.

Article 7

JURISDICTIONAL DISPUTES

7.1 (a) The Union shall have the exclusive right to elect to pursue or respond to any Jurisdictional disputes that arise under this Agreement at either the Ontario Labour Relations Board (OLRB) or the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry (Plan).

In the event the Union elects to pursue or respond to the Jurisdictional Dispute at the Plan, paragraphs 7.1(b), 7.2, 7.3 and 7.4 will apply.

In the event the Union elects to pursue or respond to the Jurisdictional Dispute at the OLRB, paragraphs 7.1(b), 7.2, 7.3, and 7.4 will NOT apply. Further, the sentence within paragraph 7.1(b) which reads "If the jurisdictional dispute cannot be settled on a local basis by the Unions involved, it shall be submitted to the International Unions involved for settlement without permitting it to interfere in any way with the progress of the work at anytime." will apply.

(b) In the event of a jurisdictional dispute, the Employer will make an assignment for the work in dispute in accordance with the Procedural Rules and Regulations of the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry. If the jurisdictional dispute cannot be settled on a local basis by the Unions

involved, it shall be submitted to the International Unions involved for settlement without permitting it to interfere in any way with the progress of the work at any time. The parties will settle such jurisdictional dispute in accordance with procedure as outlined by the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry of the Building Trades Department, AFL-CIO or any successor agency of the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry authorized by the Building Trades Department.

(c) Where a local of the Union is in disagreement with an Employer's work assignment, the Employer shall supply the Accredited Union Representative with a copy of the evidence submitted by the other

union(s) involved along with drawings and/or prints plus a description of the work or process in dispute from a qualified representative of the Employer when requested.

(d) When a jurisdictional dispute exists between unions and upon requests by the Ironworkers, the Employer shall furnish the International Representative a signed letter from a duly authorized official of the company on Employer stationery, stating whether or not the Union was employed on specific types of work on a given project.

7.2 In the event the dispute is not settled by the International Unions involved, it shall then be submitted to the Administrator of the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry for resolution. The Union and Employer involved shall advise EPSCA respectively, in writing, of an intent to submit a jurisdictional dispute to the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry and will identify the work in question. The arbitration decision will be final and binding on the parties to this Agreement.

7.3 EPSCA shall have direct recourse to the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry when the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry has under its consideration a dispute involving the assignment of work being done by employees who are covered by this Agreement.

7.4 In the event that the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry fails to render a decision within sixty (60) days of the disputed assignment being referred to the Plan, EPSCA, or the Union, shall have recourse to the Ontario Labour Relations Board.

7.5 In the event the Union elects to pursue or respond to the Jurisdictional Dispute at the OLRB, the arbitration board panel appointed by the Ontario Labour Relations Board pursuant to the Act is not authorized to award damages in respect of a mis-assignment of work only in circumstances where the other union(s) involved in the proceedings is (are) equally restricted in their ability to claim for damages. However this paragraph 7.5 shall not apply where the Jurisdictional Dispute and the mis-assignment of work involves the same employer and the same work previously the subject of a Jurisdictional Dispute before the OLRB or the Plan.

7.6 The board panel appointed by the OLRB will govern its decision pursuant to its normal criteria.

7.7 In the event the Union elects to pursue or respond to the Jurisdictional Dispute at the OLRB, the decision of the panel of the OLRB will be final and binding upon the parties to this agreement with no further recourse to the Plan on the issue decided by the OLRB.

Article 8

UNION SECURITY

8.1 UNION MEMBERSHIP

As a condition of employment, all employees covered by this Agreement shall either be members of, or will apply for membership in, the Union and, with respect to initiation fees and dues, will maintain such membership in good standing.

8.2 CHECKOFF

The Employer will deduct amounts specified in the current EPSCA wage schedule for each hour paid for each employee covered by this Agreement.

The Employer will forward same to the Financial Secretary of the Local Union where the work is being performed, postmarked not later than the fifteenth (15th) day of the month following the month for which the deductions are made. This amount is for working dues assessment and will be deducted from gross wages and identified on the employee's pay statement. The Union shall indemnify EPSCA and the Employers for any liability arising from the deduction of initiation fees or dues.

8.3 Where an employee works in more than one (1) Local Union territory for a week or less, the Employer will forward deductions to the Local Union in whose territory the employee worked the greater percentage of hours.

8.4 The Union through its International Office will notify EPSCA, in writing, of any changes to initiation fees and dues. Within three (3) weeks of receipt of an acceptable written notice any changes to such fees and dues will be implemented. The effective date will be the date of implementation.

Article 9

EMPLOYMENT

9.1 (a) For purposes of this Article, a geographic area will be established for each Project and geographic areas for each Lines and Stations Zone. The size of these geographic areas will be dependent upon the location of the work.

(b) The boundaries of the geographic areas will be jointly established at pre-job conferences.

9.2 An office will be established by EPSCA, or the Employer with the approval of EPSCA, for each Project and each Lines and Stations Zone. A purpose of this office will be to coordinate employment as specified in this Article.

9.3 EPSCA, or the Employer with the approval of EPSCA, and the Union will exchange the names of their representatives in each of the areas described in Section 9.1(a), who will be responsible for cooperating in the referral and employment of reliable and competent Union members.

9.4 EPSCA, or the Employer with the approval of EPSCA, will notify the Union of all manpower required for all work to be undertaken by Employers coming under the scope of this Agreement. All employees employed under the terms of this Article will be required to obtain a referral slip from the Local Union having jurisdiction for the geographic area except as noted in Section 9.5(b) below. All employees will report to the EPSCA/Employer referral office prior to starting work.

9.5 (a) The Employer shall have the right to request Union members from that Local Union having jurisdiction for the geographic area by name, in writing, who shall be issued a referral slip by the Local Union. The number of employees so

requested shall not exceed fifty percent (50%) of the employees supplied to the job by the Local Union, subject to the Local Union being able to supply.

(b) Employee members who are transferred within the territory of their Local Union including sector to sector by an employer will not require an additional referral slip. The parties agree that there is no restriction on the number of employees so transferred. However such transfers will not result in layoff of employee members presently on these projects.

(c) When Union members are transferred from one (1) Local Union territory to another, including sector to sector, the number of Union members will not exceed forty percent (40%) of the total crew on the job unless approval is obtained from the Local Union office. Such transferred Union members must secure a referral slip from the Local Union in whose territory the work is being performed. However, before members are transferred from one (1) Local Union territory to another, the Employer shall contact the Local Union Business Agent of the territory where the work is to be performed.

(d) The transfer of employees by an Employer will not result in a lay-off of the Employer's existing employees at the project before 14 days or the completion of the project whichever is earlier.

(e) The Employer shall have the right to recall former employees provided that:

(i) The employee being recalled is a Local Union member in good standing.
(ii) The employee has not worked for another employer since being laid off.

Recalled employees, if not named, shall not be considered as name hires and the number of employees recalled will not affect the name hire percentage in Section 9.5 (a).

9.6 The employment of additional tradesmen and apprentices shall be carried out on the following basis and sequence:

(a) The EPSCA office, or the Employer with the approval of EPSCA, will request the appropriate Local Union office for tradesmen and apprentices required. The request will include a description of the work, the number of tradesmen and apprentices required, and the name of the Employer for whom the tradesmen and apprentices will be working.

(b) The Union members who are resident in the designated geographic area will be referred by the Union for employment through the EPSCA/Employer's office. As

much as their out-of-work list will permit, the Union will supply members on a fanout basis from the project or work location.

The Employer will either hire such persons or substantiate their reasons in writing for not doing so.

(c) If, after a request has been made, the Union is unable to supply sufficient tradesmen and apprentices to meet the manpower requirements of the Employers, the Employers may employ tradesmen and apprentices who are resident within the geographic area. Such tradesmen and apprentices shall comply with the requirements of the Union Security Article of this Agreement.

Probationary members will be replaced by qualified Local Union members when they become available subject to the following.

(i) No replacement shall take place within five (5) working days of the end of the job.

(ii) The Local Union shall provide the Employer with, a minimum of two (2) working days notice when an employee is to be replaced.

(iii) Notwithstanding Article 28, the local members who replace probationary employees shall not be entitled to initial travel monies and the probationary employees being replaced shall not be entitled to return travel monies.

(iv) The Employer shall decide which probationary employee or employees shall be replaced.

(v) This provision will not be cause for grievance by any probationary member.

(vi) Employees will be laid off in the following sequence:

1. Probationary Members
2. Out-of-Province Members
3. Ontario Travel Cards/Local Members where the work is being performed maintaining the ratios of Local Union members to Travellers as specified in Article 9.5 (c).

(d) Once the supply of suitable tradesmen and apprentices within the geographic area has been exhausted and additional tradesmen and apprentices are required, EPSCA, or the Employer with the approval of EPSCA, will contact the International Representative or his designee, in order to determine whether suitable Union tradesmen and apprentices are available outside of the geographic area. EPSCA, or the Employer with the approval of EPSCA, will cooperate in providing employment to such Union tradesmen and apprentices on the basis that they be supplied from the nearest location where they are available.

The Union shall obtain prior written approval of the General Manager of EPSCA before referring a person who resides outside the Province of Ontario except for members residing in border cities adjacent to the local union having jurisdiction over the job site.

(e) In the case of a recall to work, Employers reserve the right to recall Green qualified Atomic Radiation Workers in sequence from the out of work list to the location from where they were laid off. Recalled Greenmen will perform sufficient Greenman work to maintain their skill level, or be laid off.

9.7 Re-employment as required by the Workers' Compensation Board shall not be a violation of this collective agreement nor be subject to the provisions of Article 9.

Article 10

FOREMEN AND SUBFOREMEN

10.1 It is understood that foremen and subforemen hold key positions in the relationship between the Employers and the Union. Both parties agree that every effort should be made to recruit and retain foremen and subforemen who have a high degree of efficiency in the performance of their jobs and in the handling of their men. Recognizing the responsibilities involved in being a supervisor and a member of the Union, the Employers and the Union will make every effort to minimize problems that may arise which concern the relationship between the foremen and subforemen, the Employers and the Union.

10.2 The parties recognize the responsibilities of foremen and subforemen to discharge their managerial duties. If the Union feels that the foreman or subforeman is not discharging his managerial duties in a manner that is fair and equitable, or if an Employer feels that the Union is interfering with the foreman or subforeman in the performance of his managerial duties, the Employer or the Union may refer the problem to the Executive

Committee for resolution. If the matter cannot be resolved by the Executive Committee, the grievance procedure may be invoked by either party.

10.3 The selection and retention of foremen and subforemen will be the responsibility of the Employers. When making appointments to the foreman and subforeman level, the Employers will give first consideration to those local journeyman ironworkers they presently employ on site. When making appointments to the subforeman level, the provisions of Article 9.5(c) employment will be maintained.

10.4 The foremen's differential shall be $3.00 above the journeyperson's rate as set out in the
wage schedules. The subforeman's differential shall be $2.50 above the journeyperson's rate as set out in the existing wage schedules. The rates of pay for all foremen and subforemen covered by this Agreement will be set forth in the current wage schedules. EPSCA will provide the Union with current wage schedules.

10.5 Adequate Ironworker supervision shall be employed on all overtime work where a crew is required.

10.6 Where the crew size is six (6) or less, including the forman, the foreman may work with the tools of the trade. The foreman may not be used to replace a journeyman on overtime.

Article 11

MEMBERS ON RIGS

11.1 Not less than four (4) employees and a foreman or subforeman shall be employed on or around mobile or power operated rigs of any description used on structural steel erection. When mobile or power operated rigs are used for other than structural steel erection, the number of employees required on said rig shall be determined by the foreman or subforeman who, after conferring with the steward, shall keep in mind the safe and efficient operation of the job.

Article 12

APPRENTICES

12.1 The Employer and the Union agree to participate in the Apprenticeship Program through the auspices of the Employment Training Branch, Ministry of Education and Training. To that end, the Employer agrees to employ a full complement of apprentices who are duly registered with the Employment Training Branch, Ministry of Education and Training.

12.2 One (1) apprentice shall be permitted for the first journeyman employed by the Employer, plus one (1) additional apprentice for each additional five (5) journeymen on all work.

12.3 After a six thousand (6,000) hour term of apprenticeship, the apprentice must satisfy the requirements as set out in the Apprenticeship and Tradesmen's Qualification Act and applicable regulations pertaining to Ironworkers, and when he has successfully completed same, he shall be paid at the prevailing journeyman rate.

12.4 The rates of pay for apprentices covered by this agreement will be set out in the wage schedules attached hereto.

12.5 When an apprentice leaves employment to attend trade school, the Employer agrees to hire another apprentice to take his/her place for the period of time the apprentice is in attendance at school.

Article 13

PAY PROCEDURE

13.1 NORMAL

(a) Employees will be paid weekly and payment for any given week will be made not later than the sixth (6th) working day after the close of the payroll period, but in any event not later than Thursday of the following week.

(b) Wages shall be paid by the Employers on the job site, before quitting time, in cash or by cheque, payable at par in the locality of the job site. Direct Deposit to be implemented at the Employer's option. Accompanying each payment of wages shall be a statement, in writing, which can be retained by the employee setting forth:

REV

(i) the period of time or the work for which the wages are being paid;

(ii) the rate of wages to which the employee is entitled;

(iii) the amount of wages to which the employee is entitled;

(iv) the amount of each deduction from the wages of the employee and the purpose for which each deduction is made;

(v) any allowance or other payment to which the employee is entitled;

(vi) the amount of vacation pay for which the employee is being paid;

(vii) the amount of recognized holiday pay for which the employee is being paid; and

(viii) the net amount of money being paid to the employee.

(c) In cases of inclement weather being declared on pay day, employees will receive their pay before leaving the site provided it is available on the site.

13.2 ON TERMINATION

(a) An employee who voluntarily terminates his employment will be provided his final pay on the next regular pay day.

(b) An employee who is laid off will have his final pay mailed to his regular residence*, or as otherwise requested by the employee, by priority post within 5 days of termination.

(c) An employee who is discharged shall be provided with his final pay immediately if the Employer's pay facilities are on site or as per Section 13.2(b) if the Employer's pay facilities are not on site.

(d) Included in an employee's final pay will be vacation and recognized holiday pay owing him, his UIC, Record of Employment Form.

(e) No employee shall be laid off during the first four (4) hours of his shift.

(f) When an employee is laid off from a job where he is accommodated in a camp, he will be paid one (1) hour at the applicable straight-time rate to check out of camp.

(g) Should an Employer fail to provide an employee such wages and/or forms as required above within the prescribed five (5) working day time period, then said employee shall be paid any waiting time in excess of the five (5) working day time period at straight-time rates of pay applicable to the regular working hours.

Article 14

WAGES

14.1 REV Effective July 13, 2004, and until April 30, 2010, the rates of pay for employees in the classifications listed in Article 1 of this Agreement and working in Generation Projects, Miscellaneous Projects and Lines and Stations Construction shall be as set forth in the wage schedules attached hereto.

Article 15

RECOGNIZED HOLIDAYS

15.1 The holidays recognized under this Agreement are:

New Year's Day	Civic Holiday
Good Friday	Labour Day
Easter Monday	Thanksgiving Day
Victoria Day	Christmas Day
Canada Day	Boxing Day

15.2 EPSCA agrees to recognize Heritage Day when proclaimed by legislation.

15.3 Recognized holidays falling on a Saturday or Sunday shall be observed on the following Monday. When Christmas Day falls on a Saturday or Sunday, it shall be observed on the following Monday and Boxing Day on the following Tuesday. When New Year's Day falls on a Saturday, it shall be observed either on the preceding Friday or following Monday.

15.4 EPSCA reserves the right to change the day of observance of Canada Day to the preceding Monday if it falls on Tuesday and to the following Friday if it falls on Thursday.

Article 16

VACATION AND RECOGNIZED HOLIDAY PAY

16.1 The vacation and recognized holiday pay rate shall be ten percent (10%) (six percent [6%] vacation and four percent [4%] in lieu of recognized holidays) of total earnings*.

16.2 Payment of vacation and recognized holiday pay shall be made on the regular weekly pay cheque.

16.3 Employees with one year's employment will be entitled to 3 weeks annual vacation. Employees with more than one year's employment, under special circumstances, will be entitled to additional time off subject to the approval of the Employer. Additional time off will not be unreasonably denied.

All vacation entitlement will be subject to approval providing the work schedule will permit.

* ***"Total earnings" means pay for regular hours, overtime, premium pay, shift differential, retroactive pay adjustments, call-in, Saturday and Sunday premiums and trade training.***

Article 17

WELFARE AND PENSION PLANS

17.1 For each of his employees working within the territorial jurisdiction of Locals 700, 721, 736, 765, 786, and 759 the Employer agrees to pay welfare contributions on his behalf to the Ironworkers' Central Welfare Fund.

17.2 For each of his employees working within the territorial jurisdiction of Locals 700, 721, 736, 765, 786 and 759, the Employer agrees to pay pension contributions on his behalf to the Ironworkers' Ontario Pension Fund.

17.3 The Union agrees to supply the Employer with all necessary information regarding these welfare and pension plans, including all administrative material that is required.

17.4 The amount(s) of welfare and pension contributions to be paid will be set out in the wage schedules attached hereto.

17.5 Contributions shall be postmarked by the fifteenth (15th) day of the month following the month in which the hours were paid and at no time will the contributions be paid directly to the employee. A penalty of three percent (3%) of any unpaid amount of contributions shall become due and payable to the applicable plan by a contributing Employer on the sixteenth (16th) day following the day designated for postmark by the Collective Agreement. A further charge of three percent (3%) of any monies owing shall become due and payable on the expiry of each succeeding thirty (30) day period until all monies due and owing including both contribution and charges) have been paid.

17.6 Any changes in welfare or pension plan contributions recognized under this Agreement will be confirmed in writing by the Union to EPSCA before such changes are put into effect. Within three (3) weeks of receipt of an acceptable written notice, such changes will be implemented. The effective date will be the date of implementation. Should the welfare or pension plan contributions change during the term of this Agreement then an adjustment shall be made to the base rate. The total wage package will not be changed.

17.7 The trustees of the employee benefit plans referred to in this collective agreement shall promptly notify the Union (or Council) of the failure by any Employer to pay any employee benefit contributions required to be made under this collective agreement and which are owed under the said plans in order that the Program Administrator of the Employee Wage Protection Program may deem that there has been an assignment of compensation under the said Program in compliance with the Regulation to the Employment Standards Amendment Act, 1991 in relation to the Employee Wage Protection Program.

17.8 To reduce administrative costs the parties agree that the number of monthly separate remittance and deduction cheques will be kept to a minimum. (status quo)

Article 18

IRONWORKERS' TRADE IMPROVEMENT PLAN

18.1 Employers employing employees covered by this Agreement will contribute to the Ironworkers' Trade Improvement Plan Trust for Locals 700, 721, 736, 765 and 786, or Local 759 as applicable. The Fund is to be used for the education of apprentices, the testing of welders and any purpose deemed necessary and advantageous for the improvement of the trade.

18.2 The amount(s) of contributions to the Ironworkers' Trade Improvement Plan for Locals 700, 721, 736, 759, 765 and 786 will be set out in the wage schedules attached hereto.

18.3 Employer contributions, including nil reports, shall be postmarked by the fifteenth (15th) day of the month following the month in which the hours were paid, and at no time will the Ironworkers' Trade Improvement Plan Trust contributions be paid directly to the employees. A charge of three percent (3%) of any unpaid amount of contributions shall become due and payable to the Trust by a contributing Employer on the sixteenth (16th) day following the day designated for postmark by the Collective Agreement in effect between EPSCA and the Union. A further charge of three percent (3%) of any monies owing shall become due and payable on the expiry of each succeeding thirty (30) day period until all monies due and owing (including both contributions and charges) have been paid.

18.4 Employers agree to be bound by the decisions of the Trustees of the Ironworkers' Trade Improvement Plan Trust on matters pertaining to the Trust.

18.5 The Union agrees to supply all pertinent information regarding the Trust to the Employer.

18.6 To reduce administrative costs the parties agree that the number of monthly separate remittance and deduction cheques will be kept to a minimum. (status quo)

NEW
18.7 Wage schedule, dues and remittance changes are to be provided in writing to EPSCA and changes shall only take place during the months of April and November of each calendar year. The effective date of such changed wage schedules, dues and remittances shall be the date of issuance.

Article 19

ASSOCIATION FUND

19.1 All Employers shall contribute the amount specified on the wage schedules attached hereto for each hour worked by each employee covered by this Agreement to the Electrical Power Systems Construction Association Fund. The Employer shall remit such contribution in accordance with the standard form of remittance supplied by EPSCA.

Article 20

REPORTING PAY

20.1 An employee who reports for work at the usual starting time for his shift shall receive a minimum of two (2) hours' pay plus his appropriate daily travel or board allowance at the applicable rate when he reports for work but is unable to commence work because of circumstances beyond his control. To qualify for this allowance, the employee must remain on the job during the two (2) hour period and perform any work requested which, in the opinion or judgment of his foreman or subforeman, after conferring with the steward, can be accomplished safely.

Article 21

CALL-IN PAY

21.1 When an employee is called in outside of his normal hours of work, he shall receive a minimum of four (4) hours' work at two (2) times the basic rate plus his appropriate daily travel allowance. If the employee's normal hours of work commence within this four (4) hour period, the employee will be paid premium time until the start of his normal hours and will revert to his normal hourly rate at the commencement of his normal hours of work, except in the circumstances provided for in Section 23.2.

Article 22

HOURS OF WORK

22.1 One (1) or Two (2) Shift Operation

The weekly hours of work shall consist of forty (40) hours, worked between Monday and Friday, for all employees of Employers covered by this agreement and working on a one (1) or two (2) shift operation.

REV The weekly hours of work may be arrived at by having the employees work either:

- four (4) consecutive ten-hour shifts, Monday to Thursday or;
- four (4) consecutive ten-hour shifts, Tuesday to Friday or;
- five (5) consecutive eight-hour shifts

but not concurrently on the same work program.
Weekly hours of work will be established for a minimum of two (2) weeks. The Employer will notify the Local Union of the weekly hours of work for each work program at the site. If an Employer intends to change the weekly hours of work, a minimum of seven (7) days written notice shall be sent to the Local Union.

REV The start time for the day shift shall be 7:00 AM with a possible one (1) hour variance either way. The start time for the afternoon shift shall be immediately following the day shift or within two (2) hours either way of the end of the day shift.

The shift differential for those employees working the afternoon shift when a two shift operation has been established by the Employer will be one-seventh (1/7) for scheduled hours worked on that shift.

NEW Trades assigned to fire watch duties may commence work after the start of the rest of the crew. In these cases, normal scheduled hours of work beyond the quit time of the rest of the crew will not be subject to overtime premiums

NEW Shift Differential will not be paid on overtime hours.

22.2 Three (3) Shift Operation

When a three (3) shift operation is established by the Employer, the following conditions will apply:
Those employees working on the day shift shall work eight (8) hours per shift at the straight time rate.

Those employees working on the afternoon shift shall work seven and one-half (7 1/2) hours per shift. A shift differential of one-seventh (1/7) shall be paid for all normal scheduled shift hours worked.

Those employees working on the night shift shall work seven (7) hours per shift. A shift differential of one-fifth (1/5) shall be paid for all normal scheduled shift hours worked.

A shift will be deemed to be established providing at least four (4) consecutive days of a shift are to be worked excluding Saturdays, Sundays and recognized holidays. If an employee is removed from their scheduled shift prior to completing four (4) consecutive shifts, the employee will be paid shift differential for the remainder of the hours that would have been worked had the employee not been reassigned.

It may be necessary from time to time to vary the hours of work established in this Article. Any amendments to the hours of work will be established by mutual agreement between EPSCA and the Union.

NEW Shift Differential will not be paid on overtime hours.

Article 23

OVERTIME RATES

***Article 23* is applicable *to* work at Existing Generating Sites where work involves construction of a new facility (new function) and/or new (additional) generating unit(s) and at New Generating Sites (ie Greenfield Work).**

For work at Existing Generating Sites excluding work involving construction of a new facility (new function) and/or new (additional) generating unit(s) please refer to *Article 41 - Modified Provisions of this Construction Agreement.* (Article 41.4)

23.1 On Monday to Friday inclusive, overtime work shall be paid at two (2) times the basic hourly rate for all hours worked beyond the normal daily scheduled number of hours.

Overtime work performed on Saturday, Sunday and Recognized Holidays shall be paid at two (2) times the basic hourly rate.

23.2 When an employee is required to return to work without an eight (8) hour break, all work performed shall be paid for at the appropriate overtime rate, until such time as the employee receives an eight (8) hour break.

23.3 Overtime shall be assigned as impartially as possible amongst all members of the crew, subject to their ability to perform the work required.

Article 24

REST PERIOD

24.1 For employees working normal hours, a fifteen (15) minute rest period will be allotted, at the time directed by the Employer, for each half shift worked.

24.2 For employees required to work overtime, a ten (10) minute rest period will be allotted prior to the end of the normal shift before commencing overtime work.

24.3 For employees working overtime, a fifteen (15) minute rest period will be allotted, at the time directed by the employer, after each two (2) hours of overtime worked.

Article 25

MEALS ON OVERTIME

25.1 If an employee is notified during the time he is working that he will be required to work for more than two (2) hours past his normal quitting time of the first or second shifts or for more than three and one-half (3-1/2) hours beyond the normal quitting time of the third shift, the Employer will provide a free meal to the employee after approximately two (2) hours of overtime worked and for each four (4) hours of overtime worked thereafter. The Employee will be allowed thirty (30) minutes with pay at straight time rates to eat each meal at the time directed by the Employer. When a paid meal period overlaps a rest period, the paid meal period will supplant the rest period.

To qualify for the above-noted on a Friday for work on the first and second shifts, an employee working a thirty-eight (38) hour week will be required to work for more than four (4) hours beyond the normal quitting time of his shift.

The above-noted is not applicable to the first eight (8) hours worked on Saturdays, Sundays or Recognized Holidays for employees who normally work the first or second shifts.

The above-noted is not applicable to the first six and one-half (6-1/2) hours worked on Sundays or Recognized Holidays for employees who normally work the third shift.

25.2 Where an employee has been notified the previous day, no lunch will be provided but the employee will be allowed time to eat without loss of pay.

Article 26

GENERATION PROJECTS
DAILY TRAVEL ALLOWANCE AND ROOM AND BOARD

26.1 DAILY TRAVEL ALLOWANCE

(a) A daily travel allowance will be paid by the Employers to their employees on the following basis:

(i) If an employee lives within forty (40) radius kilometers* of the Project, no travel allowance will be paid.

REV (ii) If an employee lives within forty (40) to fifty-six (56) radius kilometers of the Project, he shall receive $20.60 per day effective July 13, 2004 ($21.00 effective May 1, 2005, $21.40 effective May 1, 2006, $22.25 effective May 1, 2007, $22.70 effective May 1, 2008 and $23.15 effective May 1, 2009) travel allowance for each day worked or reported for.

REV (iii) If an employee lives within fifty-six (56) to eighty (80) radius kilometers of the Project, he shall receive $23.95 per day effective July 13, 2004 ($24.45 effective May 1, 2005, $24.95 effective May 1, 2006, $25.95 effective May 1, 2007, $26.45 effective May 1, 2008 and $27.00 effective May 1, 2009) travel allowance for each day worked or reported for.

REV (iv) If an employee lives within eighty (80) to ninety-seven (97) radius kilometers of the Project, he shall receive $27.60 per day effective July 13, 2004 ($28.15 effective May 1, 2005, $28.70 effective May 1, 2006, $29.85 effective May 1, 2007, $30.45 effective May 1, 2008 and $31.05 effective May 1, 2009) travel allowance for each day worked or reported for.

REV (v) If an employee lives greater than ninety-seven (97) radius kilometers from the project and does not qualify for subsistence allowance under Subsection 26.2 below, he shall receive $31.00 per day effective July 13, 2004 ($31.60 effective May 1, 2005, $32.25 effective May 1, 2006, $33.55 effective May 1, 2007, $34.20 effective May 1, 2008 and $34.90 effective May 1, 2009) travel allowance for each day worked or reported for.

Note: ***Bruce GS "A", Bruce GS "B" and the Bruce Heavy Water Plants will be combined to form the Bruce Complex. Travel allowance for the Bruce Complex will be calculated from the midpoint of a straight line joining the centres of the Bruce GS "A" and Bruce GS "B" turbine halls***

****For the purpose of this Article, "radius kilometers" shall be measured from the centre of the turbine hall on each Project.***

(b) When an employee is directed to report to a location that involves travelling around a natural barrier, the distance around the natural barrier shall be the shortest distance measured by a series of straight lines. The sum of the distances of these straight lines shall be applied to the ring concept to establish the employee's travel allowance entitlement. A natural barrier is defined as any obstruction or impediment which creates an unreasonable relationship between radius kilometers and actual kilometers travelled.

26.2 ROOM AND BOARD
(Excluding Darlington and Pickering Projects)

The following conditions will apply for employees whose regular residence* is more than ninety-seven (97) radius kilometers from the project:

(a) An Employer may supply either:

(i) room and board in camp or a good standard of board and lodging within a reasonable distance of a project; or
(ii) a subsistence allowance; or
(iii) a travel allowance

REV (b) An employee may exercise his option not to stay in a camp or accept room and board. An employee who exercises this option and qualifies for subsistence allowance shall receive a subsistence allowance of $79.05 per day effective July 13, 2004 ($80.65 effective May 1, 2005, $82.25 effective May 1, 2006, $85.55 effective May 1, 2007, $87.25 effective May 1, 2008 and $89.00 effective May 1, 2009) worked or reported for when employed at a location north of the French River and $65.50 per day effective July 13, 2004 ($66.80 effective May 1, 2005, $68.15 effective May 1, 2006, $70.90 effective May 1, 2007, $72.30 effective May 1, 2008 and $73.75 effective May 1, 2009) for each day worked or reported for when employed at a location south of the French River subject to Sections 26.2(c), 26.2(d), 26.3 and 26.4.

(c) To qualify for subsistence allowance an employee must maintain temporary accommodation at or near the Project. Employees who travel daily to locations beyond ninety-seven (97) radius kilometers from the Project will be entitled to $27.80 per day for each day worked or reported for.

** An employee's "regular residence" is the place where he maintains a self-contained domestic establishment (a dwelling house, apartment or similar place of residence where a person generally sleeps and eats) in which he resides, and for which he can show proof of financial commitment.*

(d) Pickering and Darlington Projects

REV (i) An employee who qualifies for subsistence allowance shall receive a subsistence allowance of $39.55 per day effective July 13, 2004 ($40.35 effective May 1, 2005, $41.15 effective May 1, 2006, $42.80 effective May 1, 2007, $43.65 effective May 1, 2008 and $44.50 effective May 1, 2009) worked or reported for, subject to Sections 26.2(c), 26.3 and 26.4.

(ii) Employees who don't qualify for board allowance and commute beyond ninety-seven (97) radius kilometers shall receive $27.80 per day for each day worked or reported for.

26.3 An employee shall not qualify for daily travel allowance or room and board allowance as provided for in Sections 26.1 and 26.2 above when such employee reports for work but does not remain at work for his scheduled daily hours of work unless excused by an authorized representative of the Employer. Such permission shall not be unreasonably denied.

26.4 An employee who maintained a regular residence within the geographic area of the Local Union for the purposes of employment and who relocates outside the geographic area will not be entitled to an increase in travel or room and board allowance entitlement as a result of this relocation.

26.5 The Union recognizes the Employer's right to charge for board and other existing services. The Employer fixes the charge for board and other existing services in camps at twenty-five dollars ($25.00) per day. This will be applied on the following basis:

(a) An employee who remains in camp on a normally scheduled work day on which he does not work will be charged twenty-five dollars ($25.00) per day, unless he is excused from work for a legitimate reason by the Project medical attendant or an authorized representative of his Employer.

(b) An employee who is absent from work on Friday without approval and who remains in camp and who is still absent from work on the following Monday without approval will be charged for room and board for Friday, Saturday, Sunday and Monday.

(c) An employee who is absent from work without approval on Friday but who works the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

(d) An employee who works the Friday and is absent from work without approval on the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

Article 27

LINES AND STATIONS CONSTRUCTION
DAILY TRAVEL ALLOWANCE AND ROOM AND BOARD

27.1 DAILY TRAVEL ALLOWANCE

The daily travel allowance will be paid by the Employers to their employees who are not living in camp or receiving a subsistence allowance as referred to in Section 27.3, on the following basis:

(a) If an employee lives within forty (40) radius kilometers of the work location, no travel allowance will be paid.

REV (b) If an employee lives within forty (40) to fifty-six (56) radius kilometers of the work location, he shall receive $20.05 per day effective July 13, 2004 ($20.55 effective May 1, 2005, $21.05 effective May 1, 2006, $21.55 effective May 1, 2007, $22.05 effective May 1, 2008 and $22.55 effective May 1, 2009) travel allowance for each day worked or reported for.

REV (c) If an employee lives within fifty-six (56) to eighty (80) radius kilometers of the work location he shall receive $23.55 per day effective July 13, 2004 ($24.05 effective May 1, 2005, $24.55 effective May 1, 2006, $25.05 effective May 1, 2007, $25.55 effective May 1, 2008 and $26.05 effective May 1, 2009) travel allowance for each day worked or reported for.

REV (d) If an employee lives within eighty (80) to ninety-seven (97) radius kilometers of the work location he shall receive $27.05 per day effective July 13, 2004 ($27.55 effective May 1, 2005, $28.05 effective May 1, 2006, $28.55 effective May 1, 2007, $29.05 effective May 1, 2008 and $29.55 effective May 1, 2009) travel allowance for each day worked or reported for.

REV (e) If an employee lives greater than ninety-seven (97) radius kilometers from the work location and does not qualify for subsistence allowance under Section 27.3 below, he shall receive $29.30 per day effective July 13, 2004 ($29.80 effective May 1, 2005, $30.30 effective May 1, 2006, $30.80 effective May 1, 2007, $31.30

effective May 1, 2008 and $31.80 effective May 1, 2009) travel allowance for each day worked or reported for, provided he continues to travel greater than ninety-seven (97) radius kilometers daily.

(f) When an employee is directed to report to a location that involves travelling around a natural barrier, the distance around the natural barrier shall be the shortest distance measured by a series of straight lines. The sum of the distances of these straight lines shall be applied to the ring concept to establish the employee's travel allowance entitlement. A natural barrier is defined as any obstruction or impediment which creates an unreasonable relationship between radius kilometers and actual kilometers travelled.

27.2 The Employer reserves the right to base daily travel allowance on the distance in radius kilometers from where an employee lives to either the work location or declared assembly point, depending on where the employee is directed to report.

27.3 ROOM AND BOARD

The following conditions will apply for employees whose regular residence* is more than ninety-seven (97) radius kilometers from the work location:

(a) An Employer may supply either:

(i) room and board in camp or a good standard of board and lodging within a reasonable distance of the work location; or
(ii) a subsistence allowance; or
(iii) a travel allowance

* ***For the purpose of this Article, "regular residence":***

(i) for metropolitan areas (Toronto and Hamilton) is the place where an employee maintains a permanent self-contained domestic establishment (a dwelling house, apartment or similar place of residence where a person generally sleeps and eats) in which he resides, and for which he can show proof of financial commitment.

(ii) for all other areas, shall be deemed to be the city or town hall of the municipality where an employee maintains a permanent self-contained domestic establishment described in (i) above. In those municipalities where a city or town hall does not exist, then the post office serving his permanent self-contained domestic establishment will apply.

REV (b) An employee may exercise his option not to stay in a camp or accept room and board. An employee who exercises this option and qualifies for subsistence allowance shall receive a subsistence allowance of $77.00 per day effective July 13, 2004 ($78.00 effective May 1, 2005, $79.00 effective May 1, 2006, $80.00 effective May 1, 2007, $81.00 effective May 1, 2008 and $82.00 effective May 1, 2009) for each day worked or reported for when employed at a location north of the French River and $64.00 per day effective July 13, 2004 ($65.00 effective May 1, 2005, $66.00 effective May 1, 2006, $67.00 effective May 1, 2007, $68.00 effective May 1, 2008 and $69.00 effective May 1, 2009) for each day worked or reported for when employed at a location south of the French River, subject to Sections 27.3(c), 27.4, and 27.5.

(c) REV To qualify for subsistence allowance an employee must maintain temporary accommodation at or near the work location. Employees who travel daily to locations beyond ninety-seven (97) radius kilometers from the work location will be entitled to $27.30 per day effective July 13, 2004 ($27.80 effective May 1, 2005, $28.30 effective May 1, 2006, $28.80 effective May 1, 2007, $29.30 effective May 1, 2008 and $29.80 effective May 1, 2009) for each day worked or reported for.

27.4 An employee shall not qualify for daily travel allowance or room and board allowance as provided for in Sections 27.1 and 27.3 above, when such employee reports for work but does not remain at work for his scheduled daily hours unless excused by an authorized representative of his Employer. Such permission shall not be unreasonably denied.

27.5 An employee who maintained a regular residence within the geographic area of the Local Union for the purposes of employment and who relocates outside the geographic area will not be entitled to an increase in travel or room and board allowance entitlement as a result of this relocation.

27.6 The Union recognizes the Employer's right to charge for board and other existing services. The Employer fixes the charge for board and other existing services in camps at twenty-five dollars ($25.00) per day. This will be applied on the following basis:

(a) An employee who remains in camp on a normally scheduled work day on which he does not work will be charged twenty-five dollars ($25.00) per day, unless he is excused from work by an authorized representative of his Employer.

(b) An employee who is absent from work on Friday without approval and who remains in camp and who is still absent from work on the following Monday

without approval will be charged for room and board for Friday, Saturday, Sunday and Monday.

(c) An employee who is absent from work without approval on Friday but who works the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

(d) An employee who works the Friday and is absent from work without approval on the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

Article 28

INITIAL AND RETURN TRAVEL AND TRANSPORTATION

28.1 REV On recruitment of tradesmen who live between ninety-seven (97) and one hundred and sixty-one (161) radius kilometers from the Project, the Employer shall pay twenty-five dollars ($25.00) for the initial trip to the Project.

28.2 ONTARIO RESIDENTS

On recruitment of tradesmen who live in Ontario, but beyond one hundred and sixty-one

REV (161) radius kilometers from the Project, the Employer shall pay thirty cents (30¢) per radius kilometer, plus travel time based on one (1) hour's pay for each eighty (80) radius kilometers of travel to a maximum of eight (8) hours' pay, for the initial trip to the Project from where the tradesman lives or place of recruitment, whichever is closer to the Project.

28.3 NON-ONTARIO RESIDENTS

On recruitment of tradesmen who live outside Ontario and beyond one hundred and sixty-one (161) radius kilometers from the Project, the Employer shall pay the equivalent of the cost of public transportation plus travel time based on one (1) hour's pay for each eighty (80) radius kilometers of travel to a maximum of eight (8) hours' pay, for the initial trip to the Project from where the tradesman lives or place of recruitment, whichever is closer to the Project.

28.4 To qualify for payment on Sections 28.1, 28.2 or 28.3, the employee must remain at the Project for a minimum of thirty (30) calendar days or the duration of the job, whichever is lesser. Such payment shall be included in the employee's first pay cheque. Should

the employee subsequently fail to qualify for payment as noted above, the Employer will deduct the payment from the employee's final pay.

28.5 On termination of employment for reasons other than discharge for cause, an employee entitled to payment under Sections 28.1, 28.2 or 28.3 shall be entitled to return expenses calculated in the same manner as in Sections 28.1, 28.2 or 28.3 above, for the return trip from the Project to where the tradesman lives or place of recruitment, whichever is closer to the Project. To be eligible for return payment, an employee must remain at the Project for a minimum of sixty (60) calendar days or the duration of the job, whichever is the lesser.

28.6 (a) On the Thunder Bay Project and Atikokan Project, an employee shall qualify for a return trip from the Project to his regular residence* for each thirty (30) days worked on the Project providing his regular residence is more than four hundred (400) radius kilometers from the Project.

(b) For each entitlement, the Employer shall pay travel expenses on the basis of the equivalent cost of public transportation plus travel time based on one (1) hour's pay for each eighty (80) radius kilometers of travel to a maximum of eight (8) hours' pay.

Article 29

WELDING TESTS

29.1 On hire a welder must possess the satisfactory qualifications and be in possession of either a current Canadian Welding Bureau (All Position) Certificate or an equivalent Ministry of Consumer and Commercial Relations (MCCR) Certificate in accordance with Section 9 of the ASME code, as required by his Employer. It shall be at the discretion of the Employer whether a welder will be hired who does not possess the satisfactory qualifications or either one (1) of the above certificates.

* ***An employee's "regular residence" is the place where he maintains a self- contained domestic establishment (a dwelling house, apartment or similar place of residence where a person generally sleeps and eats) in which he resides and for which he can show proof of financial commitment.***

29.2 Employees scheduled to take Canadian Welding Bureau welding tests during their period of employment shall receive a monetary grant from and as per the regulations of the Ironworkers' Trade Improvement Fund in lieu of wages and allowances lost in taking such tests. Ironworker Welders will be released from duty for necessary Canadian Welding Bureau retesting.

Article 30

TOOLS AND CLOTHING

30.1 Employees shall be required to provide themselves with the ordinary hand tools of their trade. The Employer will provide, insofar as is practical, separate facilities for storing the tools, but shall not be held responsible for losses, except as noted hereunder:

(a) When personal tools valued in excess of fifteen dollars ($15.00) are lost due to fire, the Employer will consider replacement or payment value to a maximum of four hundred dollars ($400.00), based on the merit of each case. This will include only personal tools that a tradesman is required to have to perform his normal duties with the Employer.

(b) The Employer agrees to compensate employees for tools and work clothing lost by theft, as supported by claims submitted in writing with substantiating evidence to establish theft resulting from forcible entry to locked storage provided by the Employer to a maximum of four hundred dollars ($400.00). The Employer agrees to replace personal tools broken on the job or lost over water to a maximum of four hundred dollars ($400.00).

(c) In the event of a loss by fire at a work site, replacement or payment of the full estimated value in excess of fifteen dollars ($15.00) but not exceeding four hundred dollars ($400.00) for the loss of personal clothing will be made.

(d) In the event of a loss by fire at an Employer-operated camp, replacement or payment of the full estimated value in excess of fifteen dollars ($15.00) but not exceeding seven hundred and fifty dollars ($750.00) for the loss of personal clothing will be made.

30.2 Employees who have obtained tools from Employer's tool crib shall be allowed sufficient time, in the opinion of Management, to return such tools to the tool crib during working hours. Employees receiving tools from such tool crib shall be held responsible for the return of such tools in good condition, subject to normal wear and tear. On layoff, employees will be allowed reasonable time to return tools to the tool crib.

30.3 Gang tools are tools which are issued to a foreman and are used by one or more members of the crew. Such tools are not identified on trade tool lists, nor are they the tools and equipment identified in Sections 30.1 and 30.2 of this Article. Such tools shall be the responsibility of the Employer.

30.4 An employee, upon becoming aware of the theft or loss of Employer supplied tools, or clothing, will immediately report such theft or loss to his Employer. Failures to do so will result in employees being charged for the value of the lost or stolen tools or clothing.

Article 31

PROTECTIVE CLOTHING AND EQUIPMENT

31.1 On jobs of an abnormally dirty nature or on jobs where acid or other chemicals damage clothing, the Employer agrees to supply gloves and coveralls.

31.2 On the Thunder Bay and Atikokan Projects the Employer will, without cost to the employee, supply helmet, welding gloves and protective sleeves but the employee will be responsible to return same.

31.3 Welding jackets, welding sleeves, welding hoods or hard hats broken or damaged on the job shall be replaced by the Employer.

Article 32

DRINKING WATER AND CLOTHES ROOM

32.1 Every Employer shall supply adequate drinking water (with ice when necessary and available) at all times, from covered containers having a drain faucet and individual drinking cups.

32.2 Every Employer shall provide or arrange at the commencement of the job, a sanitary and adequately heated, lighted and ventilated when necessary, place of shelter of adequate size, with adequate benches and tables where employees may eat their lunch, change their clothes and safely keep their tools.

32.3 Where the employer does not supply a shack of his own, but arranges for facilities, as in Section 32.2 above, he shall supply a gangbox, for each shift, with lock to safeguard his employees' tools.

32.4 Every Employer shall arrange for or provide at the commencement of the job, sanitary, adequately heated, lighted and ventilated toilet facilities. Flush toilet facilities shall be arranged for or provided when and where available.

Article 33

RADIATION WORK

33.1 Local Union to be provided with a copy of Ontario Hydro Radiation Protection Procedures and any revisions.

Each employee will have access to his personal radiation exposure record.

Long-term employees who reach their exposure limit will be given alternate employment until they can resume radiation work.

Short-term employees will be given a guaranteed period of employment at their time of hire.

33.2 **REV** Employees working in a radiation area, in plastic suits of the fully enveloping type with an independent air supply, will receive $10.00 per day. A day for the purposes of this item shall be defined as any period up to twelve (12) hours.

33.3 Construction Radiation Protection Assistant (R.P.A) is a Construction Trades Person who has achieved the full radiation qualification via the approved Ontario Hydro Training Program. This requires successful completion of the construction R.P.A. training and checkouts and the performance of R.P.A. functions while under supervision of a fully qualified Construction R.P.A. to the satisfaction of the Construction Site Safety Officer and the Station Health Physics Unit.

R.P.A. will be paid the appropriate equivalent foreman's rate when performing an R.P.A. function and will report to the Site Safety Unit. An R.P.A. is a "qualification" and not a "trade function" irrespective of union or trade affiliation.

Article 34

STANDOFF

NEW

34.1 When unable to proceed with work, an Employer may elect to Standoff part or all of a crew.

The Employer reserves the right to Standoff its employees without pay up to a maximum of ten (10) consecutive working days. Notification of Standoff will be made by the Employer during normal working hours. A Record of Employment will be issued upon the commencement of the Standoff. No travel or subsistence allowance will be paid to an employee for the Standoff period.

34.2 If Standoff continues beyond ten (10) consecutive working days, an employee, at his/her option, may elect to remain on Standoff for an additional twenty (20) consecutive working days or be removed from Standoff. The Employer retains recall rights on employees electing to continue on Standoff.

34.3 If an employee elects layoff beyond the tenth (10th) consecutive working day, it shall be carried out in accordance with the terms of the Layoff provisions of this Agreement. An employee laid off will be issued a Record of Employment form on his/her date of layoff indicating "Layoff – Shortage of Work".

34.4 Standoff shall only continue beyond thirty (30) consecutive working days with the mutual consent of the Employer and the Union, in writing.

34.5 For the purpose of this Article, when working on a 4 x 10 hour shift arrangement, the following will apply:

- eight (8) scheduled working days will be considered the equivalent of ten (10) consecutive working days.
- sixteen (16) scheduled working days will be considered the equivalent of twenty (20) consecutive working days.
- twenty-four (24) scheduled working days will be considered the equivalent of thirty (30) consecutive working days.

Article 35

GRIEVANCE PROCEDURE

35.1 Grievances within the meaning of the grievance and arbitration procedure shall consist only of disputes about the interpretation or application of particular clauses of this Agreement and about alleged violations of this Agreement. In the event of any dispute concerning the meaning or application of any provision of this Agreement or a dispute concerning an alleged violation of this Agreement, there shall be no suspension or disruption of work, but such dispute shall be treated as a grievance and shall be settled, if possible, by EPSCA and the Union. In the interests of expediting the procedures, the parties shall process grievances in the following manner:

35.2 PRELIMINARY DISCUSSION

Disputes arising out of the interpretation or alleged violation of this Agreement shall, if possible, be settled by discussion between the employee and/or his steward and the employee's supervisor.

35.3 FIRST STEP

If a dispute cannot be resolved by this method, the Accredited Union Representative for the Union may file a formal grievance on the prescribed form with the Manager of Construction or the Field Construction Manager. Such grievance shall be filed within fifteen (15) working days of the alleged grievous act.

Within ten (10) working days of the filing of the grievance, the Manager of Construction or Field Construction Manager shall investigate the grievance and convene a meeting which he or the Accredited Union Representative considers necessary to resolve it. The Manager of Construction or Field Construction Manager shall give his reply on the prescribed form to the Accredited Union Representative within five (5) working days from the date of the First Step meeting.

Copies of completed grievance forms signed by the appropriate parties shall be filed by the Manager of Construction or the Field Construction Manager with the General Manager of EPSCA and by the Accredited Union Representative with the International Representative of the Union.

If a First Step grievance meeting is considered appropriate, the Management Committee shall comprise the Manager of Construction or Field Construction Manager, or their designates, plus two (2) Management officials, one (1) of whom shall be a representative of the Employer against whom the grievance has been filed. The Union Committee shall comprise the Accredited Union Representative plus two (2) additional Union officials.

35.4 SECOND STEP

If a dispute has not been resolved at the First Step of the grievance procedure, the Accredited Union Representative may refer the grievance on the prescribed form to EPSCA's Grievance Officer. Such grievances shall be referred within ten (10) working days after the disposition has been issued under the First Step of this procedure. A copy of the grievance form shall be forwarded by the Accredited Union Representative to the International Representative of the Union.

The EPSCA Grievance Officer shall investigate the grievance and convene a meeting which he or the International Representative considers necessary to resolve it and give his reply on the prescribed form to the International Representative of the Union within five (5) working days from the receipt of the grievance form which was completed at First Step.

If a Second Step grievance meeting is considered appropriate, the Management Committee shall comprise the EPSCA Grievance Officer plus two (2) other Management representatives, one (1) of whom shall be a representative of the Employer against whom the grievance has been filed. The Union Committee shall comprise three (3) persons, including the International Representative and the Accredited Representative for the grievor, plus one (1) other representative of the Union.

35.5 EPSCA OR UNION GRIEVANCES

The processing of EPSCA grievances shall begin at the Second Step. EPSCA may submit either policy or specific grievances. The Union may also institute policy grievances at this Step. Such policy or specific grievances shall be submitted within thirty (30) days of the alleged grievous act.

35.6 TIME LIMITS

The time limits as to both documents and procedure set out in the above Sections shall be complied with by the parties to this Agreement provided, however, that the parties may mutually agree in writing in respect to an extension or waiver of any of the time limits imposed. Where no answer is given within the time limits specified in the grievance procedure, the employee concerned, the Union or EPSCA shall be entitled to submit the grievance to the next step of the grievance procedure. Any grievance not processed within the time limits specified in the grievance procedure shall be deemed to have been settled and ineligible for arbitration.

35.7 Alleged unjustified termination, discharge, suspension or disciplinary action may be grieved beginning at First Step.

35.8 GRIEVANCE FACILITIES

EPSCA shall provide the necessary facilities for all grievance meetings.

Article 36

ARBITRATION

36.1 If any dispute about the interpretation or application of particular clauses of this Agreement or about an alleged violation of this Agreement cannot be settled through the grievance procedure outlined in Article 34, the matter may be submitted within thirty (30) days of its failure of settlement by grievance procedure by either EPSCA or the Union to a Board of Arbitration for adjudication. The party desiring to submit the dispute to arbitration shall notify the other party in writing of this desire and the notice shall contain the name of the first party's nominee to an arbitration board. The recipient of the notice shall, within five (5) working days, inform the other party of the name of its nominee to the arbitration board. The two (2) nominees so selected shall, within ten (10) working days of the appointment of the second of them, appoint a third person who shall be the Chairman. If the recipient of the notice fails to appoint a nominee, the appointment shall be made by the Minister of Labour for Ontario upon the request of

the other party. If the two (2) nominees fail to agree upon a Chairman, the services of the Minister of Labour for Ontario shall be utilized and the request to the Minister may be made by either party. The arbitration board, when selected or appointed, shall proceed as soon as practicable to hear and determine the dispute and it shall issue a decision which is final and binding upon the parties and upon their respective members. The decision of a majority is the decision of the arbitration board, but if there is no majority, the decision of the Chairman governs.

36.2 The arbitration board shall have no power to add to or subtract from or modify any of the terms of this Agreement. The arbitration board shall not substitute its discretion for that of the parties except where the board determines that an employee has been discharged or otherwise disciplined for cause when this Agreement does not contain a specific penalty for the infraction that is the subject matter of the arbitration. In such cases, the arbitration board may substitute such other penalty for the discharge or discipline as to the arbitration board seems just and reasonable in all circumstances. The arbitration board shall not exercise any responsibility or function of the parties. The arbitration board shall not deal with any matter not contained in the original statement of grievance filed by the party referring the matter to arbitration.

36.3 In arbitration proceedings, each party shall pay the fees and expenses of its nominee, whether appointed by the party or by the Minister of Labour for Ontario, and the fees and expenses of the Chairman shall be shared equally by the parties.

36.4 The time limits as to both documents and procedure set out in the above Sections shall be observed by the parties to this Agreement provided, however, that the parties may mutually agree in writing in respect to an extension or waiver of any of the time limits imposed.

Article 37

NO STRIKE - NO LOCKOUT

37.1 There shall be no strikes or lockouts so long as this agreement continues to operate.

Article 38

FENCE ERECTION

38.1 For employers engaged in fence erection, the terms and conditions of employment will be those contained in Appendix I attached hereto.

Article 39

ABORIGINAL CONTENT COMMITMENT

39.1 Where an aboriginal commitment has been established on a project, the Union will co-operate in meeting the content commitments.

39.2 For a project that is less than $100,000 field labour, and has aboriginal content commitments, the terms of this collective agreement will not apply to those aboriginal content commitments.

Article 40

ENABLING AGREEMENT

40.1 Where a particular Article or Articles of this Collective Agreement is or are found to work a hardship in a specific Local Union jurisdiction territory, the terms and conditions in this Agreement for that Local Union area may be modified for a particular project by the mutual consent of the Local Union and the Employers when they deem it prudent. Such amendments made shall be submitted to the International Office and EPSCA for ratification.

It being understood and agreed that where mutual agreement for change cannot be achieved the request shall not be subject to either grievance or arbitration.

Article 41

MODIFIED PROVISIONS OF THIS CONSTRUCTION AGREEMENT

41.1 These provisions will apply to all work on Lines and Stations and on existing generating sites except the construction of:

- a new facility which provides a new function
- the construction of a new (ie. additional) generating unit

41.2 Definitions:

Facility: A facility is something that is built composed of multi-systems which serves a specific function

Function: eg. Generation, Administration, Warehousing, Heavy Water Production, Flue Gas Desulphurization, Tritium Removal, Site Services (eg. Shops)

41.3 Dispute Resolution Process

A dispute as to whether the ' Modified Provisions of this Construction Agreement ' apply to the construction of a new facility will be referred to the Executive Committee for resolution and the Executive Committee will meet within five (5) working days. If the Executive Committee is unable to resolve the dispute, the dispute will be referred to a single arbitrator within ten (10) working days for a final and binding resolution. The arbitrator shall give an oral decision within five (5) working days, and a written decision, if requested, within twenty (20) working days.

41.4 OVERTIME RATES

41.4.1 When working on an eight (8) hour day and five (5) day per week work schedule
REV (Monday to Friday inclusive), overtime work shall be paid at one and one-half (1 1/2) times the basic hourly rate for all hours worked beyond the normal daily scheduled number of hours up to a maximum of 2 hours per day. All hours in excess of 10 hours per day shall be paid at two (2) times the base hourly rate.

When working on a ten (10) hour day and four (4) day per week work schedule (Monday to Friday inclusive), overtime work shall be paid at one and one-half (1 1/2) times the basic hourly rate for all hours worked beyond the normal daily scheduled number of hours up to a maximum of 2 hours per day. All hours in excess of 12 hours per day shall be paid at two (2) times the base hourly rate.

REV Overtime work performed on Saturday, Sunday, Recognized Holidays and non-shift days shall be paid at two (2) times the basic hourly rate.

41.4.2 When an employee is required to return to work without an eight (8) hour break, all work performed shall be paid for at the appropriate overtime rate, until such time as the employee receives an eight (8) hour break.

41.4.3 Overtime shall be assigned as impartially as possible amongst all members of the crew, subject to their ability to perform the work required.

Article 42

TERM OF AGREEMENT

42.1 REV This Agreement shall continue in full force and effect from July 13, 2004 until April 30, 2010, inclusive, and thereafter it shall be considered automatically renewed for successive periods of twelve (12) months unless at least sixty (60) days prior to the end of any twelve (12) month effective period either party serves written notice upon the other that it desires cancellation, revision, or modification of any provision or provisions of this Agreement.

In witness whereof, EPSCA and the Union have caused this agreement to be executed in their names by duly authorized representatives at *Toronto* this *25th* day of *November, 2004*

FOR:
THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION

I. Starasts

General Manager,
Ivars Starasts

FOR:
INTERNATIONAL ASSOCIATION OF BRIDGE, STRUCTURAL, ORNAMENTAL AND REINFORCING IRON WORKERS

Joseph J. Hunt

General President,
Joseph J. Hunt

F. Marr

Ontario District Council President,
Fred Marr

APPENDIX I
to the

Collective Agreement

between

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION

and the

INTERNATIONAL ASSOCIATION OF BRIDGE,

STRUCTURAL AND ORNAMENTAL IRON WORKERS

May 1, 1990 - April 30, 1992

If members of the Union are to be engaged in fence erection, the master portion articles of this Agreement shall apply in full with the exception of Article 15, Vacation and Recognized Holiday Pay; Article 13, Wages; Article 21, Hours of Work; Article 22, Overtime Rates; Article 16, Welfare and Pension Plans; Article 11, Apprentices; and Article 17, Ironworkers' Trade Improvement Plan, which are amended as follows:

Article 15 - Vacation and Recognized Holiday Pay

The vacation and recognized holiday pay rate shall be ten percent (10%) (six percent [6%] vacation and four percent [4%] in lieu of recognized holidays) of total earnings.

Article 13 - Wages

The wage rates for employees engaged in fence erection shall be as follows:

Subforeman - Fence Erector rate plus fifty-four cents (54¢) per hour.

	% of J'Man	June 25, 1990	May 1, 1991
Fence Erector	75	$16.94	Not
Fence Erector Helper "A"	70	15.81	Available
Fence Erector Helper "B"	60	13.55	

Following completion of not more than three (3) months of continuous employment, an employee classified as Fence Erector Helper "B" shall be reclassified to Fence Erector Helper "A", and be paid the appropriate rate.

Article 21 - Hours of Work

The normal hours of work for employees engaged in fence erection shall be forty-four (44) hours made up of four (4) days of nine (9) hours each, Monday to Thursday inclusive, and eight (8) hours on Friday.

Article 22 - Overtime Rates

One and one-half (1-1/2) times the basic rate for hours worked in excess of normal hours in any one (1) day, Monday to Friday and for all hours worked on Saturdays and the Statutory Holidays listed in the master portion of this Agreement. Two (2) times the basic rate will be paid for all hours worked on Sundays.

Article 16 - Welfare and Pension Plans

Not applicable.

Article 17 - Ironworkers' Trade Improvement Plan

Not applicable.

APPENDIX A

MOOSE RIVER BASIN: NORTHERN ONTARIO

Where the Employer elects to establish a camp, the following conditions will apply for employees working in the Moose River Basin:

Camp Conditions

(a) An Employer may elect to provide free room and board in camp at no cost to the employee. Where the Employer elects to provide a camp such employees will not be entitled to receive a daily travel or room and board allowance.

(b) When an Employer does not elect to provide free room and board in camp, the employee will be entitled to receive a daily travel or room and board allowance as set out in Article 26.

(c) An employee who remains in camp on a normally scheduled work day on which he does not work will be charged $25.00 per day unless he is excused from work for a legitimate reason by the project medical attendant or an authorized representative of his Employer.

(d) An employee who is absent from work without approval and who remains in camp and is still absent from work the following day without approval will be charged $25.00 for the day of absence and each successive day of unapproved absence.

Hours of Work

(1) The hours of work will consist of a 21 day cycle of fourteen (14) consecutive work days followed by seven (7) consecutive days off.

(2) Regularly scheduled hours of work of ten (10) hours per day shall be paid at straight time hourly rates.

(3) Regularly scheduled hours of work on Saturday, Sunday, Recognized Holidays, and the fifth (5th) consecutive weekday shall be paid at two times the straight time hourly rate.

Wrap Around

An employee shall qualify for a return trip from the project every second twenty-one (21) day cycle he is on the project on the following basis:

(a) If an employee lives within 161 radius kilometres from the project, the Employer shall pay forty dollars ($40.00).

(b) If an employee lives greater than 161 radius kilometres from the project, the Employer shall pay as an allowance, forty dollars ($40.00) plus travel time based on the equivalent of one (1) hour's base rate of pay for each eighty (80) radius kilometres, or portion thereof, of travel time to a maximum of 800 kilometres from where the employee lives or place of recruitment, whichever is closer to the project.

APPENDIX B

7 DAY COVERAGE

These provisions would only apply to work covered by the "Modified Provisions" of this Construction Agreement.

When working under the provisions of this appendix all conditions listed below will supersede those contained in the main agreement. Where the appendix is silent, the appropriate article in the collective agreement applies.

The overtime rates will be as per the Modified Provisions.

This shift schedule is intended for work greater than four (4) weeks in duration, however, it is recognized that unforeseen circumstances may require the cancellation of this schedule.

If in the transition onto or off this 7-day shift schedule an employee would receive less than 40 paid hours in a pay period, the employee shall receive the difference between the total paid hours for that pay period and 40 hours pay. This does not apply to those employees who are laid off during or at the end of the schedule.

The employee(s) shift schedule consists of four consecutive shifts (day, afternoon, or night) followed by four scheduled days off. Shift overlap may be required.

Shift work may be established by the employer to provide seven days per week work coverage, on a one, two, or three shift per day basis. When this occurs, a specific shift arrangement will be established by the employer detailing the shift schedule to be worked. The employer will provide the Union with 48 hours notice prior to the implementation of these shift provisions.

First Shift

Regularly scheduled hours of work of up to ten (10) hours per shift Monday to Friday inclusive shall be paid at straight time hourly rates.

Second Shift

Regularly scheduled hours of work of up to ten (10) hours per shift Monday to Friday inclusive shall be paid at straight time hourly rates plus a shift differential of one-fifth of the straight time hourly rate.

Third Shift

Regularly scheduled hours of work of up to ten (10) hours per shift Monday to Friday inclusive shall be paid at straight time hourly rates plus a shift differential of one-fifth of the straight time hourly rate.

All Shifts

Regularly scheduled hours of work on Saturday, Sunday, Statutory and Recognized Holidays shall be paid at two times the straight time hourly rate. Recognized Holidays will be observed on the actual day on which the holiday occurs or as declared by legislation.

The rate for the shift will be based on the day in which the shift begins.

An unpaid lunch period of one-half hour shall be allowed to be taken no later than five hours after the commencement of a shift.

For employees working regularly scheduled hours, two fifteen (15) minute rest periods will be allotted at a time and location directed by the employer for employees to rest.

It may be necessary, from time to time, to vary the established shift arrangements. When this occurs, a revised shift arrangement will be established.

STATEMENT OF UNDERSTANDING #1

EMPLOYMENT EQUITY

It is recognized by the Electrical Power Systems Construction Association and the International Association of Bridge, Structural and Ornamental Ironworkers that Employment Equity legislation will be passed during the life of this collective agreement.

The parties therefore agree to consider and address the legislation as it affects the accommodation of aboriginals and any other group designated by the legislation.

Signed at Toronto this 29th day of June, 1992.

For the Electrical Power Systems Construction Association

For the International Association of Bridge, Structural and Ornamental Iron Workers

Letter of Understanding

between

The Electrical Power Systems
Construction Association

and

The International Association
of Bridge, Structural and Ornamental Ironworkers

It is agreed by the parties to this understanding that any issues arising from the definition of "Major" referred to in Article 1.1 (ii) shall be referred to a joint committee co-chaired by the General Manager of EPSCA and the Eastern Canadian General Organizer of the Union. It is not subject to the grievance/arbitration process as outlined in Articles 34 and 35.

F. Marr
Eastern Canadian General
Organizer

V.W. Medri
Secretary Treasurer

Letter of Understanding

between

The Electrical Power Systems
Construction Association

and

The International Association
of Bridge, Structural and Ornamental Ironworkers

Effective May 1, 1993 employers will forward to the credit of Institute of the Ironworking Industry (Triple I) two cents (2¢) for each paid hour received by Ironworkers working under E.P.S.C.A. Collective Agreements. This money will be forwarded to the Ironworkers Benefit Plan, Administrator along with other Health and Welfare deductions.

Fred Marr
General Organizer

Vello Medri
Secretary & Treasurer
E.P.S.C.A.

LETTER OF UNDERSTANDING

Compensation for Travel Time at Remote Hydro Electric Generating Sites

Considering the travelling conditions and availability of accommodation, the Employer may establish as assembly point different than the work location. Where the assembly point is different than a work location, the following provisions will apply:

1.0 An employee will be paid an allowance equivalent to his straight-time rate, up to a maximum of one (1) hour, for all time spent travelling from his assembly point to his work location.

2.0 An employee will travel on his own time when returning from his work location to his assembly point.

3.0 The Employer is entitled to 50% name hire for work covered by these provisions.

Dated this 26th day of November, 1998.

for EPSCA

for Iron Workers

LETTER OF UNDERSTANDING

between

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION

and

THE INTERNATIONAL ASSOCIATION OF BRIDGE, STRUCTURAL, ORNAMENTAL AND REINFRCING IRONWORKERS

EMPLOYMENT REFERRALS TO NUCLEAR FACILITIES AND ONTARIO HYDRO SERVICES COMPANY

It is agreed by the parties to this understanding, that prior to any member being referred for employment at a nuclear generating facility or Ontario Hydro Services Company property, the member must submit to a security check. Only members who successfully obtain security clearance will be referred to the facility for employment. Once a member has been hired on, they will receive an allowance of $50.00 on their first weeks pay cheque, in consideration of their time spent filling out the security forms.

The Union will be notified in writing of the names of the individuals who were not successful in obtaining security clearances.

The parties to this understanding also acknowledge that this pre-clearance process does not prohibit the Union from filing a grievance on behalf of any member who is refused employment due to their failure to obtain security clearance.

Dated at Toronto this 30th day of March, 2000

J.K. Dotchin

For the Electrical Power Systems Construction Association

F. Marr

For the International Association of Bridge, Structural, Ornamental And Reinforcing Ironworkers.

LETTER OF UNDERSTANDING

between

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION

and

THE INTERNATIONAL ASSOCIATION OF BRIDGE, STRUCTURAL, ORNAMENTAL AND REINFRCING IRONWORKERS

It is agreed that an employer may refuse to hire a former employee who has retired and signed a waiver that they will not be re-employed.

Dated at Toronto this 30th day of March, 2000

J.K. Dotchin

For the Electrical Power Systems Construction Association

F. Marr

For the International Association of Bridge, Structural, Ornamental And Reinforcing Ironworkers.

LETTER OF UNDERSTANDING

Between

THE ELECTRICAL POWER SYSTEMS
CONSTRUCTION ASSOCIATION

AND

INTERNATIONAL ASSOCIATION OF BRIDGE,
STRUCTURAL, ORNAMENTAL AND REINFORCING
IRON WORKERS and REINFORCING RODMEN

In order to address the issues of training and cost competitiveness, the parties agree that the following shall constitute the principles that will govern training for the term of the collective agreement.

1. The EPSCA Owners will continue to mandate the training requirements for workers on EPSCA owner sites

2. Ironworkers will attend industry standard training on their own time. The parties agree that the following training courses will be recognized as industry standard:

   - WHMIS
   - Fall Arrest
   - Fork Lift
   - Elevated Work Platform
   - Basic First Aid
   - High Voltage Awareness
   - Powder activated tools

3. The parties agree that EPSCA owners/contractors can request workers with industry standard training (as outlined above).

Dated at Toronto this 25th day of November, 2004

I. Starasts

EPSCA

F Marr

Ironworkers

MEMORANDUM OF SETTLEMENT

BETWEEN

THE ELECTRICAL POWER SYSTEMS
CONSTRUCTION ASSOCIATION

AND

INTERNATIONAL ASSOCIATION OF BRIDGE,
STRUCTURAL, ORNAMENTAL AND REINFORCING
IRON WORKERS and REINFORCING RODMEN

Dated this 27th day of April 2004

It is agreed that the existing agreement between the parties which expires April 30, 2004 will be renewed with the following amendments:

GENERAL

Amend references to add Bruce Power LP

ARTICLE 40 — MODIFIED PROVISIONS

Modified Provisions to apply to all work.

Amend the agreement in the following areas:

- Delete General Note
- Deleted boxed statement in Article 23
- Delete Article 40
- Appendix B
  - Delete first and third paragraph

ARTICLE 13 — WAGES AND PAY PROCEDURE

Add:

"Direct deposit to be implemented at the Employer's option."

ARTICLE 14 — WAGES

14.1 May 1, 2004 $1.10
May 1, 2005 $1.05
May 1, 2006 $1.00

ICI increase/date for following three years of agreement

ARTICLE 18 IRONWORKERS' TRADE IMPROVEMENT PLAN

Add, where appropriate:

"Wage schedule, dues and remittance changes are to be provided in writing to EPSCA and changes shall only take place during the months of April and November of each calendar year. The effective date of such changed wage schedules, dues and remittances shall be the date of issuance."

ARTICLE 22 HOURS OF WORK

Amend 2nd paragraph of Article 22.1 to read:

"The weekly hours of work may be arrived at by having the employees work either:

- four (4) consecutive ten-hour shifts, Monday to Thursday or;
- four (4) consecutive ten-hour shifts, Tuesday to Friday or;
- five (5) consecutive eight-hour shifts

but not concurrently on the same work program.

Weekly hours of work will be established for a minimum of two (2) weeks. The Employer will notify the Local Union of the weekly hours of work for each work program at the site. If an Employer intends to change the weekly hours of work, a minimum of seven (7) days written notice shall be sent to the Local Union."

Amend start time in 3rd paragraph of 22.1 to read 7:00 am.

Add to the 3rd paragraph of 22.1:

"The start time for the afternoon shift shall be immediately following the day shift or within two (2) hours either way at the end of the day shift. "

Add to 22.1 :

"Trades assigned to fire watch duties may commence work after the start of the rest of the crew. In these cases, normal scheduled hours of work beyond the quit time of the rest of the crew will not be subject to overtime premiums."

Add to 22.1 and 22.2:

"Shift differential will not be paid on overtime hours."

Agreement to settle existing grievance(s) related to shift differential – From date of filing of grievance to date of expiry as discussed by the Parties

ARTICLE 23 OVERTIME

Amend as follows:

23.1 On Monday to Friday inclusive, overtime work shall be paid at one and one-half (1 ½) times the basic hourly rate for all hours worked beyond the normal daily scheduled number of hours up to a maximum of 12 hours per day. All hours in excess of 12 hours per day shall be paid at two (2) times the basic hourly rate.

Overtime work performed on Saturday, Sunday, Recognized Holidays and non-shift days shall be paid at two times (2x) the basic hourly rate

23.2 When an employee is required to return to work without an eight (8) hour break, all work performed shall be paid for at the appropriate overtime rate, until such time as the employee receives an eight (8) hour break.

23.3 Overtime shall be assigned as impartially as possible amongst all members of the crew, subject to their ability to perform the work required.

ARTICLE 26 GENERATION PROJECTS DAILY TRAVEL ALLOWANCE AND ROOM AND BOARD

Travel rings and Board and Travel to be increased (and rounded to the nearest 5 cents) as follows:

- May 1, 2004 – 4%
- May 1, 2005 – 2%
- May 1, 2006 – 2%
- May 1, 2007 – 4%
- May 1, 2008 – 2%
- May 1, 2009 – 2%

ARTICLE 27 — LINES AND STATIONS DAILY TRAVEL ALLOWANCE AND ROOM AND BOARD

Travel rings and Board and Travel to be increased as follows:

Travel:
May 1, 2004 and in each subsequent year – 50 cents

Board:
May 1, 2004 and in each subsequent year - $1.00

ARTICLE 28 — INITIAL AND RETURN

Amend Article 28.1 to read twenty-five dollars ($25.00).

Amend Article 28.2 to read thirty cents (30¢)

ARTICLE 33 — RADIATION WORK

Amend Article 33.2 to read ten dollars ($10.00)

NEW ARTICLE — STANDOFF

"When unable to proceed with work, an Employer may elect to Standoff part or all of a crew.

The Employer reserves the right to Standoff its employees without pay up to a maximum of ten (10) consecutive working days. Notification of Standoff will be made by the Employer during normal working hours. A Record of Employment will be issued upon the commencement of the Standoff. No travel or subsistence allowance will be paid to an employee for the Standoff period.

If Standoff continues beyond ten (10) consecutive working days, an employee, at his/her option, may elect to remain on Standoff for an additional twenty (20) consecutive working days or be removed from Standoff. The Employer retains recall rights on employees electing to continue on Standoff.

If an employee elects layoff beyond the tenth (10th) consecutive working day, it shall be carried out in accordance with the terms of the Layoff provisions of this Agreement. An employee laid off will be issued a Record of Employment form on his/her date of layoff indicating "Layoff – Shortage of Work".

Standoff shall only continue beyond thirty (30) consecutive working days with the mutual consent of the Employer and the Union, in writing.

For the purpose of this Article, when working on a 4 x 10 hour shift arrangement, the following will apply:

- eight (8) scheduled working days will be considered the equivalent of ten (10) consecutive working days.
- sixteen (16) scheduled working days will be considered the equivalent of twenty (20) consecutive working days.
- twenty-four (24) scheduled working days will be considered the equivalent of thirty (30) consecutive working days.

ARTICLE 41 — TERM OF AGREEMENT

41.1 Duration – **Amend to read as follows:**

This Agreement shall become effective May 1, 2004 and will expire on April 30, 2010.

April 27, 2004

LETTER OF UNDERSTANDING

Between

THE ELECTRICAL POWER SYSTEMS
CONSTRUCTION ASSOCIATION

AND

INTERNATIONAL ASSOCIATION OF BRIDGE,
STRUCTURAL, ORNAMENTAL AND REINFORCING
IRON WORKERS and REINFORCING RODMEN

In order to address the issues of training and cost competitiveness, the parties agree that the following shall constitute the principles that will govern training for the term of the collective agreement.

1. The EPSCA Owners will continue to mandate the training requirements for workers on EPSCA owner sites

2. Ironworkers will attend industry standard training on their own time. The parties agree that the following training courses will be recognized as industry standard:

   - WHMIS
   - Fall Arrest
   - Fork Lift
   - Elevated Work Platform
   - Basic First Aid
   - High Voltage Awareness
   - Powder activated tools

3. The parties agree that EPSCA owners/contractors can request workers with industry standard training (as outlined above).

EPSCA

Ironworkers

It is also agreed that the:

> EPSCA/Rodmen Collective Agreement expiring April 30, 2004 will be renewed by incorporating the above amendments to the corresponding articles in the EPSCA/Rodmen Collective Agreement.

The parties agree to recommend this settlement for ratification. This agreement is conditional upon ratification by May 14, 2004. Following ratification, all terms and conditions will become effective May 1, 2004 (unless otherwise noted) and shall form the new agreement between the Parties.

Dated this 27th day of April, 2004 at Toronto, Ontario.

For EPSCA	For the Ironworkers/Rodmen
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION

AND

INTERNATIONAL ASSOCIATION OF BRIDGE, STRUCTURAL, ORNAMENTAL AND REINFORCING IRON WORKERS

Dated this 13th day of July 2004

All matters contained in April 27, 2004 Memorandum of Settlement in addition to the clarification letter dated May 11, 2004, with the exception of the following articles, will form a recommended settlement between the Parties

All conditions in the April 27, 2004 memorandum and issues resolved as of today will become effective July 13, 2004.

Article 10 – Foremen and Subforemen

The Parties agree that should there be an increase negotiated in the 2007 round of ICI bargaining those increases shall be applied to the Foreman/Subforeman rates in the EPSCA agreement.

Overtime – Article 23 (Greenfield Construction)

No changes to existing Article 23.

It is also agreed that the:

> EPSCA Collective Agreement expiring April 30, 2004 will be renewed by incorporating the above amendments to the corresponding articles in the EPSCA/Ironworker Collective Agreement.

The parties agree to recommend this settlement for ratification. This agreement is conditional upon ratification by July 30, 2004. Following ratification, all terms and conditions will become effective date of signing and shall form the new agreement between the Parties.

Dated this 13th day of July, 2004 at Toronto, Ontario.

For EPSCA	For the Ironworkers/Rodmen
_____	_____
_____	_____
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_____	_____

MAP CODE:
I-2

ISSUED:
SEPTEMBER 24, 2004

REVISED:
APRIL 29, 2005

IRONWORKERS
LOCAL 736
Hamilton

EPSCA WAGE SCHEDULE FOR PROJECTS WITHIN THE GEOGRAPHIC AREA OF THIS LOCAL
(52), (70)

GRADE AND STEP	CLASSIFICATIONS OCCUPATION CODES & EFFECTIVE DATES	BASE HOURLY RATE	VACATION & STAT. HOLIDAY	WELFARE (2)	PENSION (2)	UNION FUNDS (2)	TOTAL WAGE PACKAGE	EPSCA ASSOC. FUND(1)
	FOREMAN - 445065							
19-9	2004-07-13	33.20	3.32	2.65	5.30	0.45	44.92	0.15
	2005-05-01	33.91	3.39	2.70	5.47	0.50	45.97	0.15
	2006-05-01	34.82	3.48	2.70	5.47	0.50	46.97	0.15
	SUBFOREMAN - 445055							
19-8	2004-07-13	32.70	3.27	2.65	5.30	0.45	44.37	0.15
	2005-05-01	33.41	3.34	2.70	5.47	0.50	45.42	0.15
	2006-05-01	34.32	3.43	2.70	5.47	0.50	46.42	0.15
	JOURNEYMAN IRONWORKER, RIGGER - 445035							
19-6	2004-07-13	30.20	3.02	2.65	5.30	0.45	41.62	0.15
	2005-05-01	30.91	3.09	2.70	5.47	0.50	42.67	0.15
	2006-05-01	31.82	3.18	2.70	5.47	0.50	43.67	0.15
	APPRENTICE - 445015							
	1st 1000 hrs							
19-0	2004-07-13	18.12	1.81	2.65	5.30	0.45	28.33	0.15
	2005-05-01	18.55	1.86	2.70	5.47	0.50	29.08	0.15
	2006-05-01	19.09	1.91	2.70	5.47	0.50	29.67	0.15
	2nd 1000 hrs							
19-1	2004-07-13	21.14	2.11	2.65	5.30	0.45	31.65	0.15
	2005-05-01	21.64	2.16	2.70	5.47	0.50	32.47	0.15
	2006-05-01	22.27	2.23	2.70	5.47	0.50	33.17	0.15
	3rd 1000 hrs							
19-2	2004-07-13	22.65	2.27	2.65	5.30	0.45	33.32	0.15
	2005-05-01	23.18	2.32	2.70	5.47	0.50	34.17	0.15
	2006-05-01	23.87	2.39	2.70	5.47	0.50	34.93	0.15
	4th 1000 hrs							
19-3	2004-07-13	24.16	2.42	2.65	5.30	0.45	34.98	0.15
	2005-05-01	24.73	2.47	2.70	5.47	0.50	35.87	0.15
	2006-05-01	25.46	2.55	2.70	5.47	0.50	36.68	0.15
	5th 1000 hrs							
19-4	2004-07-13	25.67	2.57	2.65	5.30	0.45	36.64	0.15
	2005-05-01	26.27	2.63	2.70	5.47	0.50	37.57	0.15
	2006-05-01	27.05	2.71	2.70	5.47	0.50	38.43	0.15
	6th 1000 hrs							
19-5	2004-07-13	27.18	2.72	2.65	5.30	0.45	38.30	0.15
	2005-05-01	27.82	2.78	2.70	5.47	0.50	39.27	0.15
	2006-05-01	28.64	2.86	2.70	5.47	0.50	40.17	0.15

(1)= per hour worked; (2)= per hour paid

IRONWORKERS
LOCAL 736
Hamilton

EPSCA WAGE SCHEDULE FOR PROJECTS WITHIN THE GEOGRAPHIC AREA OF THIS LOCAL
(52), (70)

GRADE AND STEP	CLASSIFICATIONS OCCUPATION CODES & EFFECTIVE DATES	BASE HOURLY RATE	VACATION & STAT. HOLIDAY	WELFARE (2)	PENSION (2)	UNION FUNDS (2)	TOTAL WAGE PACKAGE	EPSCA ASSOC. FUND(1)

Overtime Rate:

Mon-Fri:

Scheduled Work Days : 1 1/2 times for up to and including 2 hours beyond the normal daily scheduled number of hours. This applies for both 4 day x 10 hours per day schedule and 5 day by 8 hour per day schedule.

Non-Scheduled Work Days: 2 times for all hours worked.

Sat: 2 times for all hours worked.

Sun-Hol: 2 times for all hours worked.

UNION FUNDS:

Union Funds contain the following items:

Trade Improvement Plan -	$0.23	per hour paid
District Council -	$0.20	per hour paid
	$0.25	per hour paid - effective May 1, 2005
Institute of Ironworker Industry -	$0.02	per hour paid

BENEFITS ADMINISTRATOR:

All deductions and contributions, excluding Union Dues, are to be sent to the following location:

Ontario Ironworker/Rodmen Benefits Plan Administrator
111 Sheppard Ave., East
North York, ON
M2N 6S2

UNION DUES:

Union Dues for this Local are: $0.75 per hour
$0.78 per hour - effective May 1, 2005

This amount is not included in above noted Union Funds.
Union Dues are to be deducted from the Base Hourly Rate.
Union Dues are to be sent to the following person and location:

Mr. D. Smees
Business Manager
Ironworker/Rodmen - Local 736
1955 Upper James St.
Hamilton, ON
L9B 1K8

GEOGRAPHIC AREA: Counties of Huron, Bruce, Perth, Grey, Oxford, Brant and Wellington; the Regional Municipalities of Waterloo, Haldimand-Norfolk, Niagara and Hamilton Wentwoth; all of Halton(RM) except the premises of the Ford Motor Company.

Rodmen

COLLECTIVE AGREEMENT

between

THE ELECTRICAL POWER SYSTEMS

CONSTRUCTION ASSOCIATION

and the

INTERNATIONAL ASSOCIATION OF BRIDGE,

STRUCTURAL, ORNAMENTAL AND REINFORCING

IRON WORKERS

on behalf of

Reinforcing Rodmen

May 1, 2004 - April 30, 2010

EPSCA/RODMEN COLLECTIVE AGREEMENT

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COLLECTIVE AGREEMENT

by and between

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION
(hereinafter called EPSCA)

and the

INTERNATIONAL ASSOCIATION OF BRIDGE,
STRUCTURAL, ORNAMENTAL AND REINFORCING IRON WORKERS
on behalf of Reinforcing Rodmen
(hereinafter called the Union)

* * * * *

WITNESSETH

WHEREAS EPSCA is an Association formed to represent all Employers engaged in construction industry work in the electrical power systems sector in collective bargaining and on their behalf enter into collective agreements covering those of their employees in the bargaining unit as hereinafter defined; and

WHEREAS the Union is affiliated with the American Federation of Labour - Congress of Industrial Organizations and has in its membership competent, skilled and qualified journeymen and apprentices to perform work coming within the trade and craft jurisdiction; and

WHEREAS the Association and the Union desire to mutually establish and stabilize wages, hours and working conditions for journeymen and apprentices employed by Employers within the electrical power systems sector of the construction industry, and further, to encourage closer cooperation and understanding between the Association and the Union to the end that a satisfactory, continuous and harmonious relationship will exist between the parties to this Agreement;

NOW THEREFORE, the Association and the Union mutually agree that the working conditions as set out below shall be applicable throughout the Province of Ontario.

Article 1

RECOGNITION

1.1 EPSCA recognizes the Union as the exclusive bargaining agency for a bargaining unit as defined in Section 1.4 engaged in

(i) all construction industry work under the responsibility of Design and Construction Branch (including Generation Projects Division and Transmission Systems Division),

(ii) all Major* construction industry work which is tendered/contracted for other than the Design and Construction Branch and,

REV (iii) work performed by the Design and Construction Branch for any Operations branch of Ontario Power Generation Inc (OPGI), Bruce Power LP and Ontario Hydro Services Company (OHSC) [formerly Ontario Hydro] where it has been determined by that Operations branch that there does not exist internally the expertise or the current staff to perform the work.

REV This work shall be performed in the Province of Ontario on Ontario Power Generation Inc (OPGI), Bruce Power LP and Ontario Hydro Services Company (OHSC) [formerly Ontario Hydro] property for the bulk power system, save and except the building of commercial-type office facilities at urban locations remote from operating facilities. The work encompasses:

- construction of new facilities
- additions to existing facilities
  - modifications
  - rehabilitation
  - reconstruction of existing facilities

For the purpose of clarity, the bulk power system comprises generating stations, hydraulic works, heavy water facilities, transmission lines (voltage over 50 kV) and transmission stations, microwave and repeater stations.

1.2 The Union recognizes EPSCA as the sole and exclusive collective bargaining agency for all of the Employers covered by this Agreement, and in all matters pertaining to the administration of this Collective Agreement.

1.3 The term "employee" shall include all employees of the Employers in the classifications as set out in Section 1.4 below.

* ***The definition of Major described in (ii) above and any issues arising out of the interpretation of Major shall be dealt with in an attached Letter of Understanding.***

1.4 The bargaining unit under this Agreement shall comprise the following classifications:

RODMEN

Foreman
Subforeman
Journeyman Rodman
Apprentice

1.5 The term "Employers" shall include individual members of EPSCA and any company, partnership, sole proprietorship, joint venture, contractor, subcontractor or any person who is bound by the terms and conditions of this Agreement.

1.6 This Agreement shall cover all of the employees of the Employer for whom the Union has bargaining rights that work on field fabrication, handling, racking, sorting, cutting, bending, hoisting, placing, burning, welding, and tying of all materials used to reinforce concrete construction without limiting the generality of the foregoing, this includes reinforcing bars, welded wire mesh, post-tensioning systems (wire, strand, bar, plastic and substitute materials, including the stressing and all related work).

1.7 The classifications referred to in Section 1.4 do not establish craft jurisdiction. Such jurisdiction is established in accordance with Article 6 of this Collective Agreement.

Article 2

EXECUTIVE COMMITTEE

2.1 To advance harmonious relations between EPSCA, the Employers, the Union, and the employees, the parties shall each appoint an Executive Committee. The Committees shall meet together at least annually to review matters associated with the administration of this Collective Agreement with the intent of achieving uniformity of application of this Agreement wherever employees are working in the Province. This Committee shall consist of not more than six (6) members from each party.

Article 3

ACCREDITED UNION REPRESENTATIVES

3.1 The Senior Representative of the Union will designate Local Union representatives as Accredited Union Representatives to handle the day-to-day administration of this Agreement on the basis of not more than two (2) representatives from the Union for each Project and suitable number for each Lines and Stations Construction Zone. The Union will notify the General Manager of EPSCA in writing of the names of such Union representatives, or alternates in the event of illness or unavailability, so thatthey may be issued identification cards to permit entry to the site. Upon entering the job site, such representatives after identifying themselves to the EPSCA Representative and the authorized representative of the Employer, will be free to observe the progress and conduct of the work and to conduct normal union business. The Union undertakes that these representatives will not hinder or interfere in any way with the said work.

Article 4

UNION STEWARDS

4.1 The Accredited Union Representative shall inform the appropriate EPSCA Representative in writing of the names of all stewards as they are appointed and when they cease to act as stewards. If the Employer disapproves of the appointed steward, the Employer shall immediately notify the Union through the EPSCA Representative, in writing, stating the reason for disapproval. If the reason(s) are acceptable to the Union, a new steward will be appointed immediately. If an acceptable Union Steward cannot be chosen, the Union and the Employer shall meet jointly to discuss the reasons for disapproval and if necessary the grievance procedure will be followed. There shall not be more than one (1) steward per Employer unless the Employer and Union mutually agree that more stewards are required. A steward shall exercise his duties only in respect to employees of his Employer. A steward shall obtain permission from his immediate supervisor before leaving his work area for Union business. Such permission shall not be unreasonably denied. No Foreman or Subforeman shall be permitted to act as a Steward.

The Accredited Union Representative shall inform the appropriate EPSCA Representative in writing of the name of one (1) steward who will represent the Union at stewards' meetings.

4.2 The steward shall be supplied by his Employer with a list of employees hired, discharged and to be laid off.

4.3 In the event of a work stoppage or threat of a work stoppage, or any other employee activity prohibited by this Agreement, affected stewards, in keeping with their responsibilities, as it is incumbent upon all Union representatives, shall immediately do all in their power to ensure that the prohibited action of the employees is prevented or stopped.

4.4 The Employer agrees that when employees are laid off, the steward will be one of the last two employees laid off provided the steward is able to perform the remaining work required.

4.5 A Union steward will not be transferred to another project unless mutually agreed to by the Employer and the Accredited Union Representative.

4.6 A steward shall be given the first opportunity to work overtime provided he is able to perform the work required. When a crew not containing a steward is required to work overtime, one (1) member of the crew will be replaced by a steward in order that a steward may be present for overtime hours worked.

Article 5

ADVANCE NOTICES

5.1 EPSCA will advise the Union of all new construction work coming under the scope of this Agreement for the construction field forces of the Employers.

Upon the request of the Union, EPSCA will convene a pre-job conference before work commences to discuss the preliminary details of the proposed work to be performed and to establish conditions in accordance with this Agreement for the Project.

Article 6

WORK ASSIGNMENT

6.1 The Jurisdiction of the Unions shall be that jurisdiction established by agreements between International Unions claiming the work or Decisions of Record recognized by the AFL-CIO for the various classifications and the character of work performed, having regard for the special requirements of thermal, nuclear or hydraulic generation and transmission and transformation construction.

6.2 A markup process will be utilized when an Employer intends to perform work on a project site*. The purpose of this markup process is to indicate to the Union the work which is planned to be carried out by the Employer in order to minimize the potential for jurisdictional disputes. In the Electricity Production zones when work falls within this criteria the EPSCA Office will send out a "Notification of Work" along with a copy of the original minutes of mark-up meeting(s) to the Local Unions prior to work commencing. This procedure shall not preclude the Unions' right to contest previously assigned work, if the work is in a Local Union jurisdiction other than the one it was marked up in.

When work is to be performed on a project site and it meets the following criteria; same employer, same work, same project site, the markup process will not be required.

When an Employer has work that is less than a three (3) week duration and there are ten (10) or fewer employees covered by EPSCA Collective Agreements employed on this specific work, the Union will be notified of the scope of work and the Employer's proposed work assignments. The Union will have two (2) weeks from the date of notification to submit jurisdictional claims and supporting evidence to the Employer for consideration. The Employer will notify the Union of the final work assignments prior to the commencement of the work.

All work that does not meet the criteria set out in paragraph 2, will be reviewed and assigned at a markup meeting.

EPSCA will provide written notice to the Union (International Office and Local Union Office) as far in advance as possible of markup meetings. The Union may attend these markup meetings, and every effort will be made to settle questions of jurisdiction before the work is expected to commence.

The Employer who has the responsibility for the new work shall make a proposed assignment of the work involved. The Employer shall be responsible for providing copies of proposed assignments to the Union (International Office and Local Union Office). The Employer will specify a time limit for the Union to submit evidence supporting its claims. The Employer will evaluate all evidence submitted and make a final assignment of the work involved. This final assignment will be in accordance with the procedural rules established by the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry. The Employer will advise the Union of the final assignments prior to the work commencing.

** For the purposes of this Article, Nanticoke, Lambton, Bruce Nuclear Power Development (BNPD), Darlington, Pickering and the six (6) Electricity Production Zones are each considered one project site.*

The EPSCA representative will record the proposed assignments and jurisdictional claims and forward a copy of them within fifteen (15) working days to the Union (International Office and Local Union Office).

The parties recognize that circumstances may arise, particularly with discovery and emergency work, where the process set out above may not be practical or possible.

Article 7

JURISDICTIONAL DISPUTES

7.1 (a) The Union shall have the exclusive right to elect to pursue or respond to any Jurisdictional disputes that arise under this Agreement at either the Ontario Labour Relations Board (OLRB) or the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry (Plan).

In the event the Union elects to pursue or respond to the Jurisdictional Dispute at the Plan, paragraphs 7.1(b), 7.2, 7.3 and 7.4 will apply.

In the event the Union elects to pursue or respond to the Jurisdictional Dispute at the OLRB, paragraphs 7.1(b), 7.2, 7.3, and 7.4 will NOT apply. Further, the sentence within paragraph 7.1(b) which reads "If the jurisdictional dispute cannot be settled on a local basis by the Unions involved, it shall be submitted to the International Unions involved for settlement without permitting it to interfere in any way with the progress of the work at anytime." will apply.

(b) In the event of a jurisdictional dispute, the Employer will make an assignment for the work in dispute in accordance with the Procedural Rules and Regulations of the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry. If the jurisdictional dispute cannot be settled on a local basis by the Unions involved, it shall be submitted to the International Unions involved for settlement without permitting it to interfere in any way with the progress of the work at any time. The parties will settle such jurisdictional dispute in accordance with procedure as outlined by the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry of the Building Trades Department, AFL-CIO or any successor agency of the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry authorized by the Building Trades Department.

(c) Where a local of the Union is in disagreement with an Employer's work assignment, the Employer shall supply the Accredited Union Representative with a copy of the evidence submitted by the other union (s) involved along with drawings and/or prints plus a description of the work or process in dispute from a qualified representative of the Employer when requested.

(d) When a jurisdictional dispute exists between unions and upon requests by the Ironworkers, the Employer shall furnish the International Representative a signed letter from a duly authorized official of the company on Employer stationery, stating whether or not the Union was employed on specific types of work on a given project.

7.2 In the event the dispute is not settled by the International Unions involved, it shall then be submitted to the Administrator of the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry for resolution. The Union and Employer involved shall advise EPSCA respectively, in writing, of an intent to submit a jurisdictional dispute to the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry and will identify the work in question. The arbitration decision will be final and binding on the parties to this Agreement.

7.3 EPSCA shall have direct recourse to the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry when the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry has under its consideration a dispute involving the assignment of work being done by employees who are covered by this Agreement.

7.4 In the event that the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry fails to render a decision within sixty (60) days of the disputed assignment being referred to the Plan, EPSCA, or the Union, shall have recourse to the Ontario Labour Relations Board.

7.5 In the event the Union elects to pursue or respond to the Jurisdictional Dispute at the OLRB, the arbitration board panel appointed by the Ontario Labour Relations Board pursuant to the Act is not authorized to award damages in respect of a mis-assignment of work only in circumstances where the other union(s) involved in the proceedings is (are) equally restricted in their ability to claim for damages. However this paragraph 7.5 shall not apply where the Jurisdictional Dispute and the mis-assignment of work involves the same employer and the same work previously the subject of a Jurisdictional Dispute before the OLRB or the Plan.

7.6 The board panel appointed by the OLRB will govern its decision pursuant to its normal criteria.

7.7 In the event the Union elects to pursue or respond to the Jurisdictional Dispute at the OLRB, the decision of the panel of the OLRB will be final and binding upon the parties to this agreement with no further recourse to the Plan on the issue decided by the OLRB.

Article 8

UNION SECURITY

8.1 UNION MEMBERSHIP

As a condition of employment, all employees covered by this Agreement shall either be members of, or will apply for membership in, the Union and, with respect to initiation fees and dues, will maintain such membership in good standing.

8.2 CHECKOFF

The employer will deduct amounts specified in the current EPSCA wage schedule for each hour paid for each employee covered by this agreement. The Employer will forward same to the Financial Secretary of the Local Union where the work is being performed, postmarked not later than the twentieth (20th) day of the month following the month for which the deductions are made.

These amounts are for working dues assessment and will be deducted from gross wages and identified on the employee's pay statement. The Union shall indemnify EPSCA and the Employers for any liability arising from the deduction of initiation fees or dues. The Union through its International Office will notify EPSCA, in writing, of any changes to initiation fees and dues. Within three (3) weeks of receipt of an acceptable written notice any changes to such fees and dues will be implemented. The effective date will be the date of implementation.

8.3 Where an employee works in more than one (1) Local Union territory for a week or less, the Employer will forward deductions to the Local Union in whose territory the employee worked the greater percentage of hours.

Article 9

EMPLOYMENT

9.1 (a) For purposes of this Article, a geographic area will be established for each Project and geographic areas for each Lines and Stations Zone. The size of these geographic areas will be dependent upon the location of the work.

(b) The boundaries of the geographic areas will be jointly established at pre-job conferences.

9.2 An office will be established by EPSCA, or the Employer with the approval of EPSCA, for each Project and each Lines and Stations Zone. A purpose of this office will be to coordinate employment as specified in this Article.

9.3 EPSCA, or the Employer with the approval of EPSCA, and the Union will exchange the names of their representatives in each of the areas described in Section 9.1 (a), who will be responsible for cooperating in the referral and employment of reliable and competent Union members.

9.4 EPSCA, or the Employer with the approval of EPSCA, will notify the Union of all manpower required for all work to be undertaken by Employers coming under the scope of this Agreement.

All employees employed under the terms of this Article will be required to obtain a referral slip from the Local Union having jurisdiction for the geographic area, except as noted in Section 9.5 (b) below. All employees will report to the EPSCA/Employer's referral office prior to starting work.

9.5 (a) The Employer shall have the right to request, by name, Local Union members who have solicited jobs. These members must present a written request to the Union who will issue them a referral slip. This right to request shall not be abused.

(b) Employee members who are transferred within the territory of their Local Union including sector to sector by an employer will not require an additional referral slip. The parties agree that there is no restriction on the number of employees so transferred. However such transfers will not result in layoff of employee members presently on these projects.

(c) When Union members are transferred from one (1) Local Union territory to another, including sector to sector, the number of Union members will not exceed forty percent (40%) of the total crew on the job unless approval is obtained from the Local Union office. Such transferred Union members must secure a referral slip from the Local Union in whose territory the work is being performed. However, before members are transferred from one (1) Local Union territory to another, the Employer shall contact the Local Union Business Agent of the territory where the work is to be performed.

(d) The transfer of employees by an Employer will not result in a lay-off of the Employer's existing employees at the project before 14 days or the completion of the project whichever is earlier.

(e) The Employer shall have the right to recall former employees provided that:

(i) The employee being recalled is a Local Union member in good standing.
(ii) The employee has not worked for another employer since being laid off.

Recalled employees, if not named, shall not be considered as name hires.

9.6 The employment of additional tradesmen and apprentices shall be carried out on the following basis and sequence:

(a) The EPSCA office, or the Employer with the approval of EPSCA, will request the appropriate Local Union office for tradesmen and apprentices required. The request will include a description of the work, the number of tradesmen and apprentices required, and the name of the Employer for whom the tradesmen and apprentices will be working.

(b) The Union members who are resident in the designated geographic area will be referred by the Union for employment through the EPSCA/Employer's office. As much as their out-of-work lists will permit, the Union will supply members on a fan out basis from the project or work location.

The Employers will either hire such persons or substantiate their reasons in writing for not doing so.

(c) If, after a request has been made, the Union is unable to supply sufficient tradesmen and apprentices to meet the manpower requirements of the Employers within forty-eight (48) hours after a requisition is made by EPSCA, the Employers may employ tradesmen and apprentices who are resident within the geographic area. Such tradesmen and apprentices shall comply with the requirements of the Union Security Article of this Agreement.

(d) Once the supply of suitable tradesmen and apprentices within the geographic area has been exhausted and additional tradesmen and apprentices are required, EPSCA, or the Employer with the approval of EPSCA, will contact the International Representative or his designee, in order to determine whether suitable Union tradesmen and apprentices are available outside of the geographic area. EPSCA, or the Employer with the approval of EPSCA, will cooperate in providing employment to such Union tradesmen and apprentices on the basis that they be supplied from the nearest location where they are available.

The Union shall obtain prior written approval of the General Manager of EPSCA before referring a person who resides outside the Province of Ontario except for members residing in border cities adjacent to the local union having jurisdiction over the job site.

(e) In the case of a recall to work, Employers reserve the right to recall Green qualified Atomic Radiation Workers in sequence from the out of work list to the location from where they were laid off. Recalled Greenmen will perform sufficient Greenman work to maintain their skill level, or be laid off.

9.7 Probationary members will be replaced by qualified Local Union members when they become available subject to the following:

(i) No replacement shall take place within five (5) working days of the end of the job.

(ii) The Local Union shall provide the Employer with a minimum of two (2) working days notice when an employee is to be replaced.

(iii) Notwithstanding Article 29, the local members who replace probationary employees shall not be entitled to initial travel monies and the probationary employees being replaced shall not be entitled to return travel monies.

(iv) The Employer shall decide which probationary employee or employees shall be replaced.

(v) This provision will not be cause for grievance by any probationary member.

9.8 Employees will be laid-off in the following sequence:

(a) probationary members

(b) out-of-province travel card members

(c) in-province members

This layoff sequence is subject to:

(a) That the employees being retained at any time in the sequence, have the skills and ability to satisfactorily perform the work yet to be completed.

(b) That at all times in the total makeup of the employers bargaining unit work force, the employer will have the right to retain union members who have been transferred from one local union territory to another (travel card members) providing, however, that the number of travel card members being retained does not exceed forty (40) percent of the total bargaining unit work force on an individual project or work location.

This layoff provision should apply on an individual project or work location basis.

The local union will indicate on an employee's referral slip the travel card member's home local.

9.9 Re-employment as required by the Workers' Compensation Board shall not be a violation of this collective agreement nor be subject to the provisions of Article 9.

Article 10

FOREMEN AND SUBFOREMEN

10.1 It is understood that foremen and subforemen hold key positions in the relationship between the Employers and the Union. Both parties agree that every effort should be made to recruit and retain foremen and subforemen who have a high degree of efficiency in the performance of their jobs and in the handling of their men. Recognizing the responsibilities involved in being a supervisor and a member of the Union, the Employers and the Union will make every effort to minimize problems that may arise which concern the relationship between the foremen and subforemen, the Employers and the Union.

10.2 The parties recognize the responsibilities of foremen and subforemen to discharge their managerial duties. If the Union feels that the foreman or subforeman is not discharging his managerial duties in a manner that is fair and equitable, or if an Employer feels that the Union is interfering with the foreman or subforeman in the performance of his managerial duties, the Employer or the Union may refer the problem to the Executive Committee for resolution. If the matter cannot be resolved by the Executive Committee, the grievance procedure may be invoked by either party.

10.3 The selection and retention of foremen and subforemen will be the responsibility of the Employers. When making appointments to the foreman and subforeman level, the Employers will give first consideration to those local journeyman rodmen they presently employ on site. When making appointments to the subforeman level, the provisions of Article 9.5 (c) employment will be maintained.

10.4 The foremen's differential shall be $3.00 above the journeyperson's rate as set out in the wage schedules. The subforeman's differential shall be $2.50 above the journeyperson's rate as set out in the existing wage schedules. The rates of pay for all foremen and subforemen covered by this Agreement will be set forth in the current wage schedules. EPSCA will provide the Union with current wage schedules.

10.5 Adequate Rodmen supervision shall be employed on all overtime work where a crew is required.

10.6 Where the crew size is six (6) or less, including the foreman, the foreman may work with the tools of the trade. The foreman may not be used to replace a journeyman on overtime.

Article 11

MEMBERS ON RIGS

11.1 When mobile or power operated rigs are used for hoisting reinforcing steel, the number of men required on said rig shall be determined by the foreman or subforeman who, after conferring with the steward, shall keep in mind the safe and efficient operation of the job.

Article 12

APPRENTICES

12.1 After 4000 hours term of Apprenticeship, the Apprentice shall have satisfied the requirements as set out by the Joint Apprenticeship Committee, and when he has successfully passed same, he shall be paid at the prevailing Journeyman's rate.

12.2 One (1) Apprentice shall be permitted for the first Journeyman employed by the Employer plus one (1) additional Apprentice for each additional five (5) Journeymen on all work.

12.3 The Employer and the Union agree to participate in the Apprenticeship program through the auspices of the Employment Training Branch, Ministry of Education and Training.

12.4 The rates of pay for Apprentices covered by this Agreement will be set out in the wage schedules attached hereto.

12.5 When an apprentice leaves employment to attend trade school, the Employer agrees to hire another apprentice to take his place for the period of time the apprentice is in attendance at school.

Article 13

PAY PROCEDURE

13.1 NORMAL

(a) Employees shall be paid weekly and payment for any given week will be made not later than the sixth (6th) working day after the close of the payroll period, but in any event not later than Thursday of the following week.

(b) Wages shall be paid by the Employers on the job site, before quitting time, in
REV cash or by cheque, payable at par in the locality of the job site. Direct Deposit to be implemented at the Employer's option. Accompanying each payment of wages shall be a statement, in writing, which can be retained by the employee setting forth:

(i) the period of time or the work for which the wages are being paid;
(ii) the rate of wages to which the employee is entitled;
(iii) the amount of wages to which the employee is entitled;
(iv) the amount of each deduction from the wages of the employee and the purpose for which each deduction is made;
(v) any allowance or other payment to which the employee is entitled;
(vi) the amount of vacation pay for which the employee is being paid;
(vii) the amount of statutory and recognized holiday pay for which the employee is being paid; and
(viii) the net amount of money being paid to the employee.

(c) In cases of inclement whether being declared on pay day, employees will receive their pay before leaving the site provided it is available on the site.

13.2 ON TERMINATION

(a) An employee who voluntarily terminates his employment will be provided his final pay on the next regular pay day.

(b) An employee who is laid off will have his final pay mailed to his regular residence*, or as otherwise requested by the employee, by Priority Post within five (5) working days of termination.

(c) An employee who is discharged shall be provided with his final pay immediately if the Employer's pay facilities are on site or as per Section 13.2 (b) if the Employer's pay facilities are not on site.

(d) Included in an employee's final pay will be vacation and recognized holiday pay owing him, his UIC, Record of Employment Form.

(e) No employee shall be laid off during the first four (4) hours of his shift.

(f) When an employee is laid off from a job where he is accommodated in a camp, he will be paid one hour at the applicable straight-time rate to check out of camp.

* ***An employee's "regular residence" is the place where he maintains a permanent self-contained domestic establishment (a dwelling house, apartment or similar place of residence where a person generally sleeps and eats) in which he resides and for which he can show proof of financial commitment.***

(g) Should an Employer fail to provide an employee such wages and/or forms as required above within the prescribed five (5) working day time period, then said employee shall be paid any waiting time in excess of the five (5) working day time period at straight-time rates of pay applicable to the regular working hours for the regular working hours in the day.

Article 14

WAGES

14.1 REV Effective May 1, 2004, and until April 30, 2010, the rates of pay for employees in the classifications listed in Article 1 of this Agreement and working in Generation Projects, Miscellaneous Projects and Lines and Stations Construction shall be set as forth in the wage schedules attached hereto.

Article 15

STATUTORY AND RECOGNIZED HOLIDAYS

15.1 The holidays recognized under this Agreement are:

New Year's Day	Civic Holiday
Good Friday	Labour Day
Easter Monday	Thanksgiving Day
Victoria Day	Christmas Day
Canada Day	Boxing Day

15.2 EPSCA agrees to recognize Heritage Day when proclaimed by legislation.

15.3 Statutory and recognized holidays falling on a Saturday or Sunday shall be observed on the following Monday. When Christmas Day falls on a Saturday or Sunday, it shall be observed on the following Monday and Boxing Day on the following Tuesday. When New Year's Day falls on a Saturday or Sunday, it shall be observed either on the preceding Friday or following Monday.

15.4 EPSCA reserves the right to change the day of observance of Canada Day to the preceding Monday if it falls on Tuesday and to the following Friday if it falls on Thursday.

Article 16

VACATION, STATUTORY AND RECOGNIZED HOLIDAY PAY

16.1 The vacation, statutory and recognized holiday pay rate shall be ten percent (10%) (six percent [6%] vacation and four percent [4%] in lieu of statutory and recognized holidays) of total earnings*.

16.2 Payment of vacation, statutory and recognized holiday pay shall be made on the regular weekly pay cheque.

16.3 Employees with one year's employment will be entitled to 3 weeks annual vacation. Employees with more than one year's employment, under special circumstances, will be entitled to additional time off subject to the approval of the Employer. Additional time off will not be unreasonably denied.

All vacation entitlement will be subject to approval providing the work schedule will permit.

Article 17

WELFARE AND PENSION PLANS

17.1 For each of his employees working within the territorial jurisdictions of Locals 700, 736, 765, and 786, the Employer agrees to pay welfare contributions on his behalf to the Ironworkers Central Welfare Fund.

17.2 For each of his employees working within the territorial jurisdictions of Locals 700, 736, and 786, the Employer agrees to pay pension contributions on his behalf to the Ironworkers Ontario Pension Fund.

17.3 Contributions to the plans identified in Sections 17.1 and 17.2 shall be submitted by the twentieth (20th) day of the month following the month in which the hours were paid, and at no time will contributions be paid directly to the employee. A penalty of three percent (3%) of any unpaid amount of contributions shall become due and payable to the applicable plan by a contributing Employer on the thirtieth (30th) day following the day designated for payment by the Collective Agreement. A further penalty of three percent (3%) of any monies owing shall become due and payable on the expiry of each succeeding thirty (30) day period, until all monies due and owing (including both contributions and charges) have been paid.

* ***"Total earnings" means pay for regular hours, overtime, premium pay, shift differential, retroactive pay adjustments, call-in, Saturday and Sunday premiums and trade training.***

17.4 For each of his employees working within the territorial jurisdiction of Local 721, the Employer agrees to pay welfare contributions on his behalf to the welfare plan established for that Local.

17.5 For each of his employees working within the territorial jurisdiction of Local 721, the Employer agrees to pay pension contributions on his behalf to the pension plan established for that Local.

17.6 Contributions to the plans identified in sections 17.4 and 17.5 shall be submitted by the fifteenth (15th) of the following month in which the hours were paid, and at no time shall the contributions be paid directly to the employee. If payment is over thirty (30) days late, the interest, at one percent (1%) per month, shall be paid from the due date.

17.7 For Locals 700, 721, 736, 759, 765 and 786, the Union agrees to supply the Employer with all information regarding the welfare and pension plans and also all the administrative material that is required for the implementation of these payments.

17.8 The amount(s) of welfare and pension contributions to be paid will be set out in the wage schedules attached hereto.

17.9 Any changes in welfare or pension plan contributions recognized under this Agreement will be confirmed in writing by the Union to EPSCA before such changes are put into effect. Within three (3) weeks of receipt of an acceptable written notice, such changes will be implemented. The effective date will be the date of implementation. Should the welfare or pension plan contributions change during the term of this Agreement then an adjustment shall be made to the base rate. The total wage package will not be changed.

17.10 The trustees of the employee benefit plans referred to in this collective agreement shall promptly notify the Union (or Council) of the failure by any Employer to pay any employee benefit contributions required to be made under this collective agreement and which are owed under the said plans in order that the Program Administrator of the Employee Wage Protection Program may deem that there has been an assignment of compensation under the said Program in compliance with the Regulation to the *Employment Standards Amendment Act, 1991* in relation to the Employee Wage Protection Program.

17.11 To reduce administrative costs the parties agree that the number of monthly separate remittance and deduction cheques will be kept to a minimum. (status quo)

Article 18

TRADE IMPROVEMENT PLAN

18.1 Employers employing employees covered by this Agreement will contribute to the Ironworkers Trade Improvement Plan Trust for Locals 700, 721, 736, 765 and 786.

18.2 The amount(s) of contributions to the Ironworkers Trade Improvement Plan will be as set out in the wage schedules attached hereto.

18.3 Employer contributions, including nil reports, shall be postmarked by the twentieth (20th) day of the month following the month in which the hours were paid, and at no time will the Ironworkers Trade Improvement Plan Trust contributions be paid directly to the employees. A charge of three percent (3%) of any unpaid amount of contributions shall become due and payable to the Trust by a contributing Employer on the thirtieth (30th) day following the day designated for postmark by the Collective Agreement in effect between EPSCA and the Union. A further charge of three percent (3%) of any monies owing shall become due and payable on the expiry of each succeeding thirty (30) day period until all monies due and owing (including both contributions and charges) have been paid.

18.4 Employers agree to be bound by the decisions of the Trustees of the Ironworker Trade Improvement Plan Trust on matters pertaining to the Trust.

18.5 The Union agrees to supply all pertinent information regarding the Trust to the Employer.

18.6 To reduce administrative costs the parties agree that the number of monthly separate remittance and deduction cheques will be kept to a minimum. (status quo)

18.7 **NEW** Wage schedule, dues and remittance changes are to be provided in writing to EPSCA and changes shall only take place during the months of April and November of each calendar year. The effective date of such changed wage schedules, dues and remittances shall be the date of issuance.

Article 19

ASSOCIATION FUND

19.1 All Employers shall contribute the amount specified on the wage schedules attached hereto for each hour worked by each employee covered by this Agreement to the Electrical Power Systems Construction Association Fund. The Employer shall remit such contribution in accordance with the standard form of remittance supplied by EPSCA.

Article 20

CLOTHING ALLOWANCE

20.1 In view of the special requirements of reinforcing work performed by employees in thermal, nuclear or hydraulic generation and transmission and transformation construction, Employers agree to pay a clothing allowance of three cents (3¢) per hour worked. The amount of clothing allowance will be set out in the wage schedules attached hereto.

Article 21

REPORTING PAY

21.1 An employee who reports for work at the usual starting time for his shift shall receive a minimum of two (2) hours' pay plus his appropriate daily travel or board allowance at the applicable rate when he reports for work but is unable to commence work because of circumstances beyond his control.

To qualify for this allowance, the employee must remain on the job during the two (2) hour period and perform any work requested which, in the opinion or judgment of his foreman or subforeman, after conferring with the steward, can be accomplished safely.

Article 22

CALL-IN PAY

22.1 When an employee is called in outside of his normal hours of work, he shall receive a minimum of four (4) hours' work at two (2) times the basic rate plus his appropriate daily travel allowance. If the employee's normal hours' of work commence within this four (4) hour period, the employee will be paid premium time until the start of his normal hours and will revert to his normal hourly rate at the commencement of his normal hours of work.

Article 23

HOURS OF WORK

23.1 One (1) or Two (2) Shift Operation

The weekly hours of work shall consist of forty (40) hours, worked between Monday and Friday, for all employees of Employers covered by this agreement and working on a one (1) or two (2) shift operation.

REV The weekly hours of work may be arrived at by having the employees work either:

- four (4) consecutive ten-hour shifts, Monday to Thursday or;
- four (4) consecutive ten-hour shifts, Tuesday to Friday or;
- five (5) consecutive eight-hour shifts

but not concurrently on the same work program.

Weekly hours of work will be established for a minimum of two (2) weeks. The Employer will notify the Local Union of the weekly hours of work for each work program at the site. If an Employer intends to change the weekly hours of work, a minimum of seven (7) days written notice shall be sent to the Local Union

REV The start time for the day shift shall be 7:00 AM with a possible one (1) hour variance either way. The start time for the afternoon shift shall be immediately following the day shift or within two (2) hours either way of the end of the day shift.

The shift differential for those employees working the afternoon shift when a two shift operation has been established by the Employer will be one-seventh (1/7) for scheduled hours worked on that shift.

NEW Trades assigned to fire watch duties may commence work after the start of the rest of the crew. In these cases, normal scheduled hours of work beyond the quit time of the rest of the crew will not be subject to overtime premiums.

NEW Shift differential will not be paid on overtime hours.

23.2 Three (3) Shift Operation

When a three (3) shift operation is established by the Employer, the following conditions will apply:

Those employees working on the day shift shall work eight (8) hours per shift at the straight time rate.

Those employees working on the afternoon shift shall work seven and one-half (7 1/2) hours per shift. A shift differential of one-seventh (1/7) shall be paid for all normal scheduled shift hours worked.

Those employees working on the night shift shall work seven (7) hours per shift. A shift differential of one-fifth (1/5) shall be paid for all normal scheduled shift hours worked.

A shift will be deemed to be established providing at least four (4) consecutive days of a shift are to be worked excluding Saturdays, Sundays and recognized holidays. If an employee is removed from their scheduled shift prior to completing four (4) consecutive shifts, the employee will be paid shift differential for the remainder of the hours that would have been worked had the employee not been reassigned.

It may be necessary from time to time to vary the hours of work established in this Article. Any amendments to the hours of work will be established by mutual agreement between EPSCA and the Union.

NEW Shift differential will not be paid on overtime hours.

Article 24

OVERTIME RATES

24.1 **REV** When working on an eight (8) hour day and five (5) day per week work schedule (Monday to Friday inclusive), overtime work shall be paid at one and one-half (1 1/2) times the basic hourly rate for all hours worked beyond the normal daily scheduled number of hours up to a maximum of 2 hours per day. All hours in excess of 10 hours per day shall be paid at two (2) times the base hourly rate.

When working on a ten (10) hour day and four (4) day per week work schedule (Monday to Friday inclusive), overtime work shall be paid at one and one-half (1 1/2) times the basic hourly rate for all hours worked beyond the normal daily scheduled number of hours up to a maximum of 2 hours per day. All hours in excess of 12 hours per day shall be paid at two (2) times the base hourly rate.

Overtime work performed on Saturday, Sunday, Recognized Holidays and non-shift days shall be paid at two (2) times the basic hourly rate.

24.2 For Local 721, the first hour of overtime, after regularly scheduled hours, Monday to Friday inclusive, shall be paid at the rate of time and one-half of the regular day shift rate.

24.3 Where one or more crews are repeatedly working overtime, fifty (50) percent of the crew will be replaced with members from other crews for the overtime work.

Article 25

REST PERIOD

25.1 For employees working normal hours, a fifteen (15) minute rest period will be allotted, at the time directed by the Employer, for each half shift worked.

25.2 For employees required to work overtime, a ten (10) minute rest period will be allotted prior to the end of the normal shift before commencing overtime work.

25.3 For employees working overtime, a fifteen (15) minute rest period will be allotted, at the time directed by the Employer, after each two (2) hours of overtime worked.

Article 26

MEALS ON OVERTIME

26.1 If an employee is notified during the time he is working that he will be required to continue working for more than two (2) hours past his normal quitting time that day, the Employer will provide a free meal to the employee at the end of his regular hours of work. The next overtime meal will be provided after six (6) hours of overtime worked and for each four (4) hours of overtime worked thereafter.

The employee will be allowed thirty (30) minutes with pay at straight time rates to eat each meal at the time directed by the Employer. When a paid meal period overlaps a rest period the paid meal period will supplant the rest period.

To qualify for the above-noted on a Friday for work on the first and second shifts, an employee working a thirty-eight (38) hour week will be required to work for more than four (4) hours beyond the normal quitting time of his shift.

The above-noted is not applicable to the first eight (8) hours worked on Saturdays, Sundays or recognized holidays for employees who normally work the first or second shifts.

The above-noted is not applicable to the first six and one-half (6-1/2) hours worked on Saturdays, Sundays or recognized holidays for employees who normally work the third shift.

26.2 Where an employee has been notified the previous day, no lunch will be provided but the employee will be allowed time to eat without loss of pay at a time directed by the Employer.

Article 27

GENERATION PROJECTS
DAILY TRAVEL ALLOWANCE AND ROOM AND BOARD

27.1 DAILY TRAVEL ALLOWANCE

(a) A daily travel allowance will be paid by the Employers to their employees on the following basis:

(i) If an employee lives within forty (40) radius kilometers* of the Project, no travel allowance will be paid.

REV (ii) If an employee lives within forty (40) to fifty-six (56) radius kilometers of the Project, he shall receive $20.60 per day effective May 1, 2004 ($21.00 effective May 1, 2005, $21.40 effective May 1, 2006, $22.25 effective May 1, 2007, $22.70 effective May 1, 2008 and $23.15 effective May 1, 2009) travel allowance for each day worked or reported for.

REV (iii) If an employee lives within fifty-six (56) to eighty (80) radius kilometers of the Project, he shall receive $23.95 per day effective May 1, 2004 ($24.45 effective May 1, 2005, $24.95 effective May 1, 2006, $25.95 effective May 1, 2007, $26.45 effective May 1, 2008 and $27.00 effective May 1, 2009) travel allowance for each day worked or reported for.

REV (iv) If an employee lives within eighty (80) to ninety-seven (97) radius kilometers of the Project, he shall receive $27.60 per day effective May 1, 2004 ($28.15 effective May 1, 2005, $28.70 effective May 1, 2006, $29.85 effective May 1, 2007, $30.45 effective May 1, 2008 and $31.05 effective May 1, 2009) per day travel for each day worked or reported for.

REV (v) If an employee lives greater than ninety-seven (97) radius kilometers from the project and does not qualify for subsistence allowance under Subsection 27.2 below, he shall receive $ 31.00 per day effective May 1, 2004 ($31.60 effective May 1, 2005, $32.25 effective May 1, 2006, $33.55 effective May 1, 2007, $34.20 effective May 1, 2008 and $34.90 effective May 1, 2009) per day travel allowance for each day worked or reported for.

Note: Bruce GS "A", Bruce GS "B" and the Bruce Heavy Water Plants will be combined to form the Bruce Complex. Travel allowance for the Bruce Complex will be calculated from the midpoint of a straight line joining the centres of the Bruce GS "A" and Bruce GS "B" turbine halls.

* ***For the purpose of this Article, "radius kilometers" shall be measured from the centre of the turbine hall on each Project.***

(b) When an employee is directed to report to a location that involves travelling around a natural barrier, the distance around the natural barrier shall be the shortest distance measured by a series of straight lines. The sum of the distances of these straight lines shall be applied to the ring concept to establish the employee's travel allowance entitlement. A natural barrier is defined as any obstruction or impediment which creates an unreasonable relationship between radius kilometers and actual kilometers travelled.

27.2 ROOM AND BOARD
(Excluding Darlington and Pickering Projects)

The following conditions will apply for employees whose regular residence* is more than ninety-seven (97) radius kilometers from the project:

(a) An Employer may supply either:

(i) room and board in camp or a good standard of board and lodging within a reasonable distance of a project; or

(ii) a subsistence allowance; or

(iii) travel allowance

REV (b) An employee may exercise his option not to stay in a camp or accept room and board. An employee who exercises this option and qualifies for subsistence allowance shall receive a subsistence allowance of $79.05 per day effective May 1, 2004 ($80.65 effective May 1, 2005, $82.25 effective May 1, 2006, $85.55 effective May 1, 2007, $87.25 effective May 1, 2008 and $89.00 effective May 1, 2009) for each day worked or reported for when employed at a location north of the French River and $65.50 per day effective May 1, 2004 ($66.80 effective May 1, 2005, $68.15 effective May 1, 2006, $70.90 effective May 1, 2007, $72.30 effective May 1, 2008 and $73.75 effective May 1, 2009) for each day worked or reported for when employed at a location south of the French River subject to sections 27.2(c), 27.2(d), 27.3 and 27.4.

* ***An employee's "regular residence" is the place where he maintains a self-contained domestic establishment (a dwelling house, apartment or similar place of residence where a person generally sleeps and eats) in which he resides, and for which he can show proof of financial commitment.***

REV(c) To qualify for subsistence allowance an employee must maintain temporary accommodation at or near the Project. Employees who travel daily to locations beyond ninety-seven (97) radius kilometers from the Project will be entitled to receive $ 28.90 per day effective May 1, 2004 ($29.50 effective May 1, 2005, $30.10 effective May 1, 2006, $31.30 effective May 1, 2007, $31.95 effective May 1, 2008 and $32.60 effective May 1, 2009) for each day worked or reported for.

(d) Pickering and Darlington Projects

REV (i) An employee who qualifies for subsistence allowance shall receive a subsistence allowance of receive $39.55 per day effective May 1, 2004 ($40.35 effective May 1, 2005, $41.15 effective May 1, 2006, $42.80 effective May 1, 2007, $43.65 effective May 1, 2008 and $44.50 effective May 1, 2009) for each day worked or reported for, subject to Articles 27.2(c), 27.3 and 27.4.

(ii) Employees who don't qualify for board allowance and commute beyond 97 radius kilometers shall receive $ 28.90 per day effective May 1, 2004 ($29.50 effective May 1, 2005, $30.10 effective May 1, 2006, $31.30 effective May 1, 2007, $31.95 effective May 1, 2008 and $32.60 effective May 1, 2009) for each day worked or reported for.

27.3 An employee shall not qualify for daily travel allowance or room and board allowance as provided for in Sections 27.1 and 27.2 above when such employee reports for work but does not remain at work for his scheduled daily hours of work unless excused by an authorized representative of the Employer. Such permission shall not be unreasonably denied.

27.4 An employee who maintained a regular residence within the geographic area of the Local Union for the purposes of employment and who relocates outside the geographic area will not be entitled to an increase in travel or room and board allowance entitlement as a result of this relocation.

27.5 The Union recognizes the Employer's right to charge for board and other existing services. The Employer fixes the charge for board and other existing services in camps at twenty-five dollars ($25.00) per day. This will be applied on the following basis:

(a) An employee who remains in camp on a normally scheduled work day on which he does not work will be charged twenty-five dollars ($25.00) per day, unless he is excused from work for a legitimate reason by the Project medical attendant or by an authorized representative of his Employer.

(b) An employee who is absent from work on Friday without approval and who remains in camp and who is still absent from work on the following Monday without approval will be charged for room and board for Friday, Saturday, Sunday and Monday.

(c) An employee who is absent from work without approval on Friday but who works the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

(d) An employee who works the Friday and is absent from work without approval on the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

Article 28

LINES AND STATIONS CONSTRUCTION
DAILY TRAVEL ALLOWANCE AND ROOM AND BOARD

28.1 DAILY TRAVEL ALLOWANCE

The daily travel allowance will be paid by the Employers to their employees who are not living in camp or receiving a subsistence allowance as referred to in Section 28.3, on the following basis:

(a) If an employee lives within forty (40) radius kilometers of the work location, no travel allowance will be paid.

REV (b) If an employee lives within forty (40) to fifty-six (56) radius kilometers of the work location, he shall receive $20.05 per day effective May 1, 2004 ($20.55 effective May 1, 2005, $21.05 effective May 1, 2006, $21.55 effective May 1, 2007, $22.05 effective May 1, 2008 and $22.55 effective May 1, 2009) travel allowance for each day worked or reported for.

REV (c) If an employee lives within fifty-six (56) to eighty (80) radius kilometers of the work location he shall receive $23.55 per day effective May 1, 2004 ($24.05 effective May 1, 2005, $24.55 effective May 1, 2006, $25.05 effective May 1, 2007, $25.55 effective May 1, 2008 and $26.05 effective May 1, 2009) per day travel allowance for each day worked or reported for.

REV (d) If an employee lives within eighty (80) to ninety-seven (97) radius kilometers of the work location he shall receive $27.05 per day effective May 1, 2004 ($27.55 effective May 1, 2005, $28.05 effective May 1, 2006, $28.55 effective May 1, 2007, $29.05 effective May 1, 2008 and $29.55 effective May 1, 2009) per day travel allowance for each day worked or reported for.

REV (e) If an employee lives greater than ninety-seven (97) radius kilometers from the work location and does not qualify for subsistence allowance under Section 28.3 below, he shall receive $29.30 per day effective May 1, 2004 ($29.80 effective May 1, 2005, $30.30 effective May 1, 2006, $30.80 effective May 1, 2007, $31.30 effective May 1, 2008 and $31.80 effective May 1, 2009) per day travel allowance for each day worked or reported for, provided he continues to travel greater than ninety-seven (97) radius kilometers daily.

(f) When an employee is directed to report to a location that involves travelling around a natural barrier, the distance around the natural barrier shall be the shortest distance measured by a series of straight lines. The sum of the distances of these straight lines shall be applied to the ring concept to establish the employee's travel allowance entitlement. A natural barrier is defined as any obstruction or impediment which creates an unreasonable relationship between radius kilometers and actual kilometers travelled.

28.2 The Employer reserves the right to base daily travel allowance on the distance in radius kilometers from where an employee lives to either the work location or declared assembly point, depending on where the employee is directed to report.

28.3 ROOM AND BOARD

The following conditions will apply for employees whose regular residence* is more than ninety-seven (97) radius kilometers from the work location:

(a) An Employer may supply either:
- (i) room and board in camp or a good standard of board and lodging within a reasonable distance of the work location; or
- (ii) a subsistence allowance; or
- (iii) a travel allowance

* ***For the purpose of this Article, "regular residence":***

(i) ***for metropolitan areas (Toronto and Hamilton) is the place where an employee maintains a self-contained domestic establishment (a dwelling house, apartment or similar place of residence where a person generally sleeps and eats) in which he resides, and for which he can show proof of financial commitment.***

(ii) ***for all other areas, shall be deemed to be the city or town hall of the municipality where an employee maintains a self-contained domestic establishment described in (i) above. In those municipalities where a city or town hall does not exist, then the post office serving his permanent self-contained domestic establishment will apply.***

REV (b) An employee may exercise his option not to stay in a camp or accept room and board. An employee who exercises this option and qualifies for subsistence allowance shall receive a subsistence allowance of $77.00 per day effective May 1, 2004 ($78.00 effective May 1, 2005, $79.00 effective May 1, 2006, $80.00 effective May 1, 2007, $81.00 effective May 1, 2008 and $82.00 effective May 1, 2009) worked or reported for when employed at a location north of the French River and receive $64.00 per day effective May 1, 2004 ($65.00 effective May 1, 2005, $66.00 effective May 1, 2006, $67.00 effective May 1, 2007, $68.00 effective May 1, 2008 and $69.00 effective May 1, 2009) worked or reported for when employed at a location south of the French River, subject to Sections 28.3(c), 28.4, and 28.5.

(c) To qualify for subsistence allowance an employee must maintain temporary accommodation at or near the work location. Employees who travel daily to locations beyond ninety-seven (97) radius kilometers from the work location will be entitled to $26.80 per day worked or reported for.

28.4 An employee shall not qualify for daily travel allowance or room and board allowance as provided for in Sections 28.1 and 28.3 above, when such employee reports for work but does not remain at work for his scheduled daily hours unless excused by an authorized representative of his Employer. Such permission shall not be unreasonably denied.

28.5 An employee who maintained a regular residence within the geographic area of the Local Union for the purposes of employment and who relocates outside the geographic area will not be entitled to an increase in travel or room and board allowance entitlement as a result of this relocation.

28.6 The Union recognizes the Employer's right to charge for board and other existing services. The Employer fixes the charge for board and other existing services in camps at twenty-five dollars ($25.00) per day. This will be applied on the following basis:

(a) An employee who remains in camp on a normally scheduled work day on which he does not work will be charged twenty-five dollars ($25.00) per day, unless he is excused from work by an authorized representative of his Employer.

(b) An employee who is absent from work on Friday without approval and who remains in camp and who is still absent from work on the following Monday without approval will be charged for room and board for Friday, Saturday, Sunday and Monday.

(c) An employee who is absent from work without approval on Friday but who works the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

(d) An employee who works the Friday and is absent from work without approval on the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

Article 29

INITIAL AND RETURN TRAVEL AND TRANSPORTATION

29.1 **REV** On recruitment of tradesmen who live between ninety-seven (97) and one hundred and sixty-one (161) radius kilometers from the Project, the Employer shall pay twenty-five dollars ($25.00) for the initial trip to the Project.

29.2 ONTARIO RESIDENTS

On recruitment of tradesmen who live in Ontario, but beyond one hundred and sixty-one

REV (161) radius kilometers from the Project, the Employer shall pay thirty cents (30¢) per radius kilometer, plus travel time based on one (1) hour's pay for each eighty (80) radius kilometers of travel to a maximum of eight (8) hours' pay, for the initial trip to the Project from where the tradesman lives or place of recruitment, whichever is closer to the Project.

29.3 NON-ONTARIO RESIDENTS

On recruitment of tradesmen who live outside Ontario and beyond one hundred and sixty-one (161) radius kilometers from the Project, the Employer shall pay the equivalent of the cost of public transportation plus travel time based on one (1) hour's pay for each eighty (80) radius kilometers of travel to a maximum of eight (8) hours' pay, for the initial trip to the Project from where the tradesman lives or place of recruitment, whichever is closer to the Project.

29.4 To qualify for payment on Sections 29.1, 29.2 or 29.3, the employee must remain at the Project for a minimum of thirty (30) calendar days or the duration of the job, whichever is lesser. Such payment shall be included in the employee's first pay cheque. Should the employee subsequently fail to qualify for payment as noted above, the Employer will deduct the payment from the employee's final pay.

29.5 On termination of employment for reasons other than discharge for cause, an employee entitled to payment under Sections 29.1, 29.2 or 29.3 shall be entitled to return expenses calculated in the same manner as in Sections 29.1, 29.2 or 29.3 above, for the return trip from the Project to where the tradesman lives or place of recruitment, whichever is closer to the Project. To be eligible for return payment, an employee must remain at the Project for a minimum of sixty (60) calendar days or the duration of the job, whichever is the lesser.

29.6 (a) On the Thunder Bay Project and Atikokan Project, an employee shall qualify for a return trip from the Project to his regular residence* for each thirty (30) days worked on the Project providing his regular residence is more than four hundred (400) radius kilometers from the Project.

(b) For each entitlement, the Employer shall pay travel expenses on the basis of the equivalent cost of public transportation plus travel time based on one (1) hour's pay for each eighty (80) radius kilometers of travel to a maximum of eight (8) hours' pay.

Article 30

TOOLS AND CLOTHING

30.1 Employees shall be required to provide themselves with the ordinary hand tools of their trade as listed in the attached tool list. The Employer will provide, insofar as is practical, separate facilities for storing the tools, but shall not be held responsible for losses, except as noted hereunder:

(a) When personal tools valued in excess of $15.00 are lost due to fire, the Employer will consider replacement or payment value to a maximum of $400.00, based on the merit of each case. This will include only personal tools that a tradesman is required to have to perform his normal duties with the Employer.

(b) The Employer agrees to compensate employees for tools and work clothing lost by theft, as supported by claims submitted in writing with substantiating evidence to establish theft resulting from forcible entry to locked storage provided by the Employer to a maximum of $400.00. The Employer will consider the replacement of pliers broken on the job. Replacement will be based on the merits of each case.

(c) In the event of a loss by fire at a work site, replacement or payment of the full estimated value in excess of fifteen dollars ($15.00) but not exceeding four hundred dollars ($400.00) for the loss of personal clothing will be made.

(d) In the event of a loss by fire at an Employer-operated camp, replacement or payment of the full estimated value in excess of fifteen dollars ($15.00) but not exceeding seven hundred and fifty dollars ($750.00) for the loss of personal clothing will be made.

* ***An employee's "regular residence" is the place where he maintains a self-contained domestic establishment (a dwelling house, apartment or similar place of residence where a person generally sleeps and eats) in which he resides and for which he can show proof of financial commitment***

30.2 Employees who have obtained tools from the Employer's tool crib shall be allowed sufficient time, in the opinion of Management, to return such tools to the tool crib during working hours. Employees receiving tools from such tool crib shall be held responsible for the return of such tools in good conditions, subject to normal wear and tear. On layoff, employees will be allowed reasonable time to return tools to the tool crib.

30.3 Gang tools are tools which are issued to a foreman and are used by one or more members of the crew. Such tools are not identified on trade tool lists, nor are they the tools and equipment identified in Sections 30.1 and 30.2 of this Article. Such tools shall be the responsibility of the Employer.

30.4 An employee, upon becoming aware of the theft or loss of Employer supplied tools, or clothing, will immediately report such theft or loss to his Employer. Failures to do so will result in employees being charged for the value of the lost or stolen tools or clothing.

Article 31

PROTECTIVE CLOTHING AND EQUIPMENT

31.1 Where special wearing apparel is required, it shall be supplied for use of the employee without cost. Such equipment supplied by the Employer shall be charged against the employee, and credited to him upon its return.

Article 32

DRINKING WATER AND CLOTHES ROOM

32.1 Every Employer shall supply adequate drinking water (with ice when necessary and available) at all times, from covered containers having a drain faucet and individual drinking cups.

32.2 Every Employer shall provide or arrange at the commencement of the job, a sanitary and adequately heated, lighted and ventilated when necessary, place of shelter of adequate size, with adequate benches and tables where employees may eat their lunch, change their clothes and safely keep their tools.

32.3 Where the employer does not supply a shack of his own, but arranges for facilities, as in Section 32.2 above, he shall supply a gangbox, for each shift, with lock to safeguard his employees' tools.

32.4 Every Employer shall arrange for or provide at the commencement of the job, sanitary, adequately heated, lighted and ventilated toilet facilities. Flush toilet facilities shall be arranged for or provided when and where available.

Article 33

RADIATION WORK

33.1 Local Union to be provided with a copy of Ontario Hydro Radiation Projection Procedures and any revisions.

Each employee will have access to his personal radiation exposure record.

Long-term employees who reach their exposure limit will be given alternate employment until they can resume radiation work.

Short-term employees will be given a guaranteed period of employment at their time of hire.

33.2 *Construction Radiation Protection Assistant (R.P.A.)* is a Construction Trades Person who has achieved the full radiation qualification via the approved Ontario Hydro Training Program. This requires successful completion of the construction R.P.A. training and checkouts and the performance of R.P.A. functions while under supervision of a fully qualified Construction R.P.A. to the satisfaction of the Construction Site Safety Officer and the Station Health Physics Unit.

R.P.A. will be paid the appropriate equivalent foreman's rate when performing an R.P.A. function and will report to the Site Safety Unit. An R.P.A. is a "qualification" and not a "trade function" irrespective of union or trade affiliation.

Article 34

STANDOFF

NEW
34.1 When unable to proceed with work, an Employer may elect to Standoff part or all of a crew.

The Employer reserves the right to Standoff its employees without pay up to a maximum of ten (10) consecutive working days. Notification of Standoff will be made by the Employer during normal working hours. A Record of Employment will be issued upon the commencement of the Standoff. No travel or subsistence allowance will be paid to an employee for the Standoff period.

34.2 If Standoff continues beyond ten (10) consecutive working days, an employee, at his/her option, may elect to remain on Standoff for an additional twenty (20) consecutive working days or be removed from Standoff. The Employer retains recall rights on employees electing to continue on Standoff.

34.3 If an employee elects layoff beyond the tenth (10th) consecutive working day, it shall be carried out in accordance with the terms of the Layoff provisions of this Agreement. An employee laid off will be issued a Record of Employment form on his/her date of layoff indicating "Layoff – Shortage of Work".

34.4 Standoff shall only continue beyond thirty (30) consecutive working days with the mutual consent of the Employer and the Union, in writing.

34.5 For the purpose of this Article, when working on a 4 x 10 hour shift arrangement, the following will apply:

- eight (8) scheduled working days will be considered the equivalent of ten (10) consecutive working days.
- sixteen (16) scheduled working days will be considered the equivalent of twenty (20) consecutive working days.
- twenty-four (24) scheduled working days will be considered the equivalent of thirty (30) consecutive working days.

Article 35

GRIEVANCE PROCEDURE

35.1 Grievances within the meaning of the grievance and arbitration procedure shall consist only of disputes about the interpretation or application of particular clauses of this Agreement and about alleged violations of this Agreement. In the event of any dispute concerning the meaning or application of any provision of this Agreement or a dispute concerning an alleged violation of this Agreement, there shall be no suspension or disruption of work, but such dispute shall be treated as a grievance and shall be settled, if possible, by EPSCA and the Union. In the interests of expediting the procedures, the parties shall process grievances in the following manner:

35.2 PRELIMINARY DISCUSSION

Disputes arising out of the interpretation or alleged violation of this Agreement shall, if possible, be settled by discussion between the employee and/or his steward and the employee's supervisor.

35.3 FIRST STEP

If a dispute cannot be resolved by this method, the Accredited Union Representative for the Union may file a formal grievance on the prescribed form with the Manager of Construction or the Field Construction Manager. Such grievance shall be filed within fifteen (15) working days of the alleged grievous act.

Within ten (10) working days of the filing of the grievance, the Manager of Construction or Field Construction Manager shall investigate the grievance and convene a meeting which he or the Accredited Union Representative considers necessary to resolve it. The Manager of Construction or Field Construction Manager shall give his reply on the prescribed form to the Accredited Union Representative within five (5) working days from the date of the First Step meeting.

Copies of completed grievance forms signed by the appropriate parties shall be filed by the Manager of Construction or the Field Construction Manager with the General Manager of EPSCA and by the Accredited Union Representative with the International Representative of the Union.

If a First Step grievance meeting is considered appropriate, the Management Committee shall comprise the Manager of Construction or Field Construction Manager, or their designates, plus two (2) Management officials, one (1) of whom shall be a representative of the Employer against whom the grievance has been filed. The Union Committee shall comprise the Accredited Union Representative plus two (2) additional Union officials.

35.4 SECOND STEP

If a dispute has not been resolved at the First Step of the grievance procedure, the Accredited Union Representative may refer the grievance on the prescribed form to EPSCA's Grievance Officer. Such grievances shall be referred within ten (10) working days after the disposition has been issued under the First Step of this procedure. A copy of the grievance form shall be forwarded by the Accredited Union Representative to the International Representative of the Union.

The EPSCA Grievance Officer shall investigate the grievance and convene a meeting which he or the International Representative considers necessary to resolve it and give his reply on the prescribed form to the International Representative of the Union within five (5) working days from the receipt of the grievance form which was completed at First Step.

If a Second Step grievance meeting is considered appropriate, the Management Committee shall comprise the EPSCA Grievance Officer plus two (2) other Management representatives, one (1) of whom shall be a representative of the Employer against whom the grievance has been filed. The Union Committee shall comprise three

(3) persons, including the International Representative and the Accredited Representative for the grievor, plus one (1) other representative of the Union.

35.5 EPSCA OR UNION GRIEVANCES

The processing of EPSCA grievances shall begin at the Second Step. EPSCA may submit either policy or specific grievances. The Union may also institute policy grievances at this Step. Such policy or specific grievances shall be submitted within thirty (30) days of the alleged grievous act.

35.6 TIME LIMITS

The time limits as to both documents and procedure set out in the above Sections shall be complied with by the parties to this Agreement provided, however, that the parties may mutually agree in writing in respect to an extension or waiver of any of the time limits imposed. Where no answer is given within the time limits specified in the grievance procedure, the employee concerned, the Union or EPSCA shall be entitled to submit the grievance to the next step of the grievance procedure. Any grievance not processed within the time limits specified in the grievance procedure shall be deemed to have been settled and ineligible for arbitration.

35.7 Alleged unjustified termination, discharge, suspension or disciplinary action may be grieved beginning at First Step.

35.8 GRIEVANCE FACILITIES

EPSCA shall provide the necessary facilities for all grievance meetings.

Article 36

ARBITRATION

36.1 If any dispute about the interpretation or application of particular clauses of this Agreement or about an alleged violation of this Agreement cannot be settled through the grievance procedure outlined in Article 34, the matter may be submitted within thirty (30) days of its failure of settlement by grievance procedure by either EPSCA or the Union to a Board of Arbitration for adjudication. The party desiring to submit the dispute to arbitration shall notify the other party in writing of its desire and the notice shall contain the name of the first party's nominee to an arbitration board. The recipient of the notice shall, within five (5) working days, inform the other party of the name of its nominee to the arbitration board. The two (2) nominees so selected shall, within ten (10) working days of the appointment of the second of them, appoint a third person who shall be the Chairman. If the recipient of the notice fails to appoint a nominee, the appointment shall be made by the Minister of Labour for Ontario upon the request of the other party. If the two nominees fail to agree upon a Chairman, the services of the Minister of Labour for Ontario shall be utilized and the request to the Minister may be made by either party. The arbitration board, when selected or appointed, shall proceed as soon a practicable to hear and determine the dispute and it shall issue a decision which is final and binding upon the parties and upon their respective members. In the case of an arbitration board, the decision of a majority is the decision of the board, but if there is no majority, the decision of the Chairman governs.

36.2 The arbitration board or arbitrator shall have no power to add to or subtract from or modify any of the terms of this Agreement. The arbitration board or arbitrator shall not substitute its discretion for that of the parties except where the board or arbitrator determines that an employee has been discharged or otherwise disciplined for cause when this Agreement does not contain a specific penalty for the infraction that is the subject matter of the arbitration. In such cases, the arbitration board or arbitrator may substitute such other penalty for the discharge or discipline as to the arbitration board or arbitrator seems just and reasonable in all circumstances. The arbitration board or arbitrator shall not exercise any responsibility or function of the parties. The arbitration board or arbitrator shall not deal with any matter not contained in the original statement of grievance filed by the party referring the matter to arbitration.

36.3 In arbitration proceedings, each party shall pay the fees and expenses of its nominee, whether appointed by the party or by the Minister of Labour for Ontario, and the fees and expenses of the Chairman shall be shared equally by the parties.

36.4 The time limits as to both documents and procedure set out in the above section shall be observed by the parties to this Agreement provided, however, that the parties may mutually agree in writing in respect to an extension or waiver of any of the time limits imposed.

Article 37

NO STRIKE - NO LOCKOUT

37.1 There shall be no strikes or lockouts so long as this agreement continues to operate.

Article 38

ABORIGINAL CONTENT COMMITMENT

38.1 Where an aboriginal commitment has been established on a project, the Union will co-operate in meeting the content commitments.

38.2 For a project that is less than $100,000 field labour, and has aboriginal content commitments, the terms of this collective agreement will not apply to those aboriginal content commitments.

Article 39

ENABLING AGREEMENT

39.1 Where a particular Article or Articles of this Collective Agreement is or are found to work a hardship in a specific Local Union jurisdiction territory, the terms and conditions in this Agreement for that Local Union area may be modified for a particular project by the mutual consent of the Local Union and the Employers when they deem it prudent. Such amendments made shall be submitted to the International Office and EPSCA for ratification.

It being understood and agreed that where mutual agreement for change cannot be achieved the request shall not be subject to either grievance or arbitration.

Article 40

TERM OF AGREEMENT

40.1 REV This Agreement shall continue in full force and effect from May 1, 2004 until April 30, 2010 inclusive, and thereafter it shall be considered automatically renewed for successive periods of twelve (12) months unless at least sixty (60) days prior to the end of any twelve (12) month effective period either party serves written notice upon the other that it desires cancellation, revision, or modification of any provision or provisions of this Agreement.

In witness whereof, EPSCA and the Union have caused this Agreement to be executed in their names by duly authorized representatives at *Toronto* this *25th* day of *November*, 2004.

For:
THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION

I. Starasts

_____

For:
INTERNATIONAL ASSOCIATION OF BRIDGE, STRUCTURAL, ORNAMENTAL AND REINFORCING IRON WORKERS,

Joseph J. Hunt

_____

General President Joseph J. Hunt

F. Marr

_____

Ontario District Council President Fred Marr

TOOL LIST

1 pliers
1 belt and belt assembly
1 reel and tape

APPENDIX A

MOOSE RIVER BASIN: NORTHERN ONTARIO

Where the Employer elects to establish a camp, the following conditions will apply for employees working in the Moose River Basin:

Camp Conditions

(a) An Employer may elect to provide free room and board in camp at no cost to the employee. Where the Employer elects to provide a camp such employees will not be entitled to receive a daily travel or room and board allowance.

(b) When an Employer does not elect to provide free room and board in camp, the employee will be entitled to receive a daily travel or room and board allowance as set out in Article 27.

(c) An employee who remains in camp on a normally scheduled work day on which he does not work will be charged $25.00 per day unless he is excused from work for a legitimate reason by the project medical attendant or an authorized representative of his Employer.

(d) An employee who is absent from work without approval and who remains in camp and who is still absent from work on the following day without approval will be charged $25.00 for the day of absence and each successive day of unapproved absence.

Hours of Work

(a) The hours of work will consist of a 21 day cycle of fourteen (14) consecutive work days followed by seven (7) consecutive days off.

(b) Regularly scheduled hours of work of ten (10) hours per day shall be paid at straight time hourly rates.

(c) Regularly scheduled hours of work on Saturday, Sunday, Recognized Holidays, and the fifth (5th) consecutive weekday shall be paid at two times the straight time hourly rate.

Wrap Around

An employee shall qualify for a return trip from the project every second twenty-one (21) day cycle he is on the project on the following basis:

(a) If an employee lives within 161 radius kilometers from the project, the Employer shall pay forty dollars ($40.00)

(b) If an employee lives greater than 161 radius kilometres from the project, the Employer shall pay as an allowance, forty dollars ($40.00) plus travel time based on the equivalent of one (1) hours base rate of pay for each eighty (80) radius kilometers, or portion thereof, of travel time to a maximum of 800 kilometers from where the employee lives or place of recruitment, whichever is closer to the project.

APPENDIX B

7 DAY COVERAGE

REV

When working under the provisions of this appendix all conditions listed below will supersede those contained in the main agreement. Where this appendix is silent, the appropriate article in the collective agreement applies.

This shift schedule is intended for work greater than four (4) weeks in duration, however, it is recognized that unforeseen circumstances may require the cancellation of this schedule.

If in the transition onto or off this 7-day shift schedule an employee would receive less than 40 paid hours in a pay period, the employee shall receive the difference between the total paid hours for that pay period and 40 hours pay. This does not apply to those employees who are laid off during or at the end of the schedule.

The employee(s) shift schedule consists of four consecutive shifts (day, afternoon, or night) followed by four scheduled days off. Shift overlap may be required.

Shift work may be established by the employer to provide seven days per week work coverage, on a one, two, or three shift per day basis. When this occurs, a specific shift arrangement will be established by the employer detailing the shift schedule to be worked. The employer will provide the Union with 48 hours notice prior to the implementation of these shift provisions.

First Shift

Regularly scheduled hours of work of up to ten (10) hours per shift Monday to Friday inclusive shall be paid at straight time hourly rates.

Second Shift

Regularly scheduled hours of work of up to ten (10) hours per shift Monday to Friday inclusive shall be paid at straight time hourly rates plus a shift differential of one-fifth of the straight time hourly rate.

Third Shift

Regularly scheduled hours of work of up to ten (10) hours per shift Monday to Friday inclusive shall be paid at straight time hourly rates plus a shift differential of one-fifth of the straight time hourly rate.

All Shifts

Regularly scheduled hours of work on Saturday, Sunday, Statutory and Recognized Holidays shall be paid at two times the straight time hourly rate. Recognized Holidays will be observed on the actual day on which the holiday occurs or as declared by legislation.

The rate for the shift will be based on the day in which the shift begins.

An unpaid lunch period of one-half hour shall be allowed to be taken no later than five hours after the commencement of a shift.

For employees working regularly scheduled hours, two fifteen (15) minute rest periods will be allotted at a time and location directed by the employer for employees to rest.

It may be necessary, from time to time, to vary the established shift arrangements. When this occurs, a revised shift arrangement will be established.

STATEMENT OF UNDERSTANDING #1

EMPLOYMENT EQUITY

It is recognized by the Electrical Power Systems Construction Association and the International Association of Bridge, Structural and Ornamental Ironworkers on behalf of Reinforcing Rodmen, that Employment Equity legislation will be passed during the life of this collective agreement.

The parties therefore agree to consider and address the legislation as it affects the accommodation of aboriginals and any other group designated by the legislation.

Signed at Toronto this 29th day of June, 1992.

For the Electrical Power Systems Construction Association

For the International Association of Bridge, Structural and Ornamental Iron Workers on behalf of Reinforcing Rodmen

Letter of Understanding

between

The Electrical Power Systems
Construction Association

and

The International Association
of Bridge, Structural and Ornamental Ironworkers
on behalf of Reinforcing Rodmen

It is agreed by the parties to this understanding that any issues arising from the definition of "Major" referred to in Article 1.1 (ii) shall be referred to a joint committee co-chaired by the General Manager of EPSCA and the Eastern Canadian General Organizer of the Union. It is not subject to the grievance/arbitration process as outlined in Articles 34 and 35.

F. Marr
Eastern Canadian General
Organizer on behalf of
Reinforcing Rodmen

V.W. Medri
Secretary Treasurer

LETTER OF UNDERSTANDING

Compensation for Travel Time at Remote Hydro Electric Generating Sites

Considering the travelling conditions and availability of accommodation, the Employer may establish as assembly point different than the work location. Where the assembly point is different than a work location, the following provisions will apply:

1.0 An employee will be paid an allowance equivalent to his straight-time rate, up to a maximum of one (1) hour, for all time spent travelling from his assembly point to his work location.

2.0 An employee will travel on his own time when returning from his work location to his assembly point.

3.0 The Employer is entitled to 50% name hire for work covered by these provisions.

Dated this 26th day of November, 1998.

for EPSCA

for Iron Workers

LETTER OF UNDERSTANDING

between

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION

and

THE INTERNATIONAL ASSOCIATION OF BRIDGE, STRUCTURAL, ORNAMENTAL AND REINFRCING IRONWORKERS

EMPLOYMENT REFERRALS TO NUCLEAR FACILITIES AND ONTARIO HYDRO SERVICES COMPANY

It is agreed by the parties to this understanding, that prior to any member being referred for employment at a nuclear generating facility or Ontario Hydro Services Company property, the member must submit to a security check. Only members who successfully obtain security clearance will be referred to the facility for employment. Once a member has been hired on, they will receive an allowance of $50.00 on their first weeks pay cheque, in consideration of their time spent filling out the security forms.

The Union will be notified in writing of the names of the individuals who were not successful in obtaining security clearances.

The parties to this understanding also acknowledge that this pre-clearance process does not prohibit the Union from filing a grievance on behalf of any member who is refused employment due to their failure to obtain security clearance.

Dated at Toronto this 30th day of March, 2000

J.K. Dotchin

For the Electrical Power Systems Construction Association

F. Marr

For the International Association of Bridge, Structural, Ornamental And Reinforcing Ironworkers

LETTER OF UNDERSTANDING

between

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION

and

THE INTERNATIONAL ASSOCIATION OF BRIDGE, STRUCTURAL, ORNAMENTAL AND REINFRCING IRONWORKERS

It is agreed that an employer may refuse to hire a former employee who has retired and signed a waiver that they will not be re-employed.

Dated at Toronto this 30th day of March, 2000

J.K. Dotchin

For the Electrical Power Systems Construction Association

F. Marr

For the International Association of Bridge, Structural, Ornamental And Reinforcing Ironworkers

LETTER OF UNDERSTANDING

Between

THE ELECTRICAL POWER SYSTEMS
CONSTRUCTION ASSOCIATION

AND

INTERNATIONAL ASSOCIATION OF BRIDGE,
STRUCTURAL, ORNAMENTAL AND REINFORCING
IRON WORKERS and REINFORCING RODMEN

In order to address the issues of training and cost competitiveness, the parties agree that the following shall constitute the principles that will govern training for the term of the collective agreement.

1. The EPSCA Owners will continue to mandate the training requirements for workers on EPSCA owner sites

2. Rodmen will attend industry standard training on their own time. The parties agree that the following training courses will be recognized as industry standard:

   - WHMIS
   - Fall Arrest
   - Fork Lift
   - Elevated Work Platform
   - Basic First Aid
   - High Voltage Awareness
   - Powder activated tools

3. The parties agree that EPSCA owners/contractors can request workers with industry standard training (as outlined above).

Dated at Toronto this 25th day of November, 2004

I. Starasts

EPSCA

F. Marr

Rodmen

MAP CODE:
R-4

ISSUED:
JULY 6, 2004

REVISED:
SEPTEMBER 24, 2004

RODMEN
Local 736
Hamilton

EPSCA WAGE SCHEDULE FOR PROJECTS WITHIN THE GEOGRAPHIC AREA OF THIS LOCAL
(52), (70)

GRADE AND STEP	CLASSIFICATIONS OCCUPATION CODES & EFFECTIVE DATES	BASE HOURLY RATE	VACATION & STAT. HOLIDAY	WELFARE (2)	PENSION (2)	UNION FUNDS (2)	TOTAL WAGE PACKAGE	EPSCA ASSOC. FUND(1)
	FOREMAN - 445365							
21-9	2004-05-01	32.05	3.21	2.60	5.30	0.45	43.61	0.15
	2005-05-01	33.00	3.30	2.60	5.30	0.45	44.65	0.15
	2006-05-01	33.91	3.39	2.60	5.30	0.45	45.65	0.15
	SUBFOREMAN - 445355							
21-8	2004-05-01	31.55	3.16	2.60	5.30	0.45	43.06	0.15
	2005-05-01	32.50	3.25	2.60	5.30	0.45	44.10	0.15
	2006-05-01	33.41	3.34	2.60	5.30	0.45	45.10	0.15
	JOURNEYMAN - 445335							
21-6	2004-05-01	29.05	2.90	2.60	5.30	0.45	40.30	0.15
	2005-05-01	30.00	3.00	2.60	5.30	0.45	41.35	0.15
	2006-05-01	30.91	3.09	2.60	5.30	0.45	42.35	0.15
	APPRENTICE - 445315							
	1st 1000 hrs							
21-0	2004-05-01	20.34	2.03	2.60	5.30	0.45	30.72	0.15
	2005-05-01	21.00	2.10	2.60	5.30	0.45	31.45	0.15
	2006-05-01	21.64	2.16	2.60	5.30	0.45	32.15	0.15
	2nd 1000 hrs							
21-1	2004-05-01	23.24	2.32	2.60	5.30	0.45	33.91	0.15
	2005-05-01	24.00	2.40	2.60	5.30	0.45	34.75	0.15
	2006-05-01	24.73	2.47	2.60	5.30	0.45	35.55	0.15
	3rd 1000 hrs							
21-2	2004-05-01	26.15	2.62	2.60	5.30	0.45	37.12	0.15
	2005-05-01	27.00	2.70	2.60	5.30	0.45	38.05	0.15
	2006-05-01	27.82	2.78	2.60	5.30	0.45	38.95	0.15
	4th 1000 hrs							
21-3	2004-05-01	27.60	2.76	2.60	5.30	0.45	38.71	0.15
	2005-05-01	28.50	2.85	2.60	5.30	0.45	39.70	0.15
	2006-05-01	29.36	2.94	2.60	5.30	0.45	40.65	0.15

(1)= per hour worked; (2)= per hour paid

MAP CODE:
R-4

ISSUED:
JULY 6, 2004

REVISED:
SEPTEMBER 24, 2004

RODMEN
Local 736
Hamilton

EPSCA WAGE SCHEDULE FOR PROJECTS WITHIN THE GEOGRAPHIC AREA OF THIS LOCAL
(52), (70)

GRADE AND STEP	CLASSIFICATIONS OCCUPATION CODES & EFFECTIVE DATES	BASE HOURLY RATE	VACATION & STAT. HOLIDAY	WELFARE (2)	PENSION (2)	UNION FUNDS (2)	TOTAL WAGE PACKAGE	EPSCA ASSOC. FUND(1)

NOTE:
$0.03 per hour (worked) Clothing Allowance is included in Base Hourly Rate.

OVERTIME:
Mon-Fri:
Scheduled Work Days: 1 1/2 times for up to and including 2 hours beyond the normal daily scheduled number of hours. This applies for both 4 day x 10 hours per day schedule and 5 day by 8 hour per day schedule.
Non-Scheduled Work Days: 2 times for all hours worked.
Sat: 2 times for all hours worked.
Sun-Hol: 2 times for all hours worked.

UNION FUNDS:
Union Funds contain the following items:
Trade Improvement Plan - $0.23 **per hour paid**
District Council - $0.22 **per hour paid**

BENEFITS ADMINISTRATOR:
All deductions and contributions, excluding Union Dues, are to be sent to the following location:
Ontario Ironworker/Rodmen Benefits Plan Administrator
111 Sheppard Ave., East
North York, ON
M2N 6S2

UNION DUES:
Union Dues for this Local are **$0.75** per hour. This amount is not included in above noted Union Funds.
Union Dues are to be deducted from the Base Hourly Rate.
Union Dues are to be sent to the following person and location:
Mr. D. Smees
Business Manager
Ironworker/Rodmen - Local 736
1955 Upper James St.
Hamilton, ON
L9B 1K8

GEOGRAPHIC AREA: The Regional Municipalities of Waterloo, Hamilton-Wentworth, Haldimand-Norfolk and Niagara, all of Halton(RM) except for the premises of the Ford Motor Company; the Counties of Huron, Bruce, Perth, Oxford, Grey, Brant and Wellington.

Sheet Metal Workers

COLLECTIVE AGREEMENT

between

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION

and the

ONTARIO SHEET METAL WORKERS' CONFERENCE FOR LOCALS 30, 47, 235, 269, 392 397, 473, 504, 537, 539 and 562

May 1, 2000 - April 30, 2004

EPSCA/SHEET METAL COLLECTIVE AGREEMENT

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COLLECTIVE AGREEMENT

by and between

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION
(hereinafter called "EPSCA")

and the

ONTARIO SHEET METAL WORKERS' CONFERENCE
FOR LOCALS 30, 47, 235, 269, 392,
397, 473, 504, 537, 539 and 562
(hereinafter called the "Union")

Article 1

PREAMBLE

1.1 WHEREAS EPSCA is an Association formed to represent Employers engaged in construction industry work in the electrical power systems sector in collective bargaining and on their behalf enter into collective agreements covering those of their employees in the bargaining unit as hereinafter defined; and

WHEREAS the Union is affiliated with the American Federation of Labour - Congress of Industrial Organizations and has in its membership competent, skilled and qualified journeymen and apprentices to perform work coming within the trade and craft jurisdiction; and

WHEREAS EPSCA and the Union desire to mutually establish and stabilize wages, hours and working conditions for journeymen and apprentices employed by Employers within the electrical power systems sector of the construction industry, and further, to encourage closer co-operation and understanding between EPSCA and the Union to the end that a satisfactory, continuous and harmonious relationship will exist between the parties to this Agreement;

NOW THEREFORE, EPSCA and the Union mutually agree that the working conditions as set out below shall be applicable throughout the Province of Ontario.

Article 2

RECOGNITION

2.1 EPSCA recognizes the Union as the exclusive bargaining agency for a bargaining unit as defined in Section 2.3 engaged in all construction industry work* under the responsibility of the Design and Construction Branch/Engineering and Construction Services Branch of Ontario Power Generation Inc. (OPGI) and Hydro One [which includes Major Projects, and Construction and Services Division (Lines and Stations, Miscellaneous Projects, Hydraulic Projects and In-Service Thermal, Nuclear and Hydraulic Stations)] performed in the Province of Ontario on Ontario Power Generation Inc. (OPGI) and Hydro One Property for the bulk power system, save and except the building of commercial-type office facilities at urban locations remote from operating facilities. The work encompasses:

- construction of new facilities
- additions to existing facilities
  - modifications
  - rehabilitation
  - reconstruction of existing facilities

For the purpose of clarity, the bulk power system comprises generating stations, hydraulic works, heavy water facilities, transmission lines (voltages over 50 kV) and transmission stations, microwave and repeater stations.

2.2 The Union recognizes EPSCA as the sole and exclusive collective bargaining agency for all of the Employers covered by this Agreement, and in all matters pertaining to the administration of this Collective Agreement.

2.3 The bargaining unit under this Agreement shall comprise the following classifications:

Acting General Foreman	Sheeter/Decker
Subforeman	Welder
Foreman	Sheeter's Assistant
Journeyman Sheet Metal Worker	Material Handler
Apprentice Sheet Metal Worker	Probationary Employee

* ***For the purpose of the Electrical Power Systems Construction Association, the work performed is deemed to be under the responsibility of the Generation Projects and Transmission Systems Divisions, Design and Construction Branch/Engineering and Construction Services Branch of Ontario Power Generation Inc. (OPGI) and Hydro One .***

2.4 The term "employee" shall include all employees of the Employers engaged in construction industry work at a project or work location in the classifications, as set out in Section 2.3 above.

2.5 The term "Employers" shall include individual members of EPSCA and any company, partnership, sole proprietorship, joint venture, contractor, subcontractor or any person that agrees to be bound by the terms and conditions of this Agreement.

2.6 The term "personnel" means a certified journeyman sheet metal worker or registered apprentice; sheeter/decker, welder, sheeter's assistant, material handler and probationary employee in the sheeting and decking segment of the sheet metal industry eligible to be employed by the Employers on a project or at a work location. EPSCA recognizes that the sheet metal trade is a compulsory certified trade.

2.7 The term "applicant" means an employee who has qualified for membership in the Local Union, but who has not completed payment of prescribed initiation fees.

2.8 The term "Acting General Foreman", "foreman" or "subforeman" means an employee who is elevated by an Employer in view of his skills and ability to fulfill the duties required of him.

2.9 Sheeting and decking material handlers shall be restricted to the handling of material on the ground or on a roof, but excluding the handling and distribution of material from an Ontario Power Generation Inc. (OPGI) or an Hydro One central material yard.

2.10 The classifications referred to in Sections 2.3 do not establish craft jurisdiction. Such jurisdiction is established in accordance with Article 8 of this Collective Agreement.

2.11 EPSCA and the Union agree the use of nomenclature is meant to refer to both genders.

Article 3

SCOPE OF AGREEMENT

3.1 This Agreement will consist of a master portion of general application to the construction field forces represented by the Union together with the following wage schedules of particular application to employees represented by the Union at projects or in the areas noted in Section 3.2 below and shall be deemed to include any additional wage schedule added, as the said wage schedules may be revised by EPSCA and the Union from time to time.

3.2	Local	Geographic Jurisdiction	Project
	Hamilton Brantford Niagara (537)	Hamilton Area: In the City of Burlington, the Township of Nassagaweya, the Town of Milton, that part of the Town of Oakville being south of the Town of Milton and west of Provincial Highway Number 25 and that part of the Town of Oakville lying west of the Oakville Creek between Highway Number 25 and Lake Ontario all in the Regional Municipality of Halton; the City of Hamilton, the Regional Municipality of Hamilton-Wentworth, the Townships of Seneca, Oneida, Walpole, Rainham, North Cayuga, that part of the Township of South Cayuga lying west of Regional Road Number 36 and Number 9 and that part of the Township of Canborough lying west of Regional Road Number 17 all in the Regional Municipality of Haldimand -Norfolk and that part of the Township of West Lincoln lying between the easterly boundary of the Regional Municipality of Hamilton-Wentworth and Regional Road Number 16 as it extends from its intersection with Lincoln Regional Road Number 17 to the Town of Smithville and Lincoln County Road Number 36 as it extends from Smithville to the shores of Lake Ontario	Nanticoke
	Hamilton Brantford Niagara (537)	Niagara Peninsula Area: Western Boundary: That portion of the Regional Municipality of Niagara and the Regional Municipality of Haldimand-Norfolk east of a line from Grimsby Beach formed by Regional Road Number 14 then south on Regional Road Number 16 to Regional Road Number 63 then south on Regional Road Number 17	

Local	Geographic Jurisdiction	Project
	then west on Highway 3 to Haldimand Regional Road Number 9 then westerly on Regional Road Number 17 to a point in line southeasterly with Haldimand Regional Roads Number 9 and Number 36 to Lake Erie Eastern Boundary: Region of Niagara at the Niagara River Brantford Area: East Zorra, Blandford, Blenheim, East Oxford, North Norwich and South Norwich in Oxford County and the Counties of Brant and Norfolk	
Kingston (269)	County of Prince Edward; the Townships of Sidney, Thurlow and Tyendinaga in the County of Hastings; the Counties of Lennox and Addington, Frontenac and Leeds; the City of Belleville and the Town of Trenton	
London (473)	The Counties of Bruce, Elgin, Huron, Middlesex, Oxford, excluding the Townships of North Norwich; South Norwich; East Oxford; Blenheim; Blandford and East Zorra; Perth, including the City of Stratford, but excluding the Townships of South Easthope; North Easthope; Ellice; Mornington; Elma and Wallace	Bruce
Ottawa (47)	The City of Ottawa; the Counties of Carleton, Dundas, Glenngarry, Grenville, Lanark, Prescott, Renfrew, Russell, Stormont, and that part of the County of Nipissing south of a line from Mattawa on the Quebec border to the northwest corner of Boyd Township; southwest to the northwest corner of Paxton Township	

Local	Geographic Jurisdiction	Project
Peterborough (392)	All territory within the boundaries of Peterborough County, Victoria County, Northumberland County and Haliburton County in their entireties; the Townships of Cavan, Manvers and Hope; and that part of the Town of Newcastle east of the southerly continuation of the western border of the Township of Manvers, to the shore of Lake Ontario, in the County of Durham, and all the Townships in the County of Hastings with the exception of the Townships of Sydney, Thurlow and Tyendinaga	Wesleyville
Sarnia (539)	The County of Lambton	
Sault Ste. Marie (504)	Southern Boundary: International boundary line Northern Boundary: 49th parallel Western Boundary: The eastern limits of the Thunder Bay Region Eastern Boundary: A line running north and south at the easterly limits of Striker Township	
Sudbury (504)	The districts of Cochrane, Timiskaming, Nipissing, Sudbury, Parry Sound, Manitoulin Island, Algoma Western Boundary: The eastern limits of the district of Thunder Bay. A line running north and south at the easterly limits of the district of Thunder Bay south from the 49th parallel to the international boundary line	

Local	Geographic Jurisdiction	Project
	Northern Boundary: Starting from the eastern limits of the district of Thunder Bay along the 49th parallel easterly to the Quebec border and includes district of Cochrane south of the 49th parallel Eastern Boundary: The Quebec border from the 49th parallel to Mattawa on the Quebec border Southern Boundary: Part of the district of Nipissing north of a line from Mattawa on the Quebec border to the northwest corner of Boyd Township; southwest to the northwest corner of Paxton Township. The district of Parry Sound with the exception of the Townships of Carling, Ferguson, McDougall, McKellar, Christie, Foley, Conger and Humphries, Manitoulin Island and Algoma district to a line running north from the international boundary to the 49th parallel LESS that geographic area described for Sault Ste. Marie Local 504	
Thunder Bay (397)	Starting at the southeast corner of Thunder Bay District northeasterly to the 49th parallel, approximately at 45 degrees to Brunswick Lake and then following the 49th parallel to the Quebec border; and includes the district of Cochrane, north of the 49th parallel; Kenora, Rainy River and Thunder Bay Districts	Thunder Bay Atikokan

Local	Geographic Jurisdiction	Project
Toronto Barrie (30)	Toronto Area: Esquesing Township in Halton County and that portion of Trafalgar Township in Halton County lying east of Oakville Creek; Erin Township in Wellington County; Peel County; York County; Metropolitan Toronto; Ontario County; Cartwright and Darlington Townships in the County of Durham; Dufferin County; Simcoe County, District of Muskoka, Townships of Rama, Mara and Thorah in the County of Ontario and the Townships of Carling, Ferguson, McDougall, McKellar, Christie, Foley, Conger, Cowper and Humphrey in the District of Parry Sound, including all the Municipalities contained therein Barrie Area: Simcoe County, District of Muskoka, Townships of Rama, Mara and Thorah in the County of Ontario and the Townships of Carling, Ferguson, McDougall, McKellar, Christie, Foley, Conger, Cowper and Humphrey in the District of Parry Sound, including all the Municipalities therein	Lakeview R.L. Hearn Pickering Darlington
Waterloo-Wellington (562)	The Cities of Kitchener-Waterloo, Guelph, Cambridge. The Counties of Waterloo, Wellington, Grey, Perth; excluding the City of Stratford and the Townships of Blanchard, Downie, Fullerton, Hibbert, Logan, including all the Municipalities in the Counties or portion thereof within the geographic scope of this Appendix	
Windsor Chatham (235)	Windsor: The County of Essex Chatham: The County of Kent	J.C. Keith

Article 4

EXECUTIVE COMMITTEE

4.1 To advance harmonious relations between EPSCA, the Employers, the Union and the employees, EPSCA and the Union shall each appoint an Executive Committee. The Executive Committee shall consist of the Board of Directors and officers of EPSCA. The Executive Committee of the Union shall consist of the senior representatives of the Union and the accredited Union representatives.

The committees shall meet together at least annually to review matters associated with the administration of this Collective Agreement with the intent of achieving uniformity of application of this Agreement wherever employees are working in the Province.

Article 5

ACCREDITED UNION REPRESENTATIVES

5.1 The Business Manager of the Ontario Sheet Metal Workers' Conference will designate Local Union representatives as Accredited Union Representatives to handle the day-to-day administration of this Agreement on the basis of not more than two representatives from the Union for each Project and a suitable number for Lines and Stations Construction. The Union will notify the General Manager of EPSCA, in writing, of the names of such Union representatives, or alternatives in the event of illness or unavailability, so that they may be issued identification cards to permit entry to the site. Upon entering the job site, such representatives after identifying themselves to the EPSCA representative and the authorized representative of the Employer, will be free to observe the progress and conduct of the work and to conduct normal Union business. The Union undertakes that these representatives will not hinder or interfere in any way with the said work.

Article 6

UNION STEWARDS

6.1 Accredited Union Representatives shall inform the appropriate EPSCA representative, in writing, of the names of all stewards, one of whom shall be designated Chief Steward, as they are appointed and when they cease to act as stewards. A steward, other than a Chief Steward, shall exercise his duties only in respect to employees of his Employer. A Chief Steward, in order to carry out his duties with respect to employees of other than his Employer, shall first involve the EPSCA representative. A steward shall obtain permission from his immediate supervisor before leaving his work area for Union business. Such permission shall not be unreasonably denied.

6.2 In the event of a work stoppage or threat of a work stoppage or any other employee activity prohibited by this Agreement, affected stewards, in keeping with their responsibilities, as it is incumbent upon all Union representatives, shall immediately do all in their power to ensure that the prohibited action of the employees is prevented or stopped.

6.3 **REV** Providing he is capable of doing the work available on a job, a steward will be the last employee laid off (excluding foremen). A steward shall not be laid off or transferred to another job without prior consultation with the Accredited Union Representative.

6.4 The job steward will be informed of all scheduled overtime. Where practical, a steward shall be given the first opportunity to work the overtime providing he is qualified to perform the work.

6.5 No foreman or subforeman shall be appointed or permitted to act as a steward.

Article 7

ADVANCE NOTICE

7.1 EPSCA will advise the Union of all new construction work coming under the scope of this Agreement for the construction field forces of the Employers.

Upon the request of the Union, EPSCA will convene a prejob conference before work commences to discuss the preliminary details of the proposed work to be performed and to establish conditions in accordance with this Agreement for the project.

Article 8

WORK ASSIGNMENT

8.1 The jurisdiction of the Union shall be that jurisdiction established by agreements between International Unions claiming the work or decisions of record recognized by the AFL-CIO for the various classifications and the character of work performed, having regard for the special requirements of thermal, nuclear or hydraulic generation and transmission and transformation construction.

An Agreement or Decision of Record is one that is published by the Building and Construction Trades Department AFL-CIO (Agreement and Decisions Rendered Affecting the Building Industry).

Where no Decision or Agreement applies, the Employer agrees to consider evidence of established practices of other Employers within the construction industry when making jurisdictional assignments.

8.2 A markup process will be utilized when an Employer intends to perform work on a project site*. The purpose of this markup process is to indicate to the Union the work which is planned to be carried out by the Employer in order to minimize the potential for jurisdictional disputes.

When work is to be performed on a project site and it meets the following criteria; same Employer, same work, same project site, the markup process will not be required.

NEW In the Electricity Production Zones when work falls within this criteria the EPSCA Office will send out a "Notification of Work" along with a copy of the original minutes/final assignments of mark-up meeting(s) to the Local Unions prior to work commencing. This procedure shall not preclude the Union's right to contest previously assigned work, if the work is in a Local Union jurisdiction other than the one it was marked up in.

When an Employer has work that is less than a 3 week duration and there are ten (10) or fewer employees covered by EPSCA Collective Agreements employed on this specific work, the Union will be notified of the scope of work and the Employer's proposed work assignments. The Union will have two weeks from the date of notification to submit jurisdictional claims and supporting evidence to the Employer for consideration. The Employer will notify the Union of the final work assignments prior to the commencement of the work.

All work that does not meet the criteria set out in paragraphs 2 and 3 will be reviewed and assigned at a markup meeting.

EPSCA will provide written notice to the Union (Ontario Conference Office and Local Union Office) as far in advance as possible of markup meetings. The Union may attend these markup meetings, and every effort will be made to settle questions of jurisdiction before the work is expected to commence.

8.3 The Employer who has the responsibility for the installation shall make a proposed assignment of the work involved. The Employer will specify a time limit for the Unions involved to submit evidence of their claims. The Employer will evaluate all evidence submitted as per Article 8.1 and make a final assignment of the work involved. The Employer will advise the Union of the final assignment prior to the work commencing. A copy of such assignments shall be submitted to the Business Manager of the Ontario Sheet Metal Workers' Conference.

The parties recognize that circumstances may arise, particularly with discovery and emergency work, where the process set out above may not be practical or possible.

REV **** For the purposes of this Article, Nanticoke, Lambton, Lakeview/Hearn, Bruce Nuclear Power Development (BNPD), Pickering, Darlington, Lines and Stations and the five (5) Electricity Production Zones are each considered individual project sites.***

Article 9

JURISDICTIONAL DISPUTES

9.1 When a jurisdictional dispute exists between Unions, and upon request by the Union, the Employer shall furnish the Business Manager of the Ontario Sheet Metal Workers' Conference with a signed letter from a duly authorized official of the company on Employer stationery, stating whether or not the Union was employed on specific types of work on a given project. The Employer shall supply the Business Manager of the Ontario Sheet Metal Workers' Conference with a copy of the evidence submitted by the other union(s) involved along with drawings and/or prints plus a description of the work or process in dispute when requested.

9.2 In the event that a jurisdictional dispute cannot be settled on a local basis by the Unions involved, it shall be submitted to the Unions involved for settlement without permitting it to interfere in any way with the progress of the work at any time. In the event the dispute is not settled by the Unions involved, EPSCA and/or the Union may then submit the dispute to the Ontario Labour Relations Board under the Labour Relations Act. EPSCA and the Ontario Sheet Metal Workers Conference will advise each other, in writing, of their intent to submit a jurisdictional dispute to the Ontario Labour Relations Board and will identify in detail the work in question. The decision of the Ontario Labour Relations Board with respect to the jurisdictional dispute will be final and binding on the parties to this Agreement. The Ontario Labour Relations Board will determine the jurisdictional dispute before it pursuant to its normal criteria.

9.3 In the event the Union pursues or responds to a jurisdictional dispute at the Ontario Labour Relations Board the hearings panel appointed by the Ontario Labour Relations Board pursuant to the Act is not authorized to award damages in respect of a misassignment of work, only in circumstances where the other Union(s) involved in the proceedings is (are) equally restricted in their ability to claim for damages. However, this paragraph 9.3 shall not apply where the jurisdictional dispute and the misassignment of work involves the same Employer and the same work previously the subject matter of a jurisdictional dispute, relating to a construction project covered by this Agreement or its predecessors, before the Ontario Labour Relations Board.

9.4 In the event the building trades in the Province of Ontario are successful in establishing a Provincial Impartial Jurisdictional Disputes Board, EPSCA and the Union agree to meet and discuss implementation of procedures set forth by said Board.

Article 10

UNION SECURITY

10.1 All employees will be members or will apply for and secure membership in one of the Local Unions and will maintain such membership in good standing as a condition of employment.

10.2 Where applicable and in accordance with local practice, the Employers agree to deduct Union dues. The Employers will supply full checkoff lists of employees subject to checkoff at regular intervals, and agree to collect monthly for the Union dues payable to the Union. The Employers will transmit the monies so collected to the designated officials of Locals of the Union. The Union will indemnify the Employers for any liability arising from the deduction of dues, as requested by the Union.

10.3 Any changes in dues will be confirmed, in writing, by the Business Manager of the Local Union having geographic jurisdiction for the project or work location to the General Manager of EPSCA before such changes are put into effect. Within three (3) weeks of receipt of an acceptable written notice the change in dues will be implemented. The effective date will be the date of implementation.

Article 11

EMPLOYMENT – LAYOFF

11.1 For the purposes of this Article, a geographic area will be established for each Project and for Lines and Stations Construction in accordance with the geographic jurisdiction established in Article 3, Section 3.2 of this Agreement.

11.2 An office will be established by EPSCA, or by the Employer with the approval of EPSCA, for each Project and for Lines and Stations Construction. A purpose of this office will be to coordinate employment, as specified in this Article.

11.3 EPSCA, or the Employer with the approval of EPSCA, and the Union will exchange the names of their representatives in each of the areas described in Section 11.1 who will be responsible for cooperating in the referral and employment of reliable and competent Union personnel.

11.4 EPSCA, or the Employer with the approval of EPSCA, will notify the Union of future manpower requirements for all employees coming within the scope of this Agreement.

11.5 Employers reserve the right to employ and transfer two (2) key tradesmen to effectively utilize their special skills, having regard for the special requirements of thermal, nuclear or hydraulic generation projects and transmission and transformation construction.

The two (2) key tradesmen sent by an Employer to work on a contract at a project or work location in the territorial jurisdiction of another Local Union shall be permitted to work without interference from any Local Union for such period as the Employer may require them to do so. Such employees shall register with the EPSCA office and the Local Union office prior to commencing work.

11.6 The employment of qualified personnel, excluding two (2) key tradesmen, shall be carried out on the following basis and sequence:

(a) The EPSCA office, or the Employer's office with the approval of EPSCA, will request the appropriate Local Union office for personnel required. The request will include a description of the work, personnel required, and the name of the Employer for whom personnel will be working.

(b) Union personnel who are resident in the designated geographic area will be referred by the Local Union for employment through the EPSCA office. As much as their out-of-work lists will permit, the Local Union will supply personnel on a fan-out basis from the project or work location.

The Employers will either hire such person or substantiate their reasons, in writing, for not doing so.

(c) In the event the Local Union is unable to supply sufficient qualified and competent personnel, EPSCA may request the Business Manager of the Ontario Sheet Metal Workers' Conference to furnish such additional personnel as it requires and the Business Manager of the Ontario Sheet Metal Workers' Conference agrees to notify the Local Unions of the availability of work and request the Local Unions to refer personnel to the EPSCA office.

Out of Province personnel will only be recruited after all available members of Province of Ontario Local Unions are employed and only on the mutual agreement of the General Manager of EPSCA.

(d) Notwithstanding Article 10, Section 10.1, if upon request, the Local Union or the Business Manager of the Ontario Sheet Metal Workers' Conference is unable, within two (2) full working days, to supply personnel, including personnel with special skills, EPSCA may secure personnel from other available sources. The Employer agrees that such personnel shall be qualified and will be covered by the terms and conditions of this Agreement.

(e) The Union will cooperate with the Employer and advise the EPSCA office of the name and address of members being referred for work with Lines and Stations Construction as soon as they are known and before the employee commences work.

(f) Notwithstanding Article 11.5, Employers may transfer local employees from project to project or from work locations to work locations which are located within the geographic jurisdiction of the Local Union. Such employees shall register with the EPSCA office prior to commencing work.

11.7 Should it be necessary to reduce the working forces on the job, the Employer shall lay off or terminate his employees in the following sequence:

(i) members of other Local Unions

(ii) applicants for Local Union membership

(iii) Local Union members

Notwithstanding the above-noted sequence, Employers reserve the right to retain two (2) key tradesmen to utilize their special skills.

The Chief Steward shall be notified of the number of employees to be laid off a minimum of one (1) day in advance.

11.8 The Local Union reserves the right to replace employees who are members of other local Unions and are working on a project within the geographic jurisdiction of the Local Union with members of the Local Union who are unemployed and are available for work, subject to the following:

(a) Employees designated as key tradesmen shall not be replaced.

(b) No replacement shall take place within five (5) working days of the end of the job.

(c) The Local Union shall provide the Employer with a minimum of two (2) working days notice when an employee is to be replaced. Such replacement shall take place on the first working day of the week following the week in which appropriate notice is given.

(d) Members of the Local Union shall only replace non-local employees of the same classification.

(e) Notwithstanding Article 28, the local members who replace non-local employees shall not be entitled to initial travel monies and the non-local employees being replaced shall not be entitled to return travel monies.

(f) The Employer shall decide which employee or employees shall be replaced.

11.9 Re-employment of Sheet Metal members as required by the Workers'Compensation Board shall not be a violation of this collective agreement nor be subject to the provisions of Article 11.

Article 12

PAY PROCEDURE

12.1 NORMAL

(a) Employees shall be paid weekly and payment for any given week will be made not later than the sixth working day after the close of the payroll period, but in any event not later than Thursday of the following week.

(b) Wages shall be paid by the Employers on the job site, before quitting time, in cash or by cheque, payable at par in the locality of the job site. Accompanying each payment of wages shall be a statement, in writing, which can be retained by the employee, setting forth:

(i) the period of time or the work for which the wages are being paid;

(ii) the rate of wages to which the employee is entitled;

(iii) the amount of wages to which the employee is entitled;

(iv) the amount of each deduction from the wages of the employee and the purpose for which each deduction is made;

(v) any allowance or other payment to which the employee is entitled;

(vi) the amount of vacation pay for which the employee is being credited or paid;

(vii) the amount of recognized holiday pay for which the employee is being credited or paid; and

(viii) the net amount of money being paid to the employee.

(c) In cases of inclement weather being declared on payday, employees will receive their pay before leaving the site provided it is available on the site.

12.2 VOLUNTARY TERMINATION OR DISCHARGE FOR CAUSE

An employee who voluntarily terminates his employment or who is discharged for cause will have his final pay including his record of employment and vacation pay, if applicable, sent registered mail to his last known address on record with the Employer within five (5) working days of termination or discharge.

12.3 LAYOFF

REV (a) An employee who is laid off from a Generation Stations Project or a Lines and Stations Construction site will have his final pay and record of employment and vacation pay, if applicable, sent registered mail to his last known address on record with the Employer within five (5) working days of termination. This does not preclude an employee being issued his final pay and termination documents, on the job, prior to the five (5) day period.

REV (b) If the Employer does not mail an employee's final pay and record of employment and vacation pay as required in Section 12.3 (a) above, the Employer shall pay waiting time in excess of the five (5) day period at the rate of two (2) hours' pay for each working day until such pay and record of employment are mailed by the Employer.

(c) Employers will provide two (2) hours' notice of layoff or two hours' pay in lieu of notice to employees who are to be laid off.

12.4 APPRENTICES

An apprentice who completes the hourly contract requirement and becomes qualified as a journeyman sheet metal worker will be paid as a journeyman effective the date of successful completion of the Provincial qualifying examination.

Article 13

WAGES

13.1 The rates of pay for employees in the classifications listed in Article 2 of this Agreement shall be as set forth in the wage schedules, attached hereto.

Article 14

RECOGNIZED HOLIDAYS

14.1 The holidays recognized under this Agreement are:

New Year's Day	Civic Holiday
Good Friday	Labour Day
Easter Monday	Thanksgiving Day
Victoria Day	Christmas Day
Canada Day	Boxing Day

14.2 EPSCA agrees to recognize Heritage Day when proclaimed by legislation.

14.3 Recognized holidays falling on a Saturday or Sunday shall be observed on the following Monday. When Christmas Day falls on a Saturday or Sunday, it shall be observed on the following Monday and Boxing Day on the following Tuesday. When New Year's Day falls on a Saturday or Sunday, it shall be observed either on the preceding Friday or following Monday.

14.4 EPSCA reserves the right to change the day of observance of a recognized holiday when such holiday falls on a Tuesday or Thursday.

Article 15

VACATION AND RECOGNIZED HOLIDAY PAY

15.1 The vacation and recognized holiday pay rate shall be ten percent (10%) [four percent (4%) vacation and six percent (6%) in lieu of recognized holidays] of total earnings.

15.2 The Employer, except as noted in Section 15.3 below, agrees to pay into operative vacation and recognized holiday pay plans established or recognized in the locality by Employers under agreement with the Union for construction work of a related nature.

15.3 For employees of Ontario Power Generation Inc (OPGI) and Hydro One, payment of vacation and recognized holiday pay shall be made on the regular weekly pay cheque.

Article 16

BENEFITS

16.1 The Employer agrees to pay into operative welfare, pension and SUB plans established or recognized in the locality by Employers under agreement with the Union for construction work of a related nature, the hourly or monthly amounts specified as welfare, pension and SUB in such agreement, whether in addition to the wage rates or deducted from the wage rates, for employees covered by this Agreement during the time they are employed in the specific locality covered by such agreement. The amount(s) of welfare, pension and SUB contributions to be paid will be set out in the wage schedules, attached hereto. The Employer agrees to remit welfare, pension and SUB contributions by the 15th day of the month following that month in which such contributions were accumulated.

16.2 Should the welfare, pension, SUB or any other contribution or deduction recognized under this Agreement change during the term of this Agreement then an adjustment will be made to the base rate. The total wage package will not be changed.

Within three (3) weeks of receipt of an acceptable written notice any such changes as noted above will be implemented. The effective date will be the date of implementation.

16.3 The Union agrees to supply the Employer with all information necessary to implement and administer the welfare, pension and SUB plans.

16.4 The trustees of the employee benefit plans referred to in this collective agreement shall promptly notify the Union of the failure by any Employer to pay any employee benefit contributions required to be made under this collective agreement and which are owed under the said plans in order that the program administrator of the Employee Wage Protection Plan may deem that there has been an assignment of compensation under the said program in compliance with the regulation to the Employment Standards Amendment Act, 1991 in relation to the Employee Wage Protection Program.

16.5 The Employers agree to deduct from each employee and remit the amounts set forth in the wage schedules, attached hereto, and the area rate schedules for the Ontario Sheet Metal Workers' Conference Union Dues Promotion Trust Fund.

All monies deducted and received in accordance with this Article are the property of the Ontario Sheet Metal Workers' Conference, and shall be used by the Conference in its absolute discretion as directed by representatives of Locals 30, 47, 235, 269, 392, 397, 473, 504, 537, 539 and 562.

Article 17

REPORTING PAY

17.1 An employee who reports for work at his regular starting time and for whom no work is available for reasons other than inclement weather shall be paid for three (3) hours' work at the applicable rate, unless the employee has been notified before leaving his home or camp not to report.

17.2 An employee who reports for and commences work at the direction of his Employer shall receive four (4) hours' pay at the applicable rate. This allowance will be paid to an employee if he is requested to report for work for any part of the first half of the shift and an additional four (4) hours will also be paid if he is requested to report for work for any part of the second half of the same shift. An employee will not receive this allowance if he is unable to complete his shift as a result of inclement weather. It is not intended by this Article that an employee receive a reporting pay allowance greater than his pay for normal daily hours.

17.3 When an Employer considers it necessary to shut down a job to avoid the possible loss of human life, because of an emergency situation that could endanger the life and safety of an employee, in such cases, employees will be compensated only for the actual time worked.

17.4 An employee in receipt of reporting pay shall also receive travel or board allowance, if applicable.

Article 18

INCLEMENT WEATHER PAY

18.1 Except as noted in Section 18.3 below, an employee who reports for work at the beginning of a shift and is unable to commence work due to inclement weather will receive three (3) hours' pay at the applicable rate. To qualify, the employee must remain at a protected place designated by the Employer for three (3) hours unless excused by an authorized representative of his Employer.

18.2 Except as noted in Section 18.3 below, an employee who reports for and commences work but is unable to continue work due to inclement weather shall receive three (3) hours' pay at the applicable rate or pay for the actual time worked for that shift, whichever is the greater.

18.3 An employee engaged in sheeting and decking work shall receive two (2) hours' pay for the circumstances outlined in Section 18.1 and 18.2 above.

18.4 An employee in receipt of inclement weather pay shall also receive travel or board allowance, if applicable.

Article 19

EMPLOYER'S RESPONSIBILITY

19.1 Where the word "shop" is used in this Article, it shall be defined as a sheet metal shop under Agreement with the Sheet Metal Workers' International Association or one of its Local Unions or the Ontario Sheet Metal Workers' Conference. It being understood that such shops shall be shops using the yellow label of the International Association.

19.2 All sheet metal work at the option of the Employer shall be fabricated on the job site or in a shop.

19.3 Notwithstanding Section 19.2 above, EPSCA and the Union acknowledge that packaged equipment, catalogue items and engineered assemblies may be supplied for installation. Such packaged equipment, catalogue items and engineered assemblies shall be installed by members of the Union in accordance with their jurisdiction as provided for in Article 8, Work Assignment and Article 9, Jurisdictional Disputes of this Agreement.

19.4 Both EPSCA and the Union acknowledge that situations may arise where the terms packaged equipment, catalogue items or engineered assemblies may require interpretation. In such circumstances, this matter will be immediately referred to a permanent review panel consisting of three (3) members appointed by the Union and three (3) members appointed by EPSCA.

19.5 Nothing in this Collective Agreement shall be taken to interfere with the existing divisions of work in the plants of the Employer or affiliated companies, or as established between the Sheet Metal Workers' International Association and other certified or recognized unions operating in the plants where special building products are produced.

Article 20

FOREMEN AND SUBFOREMEN

20.1 It is understood that foremen and subforemen hold key positions in the relationship between the Employers and the Union. Both parties agree that every effort should be made to recruit and retain foremen and subforemen who have a high degree of efficiency in the performance of their jobs and in the handling of their men. Recognizing the responsibilities involved in being a supervisor and a member of the Union, the Employers and the Union will make every effort to minimize problems that may arise which concern the relationship between the foremen and subforemen, the Employers and the Union.

20.2 The parties recognize the responsibilities of foremen and subforemen to discharge their managerial duties. If the Union feels that the foreman or subforeman is not discharging his managerial duties in a manner that is fair and equitable, or if an Employer feels that the Union is interfering with the foreman or subforeman in the performance of his managerial duties, the Employer or the Union may refer the problem to the Executive Committee for resolution. If the matter cannot be resolved by the Executive Committee, the grievance procedure may be invoked by either party.

20.3 The selection and retention of foremen and subforemen will be the responsibility of the Employers. When making appointments to the foreman and subforeman level, the Employers will give consideration to those employees they presently employ on a project or at a work location.

20.4 In the interest of efficiency and productivity, the Employer shall have the right to move foremen and subforemen from project to project or from work location to work location, providing the moving of these foremen and subforemen is consistent with the key tradesmen provisions of Article 11, if they are not from the Local Union geographic area.

20.5 **REV** The foremen's differential shall three dollars ($3.00) above the journeyman rate of the locally negotiated rate, whichever is greater.

The subforemen's differential shall be one dollar and fifty cents ($1.50) above the journeyman rate.

20.6 An Employer who employs Sheet Metal Workers shall assign a Sheet Metal Foreman for a Sheet Metal crew. This clause does not apply to composite crews.

Article 21

CALL-IN PAY

21.1 When an employee is called in outside of his normal hours of work, he shall receive a minimum of four (4) hours' work at the appropriate premium rate.

If the employee's normal hours of work commence within this four (4) hour period, the employee will be paid premium time until the start of his normal hours and will revert to his normal hourly rate at the commencement of his normal hours of work.

Article 22

HOURS OF WORK

22.1 One (1) or Two (2) Shift Operation

The weekly hours of work shall consist of forty (40) hours, worked between Monday and Friday, for all employees of Employers covered by this agreement and working on a one (1) or two (2) shift operation.

The daily hours of work for all employees may be arrived at by having the employees work four (4) consecutive ten-hour shifts or by having the employees work five (5) consecutive eight-hour shifts. These shifts may run concurrently. Daily hours of work will be established for a minimum period of 30 days. If an Employer intends to change the daily hours of work, a minimum of 15 days written notice shall be sent to the Local Union.

REV The start time for the day shift shall be 8:00 AM with a possible one (1) hour variance either way. The start time for the afternoon shift shall be immediately following the day shift or within one (1) hour either way to coincide with the end of the day shift.

The shift differential for those employees working the afternoon shift when a two-shift operation has been established by the Employer will be one-seventh (1/7) for scheduled hours worked on that shift.

22.2 Three (3) Shift Operation

When a three (3) shift operation is established by the Employer, the following conditions will apply:

Those employees working on the day shift shall work eight (8) hours per shift at the straight time rate.

Those employees working on the afternoon shift shall work seven and one-half (7 1/2) hours per shift. A shift differential of one-seventh (1/7) shall be paid for all normal scheduled shift hours worked.

Those employees working on the night shift shall work seven (7) hours per shift. A shift differential of one-fifth (1/5) shall be paid for all normal scheduled shift hours worked.

22.3 A shift will be deemed to be established providing at least four (4) consecutive days of a shift are to be worked excluding Saturdays, Sundays and recognized holidays. If an employee is removed from their scheduled shift prior to completing four (4) consecutive shifts, the employee will be paid shift differential for the remainder of the hours that would have been worked had the employee not been reassigned.

22.4 It may be necessary from time to time to vary the hours of work established in this Article. Any amendments to the hours of work will be established by mutual agreement between EPSCA and the Union.

22.5 When employees engaged in sheeting and decking work are not able, due to weather conditions, to work a full day, it is agreed that the daily time limit may be exceeded on any of the remaining working days of the week, providing the weekly time limit is not exceeded thereby, but in no case under this provision shall the daily limit be exceeded by more than one (1) hour without the consent of the Union. Pay for such extended hours shall be at the basic hourly rate.

Article 23

OVERTIME RATES

23.1 When working on an eight (8) hour day and five (5) day per week work schedule (Monday to Friday inclusive), overtime work shall be paid at one and one-half (1 1/2) times the basic hourly rate for all hours worked beyond the normal daily scheduled number of hours up to a maximum of 2 hours per day. All hours in excess of 10 hours per day shall be paid at two (2) times the base hourly rate.

When working on a ten (10) hour day and four (4) day per week work schedule (Monday to Friday inclusive), overtime work shall be paid at one and one-half (1 1/2) times the basic hourly rate for all hours worked beyond the normal daily scheduled number of hours up to a maximum of 2 hours per day. All hours in excess of 12 hours per day shall be paid at two (2) times the base hourly rate.

Overtime work performed on Saturday, Sunday, Recognized Holidays and non-shift days shall be paid at two (2) times the basic hourly rate.

23.2 Overtime rates of pay for employees in the classifications covered by this Agreement shall be as set forth on the wage schedules, attached hereto.

23.3 Overtime shall be assigned as equally and as impartially as possible among all members of the crew.

Article 24

REST PERIOD

24.1 Fifteen (15) minutes will be allotted at the direction of the Employer for employees to rest at their place of work for each half (1/2) shift worked.

24.2 For employees required to work two (2) hours of overtime, a ten (10) minute rest period will be allotted prior to the end of the normal shift before commencing overtime work.

24.3 For employees, working overtime, a fifteen (15) minute rest period will be allotted, at the time directed by the Employer, after each two (2) hours of overtime worked.

Article 25

MEALS ON OVERTIME

25.1 If an employee is notified during the time he is working that he will be required to work for more than two (2) hours past the normal quitting time of the first or second shifts or for more than three and one-half (3-1/2) hours beyond the normal quitting time of the third shift, the Employer will provide a free meal to the employee after approximately two (2) hours of overtime worked and for each four (4) hours of overtime worked thereafter.

The employee will be allowed thirty (30) minutes paid at the straight time rate to eat each meal at the time directed by the Employer. When a paid meal period overlaps a rest period the paid meal period will supplant the rest period. The Employer will supply a hot meal when possible.

To qualify for the above-noted provisions on a Friday for work on the first and second shifts, an employee will be required to work for more than four (4) hours beyond the normal quitting time of his shift.

The above-noted is not applicable to the first eight (8) hours worked on Saturdays, Sundays and recognized holidays for employees who normally work the first or second shifts.

The above-noted is not applicable to the first six and one-half (6-1/2) hours worked on Sundays and recognized holidays for employees who normally work the third shift.

25.2 Where an employee has been notified the previous day, no meal will be provided, but the employee will be allowed thirty (30) minutes paid at the straight time rate to eat, at the time directed by the Employer.

Article 26

GENERATION PROJECTS
DAILY TRAVEL ALLOWANCE AND ROOM AND BOARD

DAILY TRAVEL ALLOWANCE

26.1 REV The daily travel allowance will be paid by the Employers to their employees who are not receiving free room and board as referred to in Section 26.2, on the following basis:

(a) If an employee lives within forty (40) radius kilometres* of the project, no travel allowance will be paid.

(b) If an employee lives within 40 to 56 radius kilometers of the project, he shall receive $18.85 per day travel allowance effective May 1, 2000 ($19.35 effective May 1, 2001, $19.85 effective May 1, 2002, $20.35 effective May 1, 2003) for each day worked or reported for.

(c) If an employee lives within 56 to 80 radius kilometers of the project, he shall receive $22.10 per day travel allowance effective May 1, 2000 ($22.60 effective May 1, 2001, $23.10 effective May 1, 2002, $23.60 effective May 1, 2003) for each day worked or reported for.

(d) If an employee lives within 80 to 97 radius kilometers of the project, he shall receive $25.60 per day travel allowance effective May 1, 2000 ($26.10 effective May 1, 2001, $26.60 effective May 1, 2002, $27.10 effective May 1, 2003) for each day worked or reported for.

(e) Excluding Pickering and Darlington Generating Stations, if an employee lives greater than 97 radius kilometers from the project and does not qualify for subsistence allowance under Section 26.2 below, or does not maintain a temporary accommodation at or near the project, he shall receive $29.85 per day travel allowance effective May 1, 2000 ($30.35 effective May 1, 2001, $30.85 effective May 1, 2002, $31.35 effective May 1, 2003) provided he continues to travel greater than 97 radius kilometers for each day worked or reported for.

(f) Pickering and Darlington Projects:
An employee who becomes employed at the Pickering or Darlington Project on or after June 1, 1984 and who lives greater than 97 radius kilometers from the Project shall receive $29.85 per day travel allowance effective May 1, 2000 ($30.35 effective May 1, 2001, $30.85 effective May 1, 2002, $31.35 effective May 1, 2003) for each day worked or reported for.

* ***For the purpose of this Article, "radius kilometers" shall be measured from the centre of the turbine hall on each project.***

Bruce G.S. "A", Bruce G.S. "B", and the Bruce Heavy Water Plants will be combined to form the Bruce Complex. Travel allowance for the Bruce complex will be calculated from the midpoint of a straight line joining the centres of the Bruce G.S. "A" and Bruce G.S. "B" turbine halls.

When an employee is directed to report to a location that involves travelling around a natural barrier, the distance around the natural barrier shall be the shortest distance measured by a series of straight lines. The sum of the distances of these straight lines shall be applied to the ring concept to establish the employee's travel allowance entitlement.

A natural barrier is defined as any obstruction or impediment which creates an unreasonable relationship between the radius kilometers and actual kilometers travelled.

ROOM AND BOARD

26.2 The following conditions will apply for employees whose regular residence* is more than 97 radius kilometers from the project (except at Pickering and Darlington Generating Stations) refer to Article 26.1(f)):

(a) An Employer may supply either:

(i) Free room and board in camp or a good standard of board and lodging within a reasonable distance of a project; or

(ii) a subsistence allowance.

(b) An employee may exercise his option not to stay in a camp or accept free room and board. An employee who exercises this option shall receive a subsistence allowance as follows:

(i) The Province will be divided into three (3) regions for the payment of subsistence allowance; a Northern region and a Southern region and the Bruce Project. The Northern region is the geographic area north of a line drawn between the mouth of the French River and Mattawa. The Southern region is comprised of all remaining geographic areas except that described for the Northern region and the Bruce Project.

* ***An employee's "regular residence" is:***

1. ***The place where the employee maintains a self-contained, domestic establishment (a dwelling house, apartment or similar place of residence where a person generally eats and sleeps). This is in contrast to a boarding type of situation such as a hotel/motel room, or boarding house facility which is not self-contained; and***

2. ***The total financial responsibility for the continued maintenance and upkeep of the residence rests solely with the employee. The employee must be able to show proof of such financial responsibility in accordance with the "Application for Daily Travel/Room and Board Allowance"; and***

3. ***The employee normally resides in the residence except for those periods of time when, because of the location of the work, the employee is forced to obtain temporary accommodation at that work location.***

REV (ii) An employee working at the Northern Region whose regular residence is more than 97 radius kilometers from the Project shall be paid a subsistence allowance of $70.00 per day effective May 1, 2000 ($72.00 effective May 1, 2001, $74.00 effective May 1, 2002, $76.00 effective May 1, 2003) for each day worked or reported for.

REV (iii) An employee working in the Southern Region, excluding the Bruce Project, whose regular residence is more than 97 radius kilometers from the Project in the Southern Region shall be paid a subsistence allowance of $57.00 per day effective May 1, 2000 ($59.00 effective May 1, 2001, $61.00 effective May 1, 2002, $63.00 effective May 1, 2003) for each day worked or reported for.

REV (iv) When an employee's regular residence is more than 97 radius kilometers from the Bruce Project, the employee shall be paid a subsistence allowance of $59.00 per day effective May 1, 2000 ($61.00 effective May 1, 2001, $63.00 effective May 1, 2002, $65.00 effective May 1, 2003) for each day worked or reported for.

26.3 An employee shall not qualify for daily travel allowance or room and board allowance as provided for in Sections 26.1 and 26.2 above when such employee reports for work but does not remain at work for his scheduled daily hours unless excused by an authorized representative of his Employer.

26.4 The Union recognizes the Employer's right to charge for board and other existing services. The Employer fixes the charge for board and other existing services in camps at $25.00 per day. This will be applied on the following basis:

(a) An employee who remains in camp on a normally scheduled work day on which he does not work will be charged $25.00 per day, unless he is excused from work for a legitimate reason by the project medical attendant or an authorized representative of his Employer.

(b) An employee who is absent from work on Friday without approval and who remains in camp and who is still absent from work on the following Monday without approval will be charged for room and board for Friday, Saturday, Sunday and Monday.

(c) An employee who is absent from work without approval on Friday but who works the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

(d) An employee who works the Friday and is absent from work without approval on the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

Article 27

LINES AND STATIONS CONSTRUCTION
DAILY TRAVEL ALLOWANCE AND ROOM AND BOARD

DAILY TRAVEL ALLOWANCE

27.1 **REV** The daily travel allowance will be paid by the Employers to their employees who are not living in camp or receiving a subsistence allowance as referred to in Section 27.3 and 27.4 on the following basis:

(a) If an employee lives within forty (40) radius kilometres of the work location or declared assembly point, no travel allowance will be paid.

(b) If an employee lives within 40 to 56 radius kilometers of the work location or declared assembly point, he shall receive $18.60 per day travel allowance effective May 1, 2000 ($19.10 effective May 1, 2001, $19.60 effective May 1, 2002, $20.10 effective May 1, 2003) for each day worked or reported for.

(c) If an employee lives within 56 to 80 radius kilometers of the work location or declared assembly point, he shall receive $22.10 per day travel allowance effective May 1, 2000 ($22.60 effective May 1, 2001, $23.10 effective May 1, 2002, $23.60 effective May 1, 2003) for each day worked or reported for.

(d) If an employee lives within 80 to 97 radius kilometers of the work location or declared assembly point, he shall receive $25.60 per day travel allowance effective May 1, 2000 ($26.10 effective May 1, 2001, $26.60 effective May 1, 2002, $27.10 effective May 1, 2003) for each day worked or reported for.

(e) If an employee lives greater than 97 radius kilometers from the work location or declared assembly point, and does not qualify for subsistence allowance under Section 27.3 below, or does not maintain a temporary accommodation at or near the work location or declared assembly point, he shall receive $28.85 per day travel allowance effective May 1, 2000 ($29.35 effective May 1, 2001, $29.85 effective May 1, 2002, $30.35 effective May 1, 2003) provided he continues to travel greater than 97 radius kilometers daily for each day worked or reported for.

When an employee is directed to report to a location that involves travelling around a natural barrier, the distance around the natural barrier shall be the shortest distance measured by a series of straight lines. The sum of the distances of these straight lines shall be applied to the ring concept to establish the employee's travel allowance entitlement.

A natural barrier is defined as any obstruction or impediment which creates an unreasonable relationship between radius kilometers and actual kilometers travelled.

27.2 The Employer reserves the right to base daily travel allowance on the distance in radius kilometers from where an employee lives to either the work location or declared assembly point, depending on where the employee is directed to report.

ROOM AND BOARD

27.3 The following conditions will apply for employees whose regular residence* is more than 97 radius kilometers from the work location.

(a) An Employer may supply either:

(i) room and board in camp or a good standard of board and lodging; or

(ii) a subsistence allowance.

(b) An employee may exercise his option not to stay in a camp or accept free room and board. An employee who exercises this option shall receive a subsistence allowance as follows:

(i) The Province will be divided into two (2) regions for the payment of subsistence allowance; a Northern region and a Southern region. The Northern region is the geographic area north of a line drawn between the mouth of the French River and Mattawa. The Southern region is comprised of all remaining geographic areas except that described for the Northern region.

* ***For the purpose of this Article, "regular residence":***

(i) For metropolitan areas (Toronto and Hamilton) is the place where an employee maintains a self-contained domestic establishment (a dwelling house, apartment or similar place of residence where a person generally eats and sleeps). This is in contrast to a boarding type of situation such as a hotel/motel room, or boarding house facility which is not self-contained, and the total financial responsibility for the continued maintenance and upkeep of the residence rests solely with the employee.

The employee must be able to show proof of such financial responsibility in accordance with the "Application for Daily Travel/Room and Board Allowance"; and the employee normally resides in the residence except for those periods of time when, because of the location of the work, the employee is forced to obtain temporary accommodation at that work location.

(ii) For all other areas, shall be deemed to be the city or town hall of the municipality where an employee maintains a regular residence described in (i) above. In those municipalities where a city or town hall does not exist, then the post office serving his self-contained domestic establishment will apply.

REV (ii) An employee working at the Northern Region whose regular residence is more than 97 radius kilometers from the Project shall be paid a subsistence allowance of $70.00 per day effective May 1, 2000 ($72.00 effective May 1, 2001, $74.00 effective May 1, 2002, $76.00 effective May 1, 2003) for each day worked or reported for.

REV (iii) An employee working in the Southern Region, excluding the Bruce Project, whose regular residence is more than 97 radius kilometers from the Project in the Southern Region shall be paid a subsistence allowance of $57.00 per day effective May 1, 2000 ($59.00 effective May 1, 2001, $61.00 effective May 1, 2002, $63.00 effective May 1, 2003) for each day worked or reported for.

27.4 An employee shall not qualify for daily travel allowance or room and board allowance as provided for in Sections 27.1 and 27.3 above, when such employee reports for work but does not remain at work for his scheduled daily hours unless excused by an authorized representative of his Employer. Such permission shall not be unreasonably denied.

27.5 The Union recognizes the Employer's right to charge for board and other existing services. The Employer fixes the charge for board and other existing services in camps at $25.00 per day. This will be applied on the following basis:

(a) An employee who remains in camp on a normally scheduled workday on which he does not work will be charged $25.00 per day unless he is excused from work by an authorized representative of his Employer.

(b) An employee who is absent from work on Friday without approval and who remains in camp and who is still absent from work on the following Monday without approval will be charged for room and board for Friday, Saturday, Sunday and Monday.

(c) An employee who is absent from work without approval on Friday but who works the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

(d) An employee who works the Friday and is absent from work without approval on the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

Article 28

TRAVEL AND TRANSPORTATION

28.1 On recruitment of tradesmen who live between 97 and 161 radius kilometers from the project, the Employer shall pay $25.00 for the initial trip to the project.

28.2 ONTARIO RESIDENTS

REV

On recruitment of tradesmen who live in Ontario but beyond 161 radius kilometers from the project, the Employer shall pay 27¢ per radius kilometer effective May 1, 2000 (28¢ effective May 1, 2001, 29¢ effective May 1, 2002, 30¢ effective May 1, 2003), plus travel time based on one (1) hour's pay for each 80 radius kilometers of travel to a maximum of eight (8) hours' pay, for the initial trip to the project from where the tradesman lives or place of recruitment, whichever is closer to the project.

28.3 NON-ONTARIO RESIDENTS

On recruitment of tradesmen who live outside Ontario and beyond 161 radius kilometers from the project, the Employer shall pay the equivalent of the cost of public transportation plus travel time based on one (1) hour's pay for each 80 radius kilometers of travel to a maximum of eight (8) hours' pay, for the initial trip to the project from where the tradesman lives or place of recruitment, whichever is closer to the project.

28.4 To qualify for payment in Sections 28.1, 28.2, or 28.3, the employee must remain at the project for a minimum of thirty (30) working days or the duration of the job, whichever is lesser.

28.5 On termination of employment for reasons other than discharge for cause, an employee entitled to payment under Sections 28.1, 28.2, or 28.3 shall be entitled to return expenses calculated in the same manner as in Sections 28.1, 28.2, or 28.3 above for the return trip from the project to where the tradesman lives or place of recruitment, whichever is closer to the project. To be eligible for return payment an employee must remain at the project for a minimum of thirty (30) days or the duration of the job, whichever is the lesser.

Article 29

LUNCHROOM FACILITIES

29.1 The Employer will provide clean and adequately heated (68° Fahrenheit) facilities for employees to eat their lunch at all major work locations, where such facilities may reasonably be provided. Such facilities shall have sufficient tables and benches or seats for the employees on the job.

Article 30

GRIEVANCE PROCEDURE

30.1 Grievances within the meaning of the grievance and arbitration procedure shall consist only of disputes about the interpretation or application of particular clauses of this Agreement about alleged violations of this Agreement. In the event of any dispute concerning the meaning or application of any provision of this Agreement or a dispute concerning an alleged violation of this Agreement, there shall be no suspension or disruption of work, but such dispute shall be treated as a grievance and shall be settled, if possible, by EPSCA and the Union. Settlement discussions shall be held without prejudice. In the interests of expediting the procedure, the parties shall process grievances in the following manner:

30.2 PRELIMINARY DISCUSSION

Disputes arising out of the interpretation or alleged violation of this Agreement should, if possible, be settled by discussion between the employee and/or his steward and the employee's supervisor.

30.3 FIRST STEP

If a dispute cannot be resolved by this method, the Accredited Union Representative for the Union may file a formal grievance on the prescribed form with the Manager of Construction or the Lines, Stations and Miscellaneous Construction Superintendent within fifteen (15) working days of the alleged grievous act.

Within ten (10) working days of the filing of the grievance, the Manager of Construction or Lines, Stations and Miscellaneous Construction Superintendent shall investigate the grievance and convene a meeting which he or the Accredited Union Representative considers necessary to resolve it. The Manager of Construction or Lines, Stations and Miscellaneous Construction Superintendent shall give his reply on the prescribed form to the Accredited Union Representative within five (5) working days from the date of the First Step meeting.

Copies of completed grievance forms signed by the appropriate parties shall be filed by the Manager of Construction or the Lines, Stations and Miscellaneous Construction Superintendent with the General Manager of EPSCA and by the Accredited Union Representative with the Business Manager of the Ontario Sheet Metal Workers' Conference.

If a first step grievance meeting is considered appropriate, the Management Committee shall comprise the Manager of Construction, or the Lines, Stations and Miscellaneous Construction Superintendent, or their designate, plus at least one representative against whom the grievance has been filed. The Union Committee shall comprise the Accredited Union Representative plus two (2) additional Union officials.

30.4 SECOND STEP

If a dispute has not been resolved at the First Step of the grievance procedure, the Accredited Union Representative may refer the grievance on the prescribed form to EPSCA's Grievance Officer. Such grievances shall be referred within ten (10) working days after the disposition has been issued under the First Step of this procedure. A copy of the grievance form shall be forwarded by the Accredited Union Representative to the Business Manager of the Ontario Sheet Metal Workers' Conference.

The EPSCA Grievance Officer shall investigate the grievance and convene a meeting which he or the Business Manager of the Ontario Sheet Metal Workers' Conference considers necessary to resolve it and give his reply on the prescribed form to the Business Manager of the Ontario Sheet Metal Workers' Conference within five (5) working days from the receipt of the grievance form which was completed at First Step.

If a Second Step grievance meeting is considered appropriate, the Management Committee shall comprise the EPSCA Grievance Officer plus two (2) other management representatives, one of whom shall be a representative of the Employer against whom the grievance has been filed. The Union Committee shall comprise three (3) persons, including the Business Manager of the Ontario Sheet Metal Workers' Conference and the Accredited Representative for the grievor, plus one other representative of the Union.

30.5 EPSCA OR UNION GRIEVANCES

The processing of EPSCA grievances shall begin at the Second Step. EPSCA may submit either policy or specific grievances. The Union may also institute policy grievances at this Step. Such policy or specific grievances shall be submitted within thirty (30) days of the alleged grievous act.

30.6 TIME LIMITS

The time limits as to both documents and procedure set out in the above sections shall be complied with by the parties to this Agreement provided, however, that the parties may mutually agree, in writing, in respect to an extension or waiver of any of the time limits imposed. Where no answer is given within the time limits specified in the grievance procedure, the employee concerned, the Union or EPSCA shall be entitled to submit the grievance to the next step of the grievance procedure. Any grievance not processed within the time limits specified in the grievance procedure shall be deemed to have been settled and ineligible for arbitration.

30.7 Alleged unjustified termination, discharge, suspension or disciplinary action may be grieved beginning at First Step.

30.8 GRIEVANCE FACILITIES

EPSCA shall provide the necessary facilities for all grievance meetings.

Article 31

ARBITRATION

31.1 If any dispute about the interpretation or application of particular clauses of this Agreement or about an alleged violation of this Agreement cannot be settled through the grievance procedure outlined in Article 30, the matter may be submitted within thirty (30) days of its failure of settlement by grievance procedure by either EPSCA or the Union to a Board of Arbitration for adjudication. The party desiring to submit the dispute to arbitration shall notify the other party, in writing, of its desire and the notice shall contain the name of the first party's nominee to an arbitration board. The recipient of the notice shall, within five (5) working days, inform the other party of the name of its nominee to the arbitration board. The two nominees so selected shall, within ten (10) working days of the appointment of the second of them, appoint a third person who shall be the Chairman. If the recipient of the notice fails to appoint a nominee, the appointment shall be made by the Minister of Labour for Ontario upon the request of either party. If the two nominees fail to agree upon a Chairman, the services of the Minister of Labour for Ontario shall be utilized and the request to the Minister may be made by either party. The Arbitration Board, when selected or appointed, shall proceed as soon as practicable to hear and determine the dispute and it shall issue a decision which is final and binding upon the parties and upon their respective members. The decision of a majority is the decision of the Arbitration Board, but if there is no majority, the decision of the Chairman governs.

31.2 The Arbitration Board shall have no power to add to or subtract from or modify any of the terms of this Agreement. The Arbitration Board shall not substitute its discretion for that of the parties except where the board determines that an employee has been discharged or otherwise disciplined for cause when this Agreement does not contain a specific penalty for the infraction that is the subject matter of the arbitration. In such cases, the Arbitration Board may substitute such other penalty for the discharge or discipline as to the arbitration board seems just and reasonable in all circumstances. The Arbitration Board shall not exercise any responsibility or function of the parties. The Arbitration Board shall not deal with any matter not contained in the original statement of grievance filed by the party referring the matter to arbitration.

31.3 In arbitration proceedings, each party shall pay the fees and expenses of its nominee, whether appointed by the party or by the Minister of Labour for Ontario and the fees and expenses of the Chairman shall be shared equally by the parties.

31.4 The time limits as to both documents and procedure set out in the above sections shall be observed by the parties to this Agreement provided, however, that the parties may mutually agree, in writing, in respect to an extension or waiver of any of the time limits imposed.

Article 32

STANDOFF

32.1 When unable to proceed with his work, an Employer may elect to either layoff or standoff part or all of his crew. If an employee is stoodoff, the employee may elect to remain on standoff or be laid off.

(a) Layoff

If layoff is elected, it shall be carried out in accordance with the terms of this Collective Agreement. An employee laid off will be issued a Record of Employment Form indicating "Layoff - Shortage of Work".

(b) Standoff

If standoff is elected, the Employer reserves the right to standoff its employees without pay up to a maximum of three (3) consecutive working days. Notification of standoff will be made by the Employer during normal working hours. No travel allowance will be paid to an employee for the standoff period. If standoff continues beyond three (3) consecutive working days, an employee shall be issued a Record of Employment Form indicating "Standoff - Lack of Work" dating back to his first day on standoff.

32.2 An employee qualifying for subsistence allowance who is placed on standoff will be paid subsistence allowance up to a maximum of three (3) consecutive days.

Article 33

NO STRIKE - NO LOCKOUT

33.1 There shall be no strikes or lockouts so long as this Agreement continues to operate.

Article 34

TOOL LIST

34.1 All journeymen sheet metal workers and apprentices shall provide themselves with a lockable toolbox and the full complement of tools as set out below:

		Term of Apprenticeship					Journeyman
		1	2	3	4	5	
1	scratch awl	x	x	x	x	x	x
1	tinner's hammer (16 ounces)	x	x	x	x	x	x
1	pair bull snips	x	x	x	x	x	x
1	small, medium & large screw drivers (slotted & Robertson)	x	x	x	x	x	x
		x	x	x	x	x	x
1	rule 10'	x	x	x	x	x	x
1	scriber	x	x	x	x	x	x
1	tool box (lockable)	x	x	x	x	x	x
1	pair pliers		x	x	x	x	x
1	hacksaw frame		x	x	x	x	x
1	pair vice grips						
1	right & left hand aircraft snips		x	x	x	x	x
			x	x	x	x	x
1	pair tongs folding		x	x	x	x	x
1	plumb bob & line		x	x	x	x	x
1	chalk line						
1	crescent or adjustable wrench 10"		x	x	x	x	x
			x	x	x	x	x
1	ball peen hammer		x	x	x	x	x
1	12" spirit level			x	x	x	x
1	6" divider			x	x	x	x
1	12" divider			x	x	x	x
1	centre punch			x	x	x	x
1	set of trammel points			x	x	x	x
1	cold chisel 12"				x	x	x
1	set of Allen wrenches						

34.2 Journeymen sheet metal workers and apprentices who report for work and are not in possession of a full set of tools as set out above shall not be eligible for employment and the Employer shall have the right to refuse employment or to continue to employ such journeymen or apprentices. In such instances the Employer shall not be required to pay reporting pay as established under the relative Article of this Agreement.

34.3 Employees engaged in sheeting and decking work shall provide themselves with and have in their possession on the job a lockable toolbox and the following tools:

		Probationary Employee	Material Handler	Sheeter/Decker Assistant	Sheeter/Decker
1	16 foot tape	x	x	x	x
1	pair straight snips	x	x	x	x
1	pair standard pliers		x	x	x
1	slotted screw driver		x	x	x
1	hammer		x	x	x
1	vice grip			x	x
2	vice grip "C" clamps			x	x
1	Robertson screw driver green			x	x
1	Robertson screw driver red			x	x
1	Robertson screw driver black			x	x
1	cold chisel			x	x
1	10" crescent wrench			x	x
1	pair aircraft snips RH			x	x
1	pair aircraft snips LH			x	x
1	pair folding tongs			x	x
1	18" level			x	x
1	12" divider			x	x
1	chalk line			x	x
1	hacksaw frame			x	x
1	50 foot tape			x	x

Article 35

ASSOCIATION FUND

35.1 Each Employer bound by this agreement shall contribute to the Electrical Power Systems Construction Association Fund, the amount specified on the wage schedules, attached hereto, for each hour worked by each employee covered by this Agreement.

The Employer shall remit such contribution together with the supporting information as required on the reporting forms.

Article 36

PROTECTIVE CLOTHING AND EQUIPMENT

36.1 All employees shall provide themselves with and maintain in good condition the clothing required for performance of their normal duties including approved safety helmet and approved safety footwear.

The Employer shall provide all specialized equipment, e.g., safety glasses, glare shields, welding goggles, welders' gloves, painters' masks or other specialized clothing necessary for the safe operation of an employee's normal employment. The protective clothing and equipment that is provided by the Employer will be charged out to the employee and the employee will be responsible for the return of such clothing and equipment to his Employer. Employees will be charged for clothing and equipment which are lost and not reported immediately.

36.2 An employee shall be required to provide himself with the tools of his trade as set out in Article 34. The Employer shall not be held responsible for losses, except as noted hereunder:

(a) When personal tools valued in excess of $15.00 are lost due to fire, the Employer will consider the full estimated value on the merit of each case in determining replacement or payment. This will include only personal tools that a tradesman is required to have to perform his normal duties with his Employer.

(b) The Employer will compensate his employees for ordinary hand tools and clothing lost by theft from locked storage provided by the Employer for the employees. Claims must be submitted, in writing, and must provide substantiating evidence of forcible entry to locked storage. Payment or replacement for personal clothing lost by theft on the worksite shall be limited to clothing that a tradesperson is required to have to perform his normal duties with his Employer.

(c) In the event of loss by fire at an Employer's camp or on the work site in an Employer designated storage area, replacement or payment of the full estimated value in excess of $15.00 but not exceeding $500.00 for the loss of personal clothing will be made by the Employer. Payment or replacement for personal clothing cost by fire on the work site shall be limited to clothing that a tradesperson is required to have to perform his normal duties with his Employer.

36.3 **REV** Employees working in a radiation area, in plastic suits or replacement material of the fully enveloping type with an independent air supply, will receive $8.10 per day. A day for the purposes of this item shall be defined as any period up to twelve (12) hours.

Article 37

WELDING TESTS

37.1 An existing employee who is required to take a welding test by his Employer will remain in the employ of his Employer while taking such a test and will continue to receive his appropriate pay and all applicable benefits.

New employees required to take the test shall not be paid for the time spent taking the test. New employees who fail the welding tests will be paid the appropriate travel allowance at the applicable rate.

37.2 Results of the welding test shall be given to the welder by his Employer as soon as reasonably possible.

Article 38

STABILIZATION FUND

38.1 All Employers bound by this agreement agree to pay into operative Sheet Metal Workers' Union Stabilization Funds in Locals 562, 473 and 539 established or recognized in the locality by Employers under agreement with the Union for construction work of a related nature.

The Employers will contribute the amounts specified in the wage schedules, attached hereto, for every hour worked by each of their employees within the jurisdictions of Locals 562, 473 and 539.

38.2 In the event that this fund is discontinued for any reason whatsoever, the hourly contributions herein will then become part of the hourly wages of the employee on whose behalf they have been formerly contributed.

Article 39

RADIATION WORK

39.1 (a) Local Union to be provided with a copy of Ontario Power Generation Inc (OPGI) Radiation Protection Regulations and any revisions.

(b) Local Union to be provided with a copy of Ontario Power Generation Inc (OPGI) Radiation Protection Procedures and any revisions.

(c) Each employee will have access to his personal radiation exposure record.

(d) Long-term employees who reach their exposure limit will be given alternate employment until they can resume radiation work.

(e) Short-term employees will be given a guaranteed period of employment at their time of hire.

39.2 Construction Radiation Protection Assistant is a Construction Trades Person who has achieved the full radiation qualification (Green) via the approved Ontario Power Generation Inc (OPGI) Training Program, plus has successfully completed the Construction R.P.A. training and checkouts, also has performed R.P.A. functions while under supervision of a fully qualified Construction R.P.A. to the satisfaction of the Construction Site Safety Officer and the Station Health Physics Unit.

R.P.A. will be paid the appropriate equivalent foreman's rate when performing an R.P.A. function and will report to the Site Safety Unit. An R.P.A. is a "qualification" and not a "trade function" irrespective of Union or trade affiliation.

Article 40

AIR BALANCING

40.1 When air balancing is subcontracted to an independent air balancing contractor, one (1) journeyman sheet metal worker from the Local Union will be supplied to the air balancing contractor by the contractor subcontracting the work.

Article 41

APPRENTICESHIP AND TRAINING PROGRAM

41.1 The Association will identify as far in advance as possible its training needs and communicate those needs to the Local Training Committee. The Association agrees to co-ordinate with the Local Union the specialized training required to accommodate new technology, methods, etc.

Article 42

TERM OF AGREEMENT

42.1 **REV** This Agreement shall continue in full force and effect for a term of four (4) years, from May 1, 2000 to April 30, 2004.

This Agreement shall be considered automatically renewed for successive periods of twelve (12) months commencing May 1, 2004, unless at least sixty (60) days prior to the end of any twelve (12) month period either party serves written notice upon the other that it desires termination, revision, or modification of any provision of this Agreement.

Article 43

ABORIGINAL CONTENT COMMITMENT

Where an aboriginal commitment has been established on a project, the Union will co-operate in meeting the content commitments.

For a project, or jobs within a project, that are less then $100,000 field labour, and have aboriginal content commitments, the terms of this collective agreement will not apply to those aboriginal content commitments.

Dated at Toronto, this *21st* day of *November*, 2000.

For:

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION

Joe Dotchin

Jim Coathup

For:

ONTARIO SHEET METAL WORKERS' CONFERENCE FOR LOCALS 30, 47, 235, 269, 392, 397, 473, 504, 537, 539 and 562

J. Bradshaw

A. Budway

A. McQuillan

T. English

T. Whynott

T. Fenton

S. Cronkright

T. Belleville

R. Zuccala

R. McIntyre

O. Pettipas

F. Kneebone

APPENDIX A

MOOSE RIVER BASIN: NORTHERN ONTARIO

Where the Employer elects to establish a camp, the following conditions will apply for employees working in the Moose River Basin:

Camp Conditions

(a) An Employer may elect to provide free room and board in camp at no cost to the employee. Where the Employer elects to provide a camp such employees will not be entitled to receive a daily travel or room and board allowance.

(b) When an Employer does not elect to provide free room and board in camp, the employee will be entitled to receive a daily travel or room and board allowance as set out in Article 26.

(c) An employee who remains in camp on a normally scheduled work day on which he does not work will be charged $25.00 per day unless he is excused from work for a legitimate reason by the project medical attendant or an authorized representative of his Employer.

(d) An employee who is absent from work without approval and who remains in camp and who is still absent from work the following day without approval will be charged $25.00 for the day of absence and each successive day of unapproved absence.

Hours of Work

(a) The hours of work will consist of a 21 day cycle of fourteen (14) consecutive work days followed by seven (7) consecutive days off.

(b) Regularly scheduled hours of work of ten (10) hours per day shall be paid at straight time hourly rates.

(c) Regularly scheduled hours of work on Saturday, Sunday, Recognized Holidays, and the fifth (5th) consecutive weekday shall be paid at two times the straight time hourly rate.

Wrap Around

An employee shall qualify for a return trip from the project every second twenty-one (21) day cycle he is on the project on the following basis:

(a) If an employee lives within 161 radius kilometres from the project, the Employer shall pay forty dollars ($40.00).

(b) If an employee lives greater than 161 radius kilometres from the project, the Employer shall pay as an allowance, forty dollars ($40.00) plus travel time based on the equivalent of one (1) hours base rate of pay for each eighty (80) radius kilometres, or portion thereof, of travel time to a maximum of 800 kilometres from where the employee lives or place of recruitment, whichever is closer to the project.

APPENDIX B

7-DAY COVERAGE

When working under the provisions of this Appendix, all conditions listed will supersede those contained in the main agreement. Where this Appendix is silent, the appropriate article in the Collective Agreement applies.

This shift schedule is intended for work greater than four (4) weeks in duration; however, it is recognized that unforeseen circumstances may require the cancellation of this schedule.

If in the transition onto or off this 7-day shift schedule, an employee would receive less than 40 paid hours in a pay period, the employee shall receive the difference between the total paid hours for that pay period and 40 hours' pay. This does not apply to those employees who are laid off during or at the end of the schedule.

The employee(s) shift schedule consists of four consecutive shifts (day, afternoon, or night) followed by four scheduled days off. Shift overlap may be required.

Shift work may be established by the Employer to provide seven days per week work coverage, on a one, two, or three-shift per day basis. When this occurs, a specific shift arrangement will be established by the Employer detailing the shift schedule to be worked. The Employer will provide the Union with 48 hours' notice prior to the implementation of these shift provisions.

First Shift

Regularly scheduled hours of work of up to ten (10) hours per shift, Monday to Friday inclusive, shall be paid at straight time hourly rates.

Second Shift

Regularly scheduled hours of work of up to ten (10) hours per shift, Monday to Friday inclusive, shall be paid at straight time hourly rates, plus a shift differential of one-seventh of the straight time hourly rate.

Third Shift

Regularly scheduled hours of work of up to ten (10) hours per shift, Monday to Friday inclusive, shall be paid at straight time hourly rates, plus a shift differential of one-fifth of the straight time hourly rate.

All Shifts

Regularly scheduled hours of work on Saturday, Sunday, Statutory and Recognized Holidays shall be paid at two times the straight time hourly rate. Recognized Holidays will be observed on the actual day on which the holiday occurs or as declared by legislation.

The rate for the shift will be based on the day in which the shift begins.

An unpaid lunch period of one-half hour shall be allowed to be taken no later than five hours after the commencement of a shift.

For employees working regularly scheduled hours, two fifteen (15) minute rest periods will be allotted at a time and location directed by the Employer for employees to rest.

It may be necessary, from time to time, to vary the established shift arrangements. When this occurs, a revised shift arrangement will be established.

Letter of Understanding No. 1

between the

ELECTRICAL POWER SYSTEMS
CONSTRUCTION ASSOCIATION

and the

ONTARIO SHEET METAL WORKERS' CONFERENCE
For
Locals 30, 47, 235, 269, 392, 397, 473, 504
537, 539 AND 562

Local Union Hiring Practices

It has been agreed that employers working under the EPSCA collective agreement will be able to utilize the current Local Union Hiring Hall Practices when they wish to name hire tradespersons.

It is also agreed that an employer may transfer employees from one project to another within the geographic jurisdiction of the Local Union. This provision shall have no sectoral restrictions.

Dated at *Toronto* this *3rd* of May 2000.

Barry Roberts

For:

Electrical Power Systems
Construction Association

Owen Pettipas

For:

Ontario Sheet Metal Workers
Workers' Conference

Letter of Understanding No. 2

between the

ELECTRICAL POWER SYSTEMS
CONSTRUCTION ASSOCIATION

and the

ONTARIO SHEET METAL WORKERS' CONFERENCE
For
Locals 30, 47, 235, 269, 392, 397, 473, 504
537, 539 AND 562

Employment Referrals

It is agreed by the parties to this understanding that, prior to any member being referred for employment under this collective agreement, the member must submit to a security check. Only members who successfully obtain security clearance will be referred to the facility for employment, **subject to Articles 11.6 (b) or Article 30.7.** Once these referrals have been hired on, they will receive on the first paycheque fifty dollars ($50) in consideration of the time and cost associated with the procedure for completing the authorizing forms and submitting to a Security Clearance check.

The union will be notified, as soon as possible, whether or not an individual has successfully obtained security clearance. This pre-clearance process does not prohibit the Union from filing a grievance against the Employer on behalf of any member who is refused employment due to his/her failure to obtain security clearance.

Dated at *Toronto* this *3rd* of May 2000.

Barry Roberts

For:

Electrical Power Systems
Construction Association

Owen Pettipas

For:

Ontario Sheet Metal Workers
Workers' Conference

Letter of Understanding No.3

Between

The Electrical Power Systems Construction Association

And The

Ontario Sheet Metal Workers' Conference
For Locals 30, 47, 235, 269, 392, 397, 473,
504, 537, 539 and 562

It is agreed that an employer may refuse to hire a former employee who has retired and signed a waiver that he/she will not be re-employed. This refusal for employment will be for the duration stipulated in this waiver.

Dated at Toronto, this 3rd day of May 2000.

Barry Roberts

For: Electrical Power Systems Construction Association

Owen Pettipas

For: Ontario Sheet Metal Workers Conference

Letter of Understanding No.4

Between

The Electrical Power Systems Construction Association

And The

Ontario Sheet Metal Workers' Conference
For Locals 30, 47, 235, 269, 392, 397, 473,
504, 537, 539 and 562

HIRING AND MOBILITY REOPENER

The Unions agree that, in the event of legislation being introduced in the ICI sector that would put EPSCA at a disadvantage regarding hiring and mobility, they would reopen negotiations to deal with these issues.

Dated at Toronto, this 3rd day of May 2000.

Barry Roberts

For: Electrical Power Systems Construction Association

Owen Pettipas

For: Ontario Sheet Metal Workers' Conference

MAP CODE:
SM-8

ISSUED:
SEPTEMBER 20, 2002

REVISED:
HOLD - JANUARY 18, 2005

SHEET METAL WORKERS
Local 537
St. Catharines

EPSCA WAGE SCHEDULE FOR PROJECTS WITHIN THE GEOGRAPHIC AREA OF THIS LOCAL (52)

GRADE AND STEP	CLASSIFICATIONS OCCUPATION CODES & EFFECTIVE DATES	BASE HOURLY RATE	VACATION & STAT. HOLIDAY	WELFARE (1)	PENSION (1)	UNION FUNDS (1)	TOTAL WAGE PACKAGE	DEDUCT OSM UDPF (1)	DEDUCT UDPF (1)	EPSCA ASSOC. FUND(1)
93-9	FOREMAN - 445565									
	2004-06-01***	32.96	3.30	1.98	4.35	1.30	43.89	0.21		0.15
	2004-08-01	34.16	3.42	1.98	4.35	1.30	45.21	0.21		0.15
	2005-05-01	35.16	3.52	1.98	4.35	1.30	46.31	0.21		0.15
	2006-05-01	36.26	3.63	1.98	4.35	1.30	47.52	0.21		0.15
93-8	SUBFOREMAN - 445555									
	2004-06-01***	31.46	3.15	1.98	4.35	1.30	42.24	0.21		0.15
	2004-08-01	32.66	3.27	1.98	4.35	1.30	43.56	0.21		0.15
	2005-05-01	33.66	3.37	1.98	4.35	1.30	44.66	0.21		0.15
	2006-05-01	34.76	3.48	1.98	4.35	1.30	45.87	0.21		0.15
93-6	JOURNEYMAN AND WELDER - 445535									
	2004-08-01	30.91	3.09	1.98	4.35	1.30	41.63	0.21		0.15
	2005-05-01	31.91	3.19	1.98	4.35	1.30	42.73	0.21		0.15
	2006-05-01	33.01	3.30	1.98	4.35	1.30	43.94	0.21		0.15
	APPRENTICE - 445515									
93-0	1st Period (40% of Journeyman)									
	2004-08-01	12.17	1.22	1.98	0.75	0.70	16.82	0.21		0.15
	2005-05-01	12.57	1.26	1.98	0.75	0.70	17.26	0.21		0.15
	2006-05-01	13.01	1.30	1.98	0.75	0.70	17.74	0.21		0.15
93-1	2nd Period (50% of Journeyman)									
	2004-08-01	15.89	1.59	1.98	0.75	0.80	21.01	0.21		0.15
	2005-05-01	16.39	1.64	1.98	0.75	0.80	21.56	0.21		0.15
	2006-05-01	16.94	1.69	1.98	0.75	0.80	22.16	0.21		0.15
93-2	3rd Period (60% of Journeyman)									
	2004-08-01	19.61	1.96	1.98	0.75	0.90	25.20	0.21		0.15
	2005-05-01	20.21	2.02	1.98	0.75	0.90	25.86	0.21		0.15
	2006-05-01	20.87	2.09	1.98	0.75	0.90	26.59	0.21		0.15

(1) = per hour worked; (2) = per hour paid

*** - Foremen and Subforemen's hourly base rate had been increased on June 1st, 2004 ($3.25 and $1.75 - add up from the journeymen's 2003-05-01 hourly base rate).

MAP CODE:
SM-8

ISSUED:
SEPTEMBER 20, 2002

REVISED:
HOLD - JANUARY 18, 2005

SHEET METAL WORKERS
Local 537
St. Catharines

EPSCA WAGE SCHEDULE FOR PROJECTS WITHIN THE GEOGRAPHIC AREA OF THIS LOCAL (52)

GRADE AND STEP	CLASSIFICATIONS OCCUPATION CODES & EFFECTIVE DATES	BASE HOURLY RATE	VACATION & STAT. HOLIDAY	WELFARE (1)	PENSION (1)	UNION FUNDS (1)	TOTAL WAGE PACKAGE	DEDUCT OSM UDPF (1)	DEDUCT UDPF (1)	EPSCA ASSOC. FUND(1)
93-3	**4th Period (70% of Journeyman)**									
	2004-08-01	23.34	2.33	1.98	0.75	1.00	29.40	0.21		0.15
	2005-05-01	24.04	2.40	1.98	0.75	1.00	30.17	0.21		0.15
	2006-05-01	24.81	2.48	1.98	0.75	1.00	31.02	0.21		0.15
93-4	**5th Period (80% of Journeyman)**									
	2004-08-01	27.06	2.71	1.98	0.75	1.10	33.60	0.21		0.15
	2005-05-01	27.86	2.79	1.98	0.75	1.10	34.48	0.21		0.15
	2006-05-01	28.74	2.87	1.98	0.75	1.10	35.44	0.21		0.15
94-9	**FOREMAN SHEETER/DECKER - 445566**									
	2004-06-01***	32.78	3.28	1.98	4.35	1.30	43.69	0.21		0.15
	2004-08-01	33.98	3.40	1.98	4.35	1.30	45.01	0.21		0.15
	2005-05-01	34.98	3.50	1.98	4.35	1.30	46.11	0.21		0.15
	2006-05-01	36.08	3.61	1.98	4.35	1.30	47.32	0.21		0.15
94-8	**SUBFOREMAN SHEETER/DECKER - 445556**									
	2004-06-01***	31.28	3.13	1.98	4.35	1.30	42.04	0.21		0.15
	2004-08-01	32.48	3.25	1.98	4.35	1.30	43.36	0.21		0.15
	2005-05-01	33.48	3.35	1.98	4.35	1.30	44.46	0.21		0.15
	2006-05-01	34.58	3.46	1.98	4.35	1.30	45.67	0.21		0.15
94-6	**SHEETER/DECKER AND WELDER - 445536**									
	2004-08-01	30.73	3.07	1.98	4.35	1.30	41.43	0.21		0.15
	2005-05-01	31.73	3.17	1.98	4.35	1.30	42.53	0.21		0.15
	2006-05-01	32.83	3.28	1.98	4.35	1.30	43.74	0.21		0.15
94-5	**SHEETER ASSISTANT - 445527**									
	2004-08-01	29.37	2.94	1.98	4.35	1.24	39.88	0.21		0.15
	2005-05-01	30.37	3.04	1.98	4.35	1.24	40.98	0.21		0.15
	2006-05-01	31.47	3.15	1.98	4.35	1.24	42.19	0.21		0.15
95-6	**MATERIAL HANDLER - 445526**									
	2004-08-01	27.34	2.73	1.98	4.35	1.14	37.54	0.21		0.15
	2005-05-01	28.34	2.83	1.98	4.35	1.14	38.64	0.21		0.15
	2006-05-01	29.44	2.94	1.98	4.35	1.14	39.85	0.21		0.15

(1) = per hour worked; (2) = per hour paid

MAP CODE:
SM-8

ISSUED:
SEPTEMBER 20, 2002

REVISED:
HOLD - JANUARY 18, 2005

SHEET METAL WORKERS
Local 537
St. Catharines

EPSCA WAGE SCHEDULE FOR PROJECTS WITHIN THE GEOGRAPHIC AREA OF THIS LOCAL (52)

GRADE AND STEP	CLASSIFICATIONS OCCUPATION CODES & EFFECTIVE DATES	BASE HOURLY RATE	VACATION & STAT. HOLIDAY	WELFARE (1)	PENSION (1)	UNION FUNDS (1)	TOTAL WAGE PACKAGE	DEDUCT OSM UDPF (1)	DEDUCT UDPF (1)	EPSCA ASSOC. FUND(1)
93-5	PROBATIONARY EMPLOYEE - 445525									
	2004-08-01	22.65	2.27	1.98	1.50	0.80	29.20	0.21		0.15
	2005-05-01	23.65	2.37	1.98	1.50	0.80	30.30	0.21		0.15
	2006-05-01	24.75	2.48	1.98	1.50	0.80	31.51	0.21		0.15

(1) = per hour worked; (2) = per hour paid

OVERTIME

Mon-Fri: Scheduled Work Days - 1 1/2 times for up to and including 2 hours beyond the normal daily scheduled number of hours. This applies for both a 4 day x 10 hours per day schedule and a 5 day by 8 hour per day schedule. For overtime worked in excess of the 2 overtime hours per day at 1 1/2, the overtime rate shall be 2 times the basic hourly rate. Non-Scheduled Work Days - 2 times for all hours worked.

Sat: 2 times for all hours worked.

Sun & Hol: 2 times for all hours worked.

DEDUCTIONS

Deductions include the following items:

Ontario Sheet Metal Union Dues Promotion Fund (OSMUDPF) - $0.21 per hour worked

These deductions are to be sent to the following location:

Ontario Sheet Metal Workers' and Roofers' Conference
1312 Hurontario Street
MISSISSAUGA, ON
L5G 3H3

Both the OSM UDPF and the UDPF (when listed as a deduction rather than a contribution) are to be deducted like a dues deduction, that is, from the Base Hourly Rate.

Note that these amounts are not included in either UNION DUES or CONTRIBUTIONS.

CONTRIBUTIONS AND UNION DUES

Neither Contributions (e.g. Pension, Welfare, Stabilization Fund, etc.) nor Union Dues are included in DEDUCTIONS.

Contributions:

Special Dues -	$0.18	per hour worked
Stabilization Fund -	$1.00	per hour worked (varies with classification)
Provincial Training Trust Fund -	$0.12	per hour worked

Union Dues:

This Local has no Union Dues Checkoff.

Provincial Training Trust Fund should be forwarded to the following location:

Peterson Goh Paganelli
390 Bay Street, Suite 501
TORONTO, ON
M5H 2Y2

Other Contributions should be forwarded to the following location:

Local 537 Funds Administrator
479 Main Street, East
HAMILTON, ON
L8N 1K1

Tel: 905-528-2407
Fax: 905-528-7241

GEOGRAPHIC AREA: Western Boundary: That portion of Niagara(RM) and Haldimand-Norfolk(RM) east of a line from Grimsby Beach formed by RR#14 then south on RR#16 to RR#63 then south on RR#17 then west on Hwy 3 to Haldimand RR#9 then westerly on RR#17 to a po

Insulators

COLLECTIVE AGREEMENT

between

THE ELECTRICAL POWER SYSTEMS

CONSTRUCTION ASSOCIATION

and the

INTERNATIONAL ASSOCIATION OF HEAT

AND FROST INSULATORS AND ASBESTOS WORKERS

May 1, 2000 – April 30, 2004

EPSCA/INTERNATIONAL ASSOCIATION OF HEAT AND FROST INSULATORS' AND ASBESTOS WORKERS' COLLECTIVE AGREEMENT

GENERAL NOTE

This Collective Agreement distinguishes between two broad categories of work; namely, work that is covered by the *"modified provisions"* of this construction agreement and work that is not. *"Modified provisions"* apply to <u>all</u> work on Hydro One (Lines & Stations) and <u>most</u> work on existing generating sites. Following is a more detailed explanation:

The *"Modified Provisions"* of this Construction Agreement will apply to:

(a) all work on Hydro One (Lines and Stations), and

(b) all work on existing generating sites <u>except</u> the construction of:
- **a new facility which provides a new function**
- **a new (i.e. additional) generating unit**

Appendix D - contains the *"Modified Provisions of this Construction Agreement"*. All terms of this collective agreement shall apply to work covered by Appendix D, with the exception of Article 24 - Generation Projects Daily Travel Allowance and Room and Board and Article 35 - Hours of Work. Articles 24 and 35 do not apply when working under the terms and conditions of the *"modified provisions"*, as they are replaced by Sections 1 and 2 respectively.

When work does not fall within the definition of Appendix D, all terms of this agreement, with the exception of Appendix D, apply.

EPSCA/INTERNATIONAL ASSOCIATION OF HEAT AND FROST INSULATORS' AND ASBESTOS WORKERS' COLLECTIVE AGREEMENT

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EPSCA/INTERNATIONAL ASSOCIATION OF HEAT AND FROST INSULATORS' AND ASBESTOS WORKERS' COLLECTIVE AGREEMENT

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COLLECTIVE AGREEMENT

by and between

THE ELECTRICAL POWER SYSTEMS CONSTRUCTION ASSOCIATION
(hereinafter called "EPSCA")

and the

INTERNATIONAL ASSOCIATION OF HEAT AND FROST INSULATORS AND ASBESTOS WORKERS
(hereinafter called the "Union")

WHEREAS EPSCA is an Association formed to represent Employers in collective bargaining and on their behalf enter into collective agreements covering those of their employees in the bargaining unit as hereinafter defined;

AND WHEREAS the Union and the Association desire to mutually establish and stabilize wages, hours and working conditions for journeymen and apprentices employed by Employers within the Electrical Power Systems Sector of the construction industry, in the Province of Ontario and further to encourage closer co-operation and understanding between the Association and the Union to the end that a satisfactory, continuous and harmonious relationship will exist between the parties to this Agreement;

NOW THEREFORE the parties hereby agree as follows:

Article 1

RECOGNITION

1.1 EPSCA recognizes the Union as the exclusive bargaining agency for a bargaining unit comprising employees as defined in Article 1.3 engaged in all construction industry work* performed in the Province of Ontario on Ontario Power Generation Inc. and Hydro One property for the bulk power system, save and except the building of commercial-type office facilities at urban locations remote from operating facilities.

For the purpose of clarity, the bulk power system comprises generating stations, hydraulic works, heavy water facilities, transmission lines (voltages over 50 kV), transmission stations, microwave and repeater stations.

1.2 The Union recognizes EPSCA as the exclusive bargaining representative for all Employers in respect of work performed by their respective employees in the bargaining unit set forth in Article 1.1.

1.3 The term "employee" shall include all employees of the Employers in the classifications set out below:

Insulating Mechanic
Apprentice
Temporary Help
Subforeman
Foreman
Working Foreman

1.4 Working Foreman

Foremen working within their local geographic area may work with the tools upon mutual agreement of the Employer and union when the crew size is 5 or less.

Article 1.4 is applicable only to work at Existing Generating Sites where work involves construction of a new facility (new function) and/or new (additional) generating unit(s) and at New Generating Sites (ie: Greenfield Work).

For work at Hydro One and at Existing Generating Sites excluding work involving construction of a new facility (new function) and/or new (additional) generating unit(s) please refer to Appendix D, Section 5 – Modified Provisions of this Construction Agreement.

* ***For the purpose of The Electrical Power Systems Construction Association, the work performed is deemed to be under the responsibility of the Engineering and Construction Services Branch. The work encompasses:***

- ***construction of new facilities***
- ***additions to existing facilities***
- ***major - modifications***
  - ***rehabilitation***
  - ***reconstruction of existing facilities***

1.5 The term "Employers" shall include individual members of EPSCA and any company, partnership, sole proprietorship, joint venture, contractor, subcontractor or any person that is bound by the terms and conditions of this Agreement.

1.6 EPSCA and the Union agree that the use of nomenclature is meant to refer to both genders.

Article 2

FOREMEN

2.1 It is understood that foremen hold a key position in the relationship between the Employers and the Union. Both parties agree that every effort should be made to recruit and retain foremen who have a high degree of efficiency in the performance of their jobs and in the handling of their men. Recognizing the responsibilities involved in being a supervisor and a member of a Union, the Employers and the Union will make every effort to minimize problems that may arise which concern the relationship between the foremen, the Employers and the Union.

2.2 Foremen are the first level of management supervision and, as such, are management representatives. In this capacity, they will exercise duties and responsibilities, as established by their Employers, and will not work with the tools of the trade, except as provided for in the working foreman classification.

The parties recognize the responsibility of foremen to discharge their managerial duties. If the Union feels that a foreman is not discharging his managerial duties in a manner that is fair, equitable and without bias, or if an Employer feels that the Union is interfering with a foreman in the performance of his managerial duties, the Employer or the Union may refer the problem to the Project Committee for resolution. If the matter cannot be resolved by the Project Committee, the grievance procedure may be invoked by either party.

2.3 The selection and retention of foremen will be the responsibility of the Employers. When making appointments to the foreman level, the Employers will give consideration to those journeymen they presently employ. The appointment of foremen in charge of composite or mixed crews will take into account the nature of the work to be done.

2.4 Wages

The rates of pay for foremen shall be the greater of:

(i) $3.00 per hour above the journeyman rate; or

(ii) the Employer's current practice; or

(ii) the rate negotiated in appropriate local agreements.

2.5 Mobility

To maintain efficiency and productivity, an Employer shall have the right to move foremen from construction site to construction site, as determined at the pre-job conference.

2.6 Tools and Clothing

On a charge-out basis, the Employer shall supply foremen with protective clothing appropriate for the conditions under which the work is being done.

Foremen shall be accountable, but not liable, for gang tools used by their crew.

Article 3

ACCREDITED UNION REPRESENTATIVES

3.1 The senior representative of the Union will designate local union representatives as Accredited Union Representatives to handle the day-to-day administration of this Agreement on the basis of not more than two representatives for each Major Project and a suitable number for the Construction and Services Division. The Union will notify the General Manager of EPSCA, in writing, of the names of such Union representatives, or alternates in the event of illness or unavailability, so that they may be issued identification cards to permit entry to the site. Such representatives, after identifying themselves to the EPSCA representative upon entering the job site, will be free to observe the progress and conduct of the work and to conduct normal union business. The Union undertakes that these representatives will not hinder or interfere in any way with the said work.

3.2 An Accredited Union Representative may be appointed by the International Representative to be his designate in matters requiring the involvement of the International Representative.

The International Representative will inform EPSCA, in writing, of the name, duration of, appointment and function of such designate.

Article 4

UNION STEWARDS

4.1 Accredited Union Representatives shall inform the appropriate EPSCA Representative and the Employer of the steward, in writing, of the names of all stewards, one of whom shall be designated Chief Steward, as they are appointed and when they cease to act as stewards. A steward, other than a Chief Steward, shall exercise his duties only in respect to employees of his Employer. A Chief Steward, in order to carry out his duties in respect to employees of other than his Employer, shall first involve the EPSCA Representative. A steward shall obtain permission from his immediate supervisor before leaving his work area for union business. Such permission shall not be unreasonably denied.

Except at Bruce Nuclear Power Development (BNPD):

Only in situations where an accredited Union Representative is unable to attend pre-job and/or mark-up meetings, may the Chief Steward be designated and attend, as part of the Chief Steward's duties, on behalf of the accredited union representative.

4.2 The Union shall receive written notice before the employment of a steward is terminated by his Employer, and provided the steward is able to perform the work required, he will be the last employee to be retained by his Employer in a layoff/standoff situation.

4.3 The Chief Steward will be informed of all overtime and shall be given the opportunity to work. In the event he declines the work he shall be responsible to designate a steward to work the overtime who is qualified to perform the available work.

4.4 No foreman or subforeman shall be permitted to act as a steward.

Article 5

ADVANCE NOTICE

5.1 EPSCA will advise the Union of all new Generation Station Projects and Hydro One - Lines and Stations Construction Projects coming under the provisions of this Agreement for the construction field forces of the Employers.

Upon the request of the Union, EPSCA will convene a prejob conference before work commences to discuss preliminary details of the proposed work to be performed and to establish conditions in accordance with this Agreement for the project. EPSCA will record the minutes of prejob conferences and forward them within fifteen (15) working days to the Union.

5.2 Subsequent prejob conferences will be convened by EPSCA before specific portions of work commence to discuss the final details of the work and to establish conditions in accordance with this agreement for that work.

5.3 EPSCA will provide written notice to the Union as far in advance as possible of new work and prejob conferences as noted in Articles 5.1 and 5.2 above. For work of less than one week's duration and requiring five (5) or less employees, prejob meetings must be arranged with as much advance notice as possible by the office of the General Manager of EPSCA, but without formal notice, in writing, unless the prejob meeting has been waived by the parties.

Article 6

WORK ASSIGNMENT

6.1 The jurisdiction of the Union shall be that jurisdiction established by Agreements between International Unions claiming the work or Decisions of Record recognized by the AFL-CIO for the various classifications and the character of work performed, having regard for the special requirements of thermal, nuclear or hydraulic generation and transmission and transformation construction. An Agreement or Decision of Record is one that is published by the Building and Construction Trades Department, AFL-CIO (Agreement and Decisions Rendered Affecting the Building Industry).

Where no Decision or Agreement applies, the Employer agrees to consider evidence of established practices within the industry when making jurisdictional assignments.

6.2 (a) A markup process will be utilized when an Employer intends to perform work on a project site*. The purpose of this markup process is to indicate to the Union the work which is planned to be carried out by the Employer in order to minimize the potential for jurisdictional disputes.

(b) When work is to be performed on a project site and it meets the following criteria: same employer, same work, same project site, the markup process will not be required. This procedure shall not preclude a Union's right to contest previously disputed work.

In the Electricity Production Zones when work falls within this criteria the EPSCA Office will send out a "Notification of Work" along with a copy of the original minutes of mark-up meeting(s) to the Local Unions prior to work commencing. This procedure shall not preclude the Union's right to contest previously assigned work, if the work is in a Local Union jurisdiction other than the one it was marked up in.

(c) When an Employer has work that is less than a 3 week duration and there are ten (10) or fewer employees covered by EPSCA Collective Agreements employed on this specific work, the Union will be notified of the scope of work and the Employer's proposed work assignments. The Union will have two (2) weeks from the date of notification to submit jurisdictional claims and supporting evidence to the Employer for consideration. The Employer will notify the Union of the final work assignments prior to the commencement of the work.

(d) All work that does not meet the criteria set out in clauses 6.2(b) or 6.2(c) will be reviewed and assigned at a markup meeting.

(e) EPSCA will provide written notice to the Union as far in advance as possible of markup meetings. The Union may attend these markup meetings, and every effort will be made to settle questions of jurisdiction before the work is expected to commence.

* ***For the purposes of this Article, Nanticoke, Lambton, Lakeview/Hearn, BNPD, Pickering, Darlington, Hydro One (Lines and Stations) and the five (5) Electricity Production Zones are each considered individual project sites***

(f) The Employer who has the responsibility for the work shall make a proposed assignment of the work involved. The Employer shall be responsible for providing copies of proposed assignments to the Unions in attendance at the markup meeting. The Employer will specify a reasonable time limit for the Unions involved to submit evidence of their claims. The Employer will evaluate all evidence submitted and make a final assignment of the work involved. This final assignment will be in accordance with the procedural rules established by the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry. The Employer will advise the Unions of the final assignments prior to the work commencing.

(g) The EPSCA representative will record the proposed assignments and jurisdictional claims and forward a copy of them within fifteen (15) working days to the Unions.

(h) The parties recognize that circumstances may arise, particularly with discovery and emergency work, where the process set out above may not be practical or possible, however reasonable effort will be made by the Employer to adhere to the appropriate trade jurisdiction.

Article 7

JURISDICTIONAL DISPUTES

7.1 (a) In the event there is a jurisdictional dispute which cannot be settled on a local basis by the Unions involved, it shall be submitted to the International Unions involved for settlement without permitting it to interfere in any way with the progress of the work at any time.

Any Union shall have the right to elect to pursue or respond to any jurisdictional disputes at the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry. In the event the Union elects to pursue or respond to the jurisdictional disputes at the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry, clauses 7.1(b), 7.2, 7.3, and 7.4 will apply.

In the event another Union (or other Unions) not signatory to this collective agreement has (have) the option to pursue jurisdictional disputes at the Ontario Labour Relations Board, the Union shall have the right to pursue or respond to any jurisdictional disputes at the Ontario Labour Relations Board when these Unions are involved in the jurisdictional dispute.

In the event the Union elects to pursue or respond to the jurisdictional dispute at the Ontario Labour Relations Board, clauses 7.1(b), 7.2, 7.3, and 7.4 will NOT apply.

(b) In the event that a jurisdictional dispute arises over a work assignment, the Employer will make an assignment for the work in dispute in accordance with the Procedural Rules and Regulations of the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry. Any Union which protests that a contractor has failed to assign work in accordance with the procedures specified above, shall remain at work and process the complaint through its international office. The parties will settle such jurisdictional dispute in accordance with procedure as outlined by the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry of the Building Trades Department, AFL-CIO or any successor agency of the Impartial Jurisdictional Disputes Board authorized by the Building Trades Department.

7.2 In the event the dispute is not settled by the International Unions involved, it shall then be submitted to the Administrator of the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry for resolution. In the event that the International Office of the Union elects not to file with the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry, EPSCA agrees to file the dispute at the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry at the request of the International Representative of the Union. Those Unions and Employers involved shall advise the Union and EPSCA respectively, in writing, of an intent to submit a jurisdictional dispute to the Impartial Jurisdictional Disputes Board and will identify the work in question. An arbitration decision under the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry will be final and binding to the parties to this Agreement with no further recourse to the Ontario Labour Relations Board on the issue decided by the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry.

7.3 EPSCA shall have direct recourse to the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry when the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry has under its consideration a dispute involving the assignment of work being done by employees who are covered by this Agreement.

7.4 In the event that an arbitration decision under the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry is not rendered within sixty (60) days of the disputed assignment being referred to the Plan, EPSCA and/or the Union shall have recourse to the Ontario Labour Relations Board for a decision provided it is processed as a jurisdictional dispute.

7.5 When a jurisdictional dispute exists in the electrical power systems sector, upon request by the International Representative of either of the Unions involved, Employers shall furnish the International Representative with a letter from a duly authorized official of the Employer on the Employer's stationery, stating that the Union requesting the letter was employed on specific types of work on a given project. The Union requesting the information will supply the Employer with the name of the other Union involved in the dispute and the Employer will provide that Union's International Representative with a copy of the letter being given to the requesting Union.

When a jurisdictional dispute exists in the electrical power system sector between Unions and upon written request by the International Representative of the Union, the Employer shall supply the International Representative of the Union involved with a copy of the evidence submitted by the other Union(s) involved along with drawings and/or prints plus a description of the work or process in dispute.

7.6 In the event the Union elects to pursue or respond to the Jurisdictional Dispute at the Ontario Labour Relations Board as governed by 7.4 above, the arbitration board panel appointed by the Ontario Labour Relations Board pursuant to the Act is not authorized to award damages in respect of a mis-assignment of work only in circumstances where the other union(s) involved in the proceedings is (are) equally restricted in their ability to claim for damages. However this clause 7.6 shall not apply where the Jurisdictional Dispute and the mis-assignment of work involves the same employer and the same work, and on the same job previously the subject of a Jurisdictional Dispute before the Ontario Labour Relations Board or the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry.

7.7 The board panel appointed by the Ontario Labour Relations Board will govern its decision pursuant to its normal criteria.

7.8 In the event the Union elects to pursue or respond to the Jurisdictional Dispute at the Ontario Labour Relations Board as governed by 7.4 above, the decision of the panel of the Ontario Labour Relations Board will be final and binding upon the parties to this agreement with no further recourse to the Plan on the issue decided by the Ontario Labour Relations Board.

Article 8

UNION SECURITY

8.1 UNION MEMBERSHIP

(a) Employees

As a condition of employment, all employees covered by this Agreement shall either be members of, or will apply for membership in the Union within seven (7) days of employment. It shall also be a condition of continued employment that employees maintain their union membership in good standing.

(b) Foremen

As a condition of employment, all foremen covered by this Agreement shall either be members of, or will apply for membership in the Union within seven (7) days of employment. It shall also be a condition of continued employment that foremen maintain their union membership in good standing.

8.2 CHECKOFF

The Employers shall deduct union initiation fees and dues from their employees' and foremen's wages. Such fees and dues will be deducted weekly or monthly and transmitted to the designated officials of the Union, on or before the 15th day of the month following the month in which deductions are made, together with full checkoff lists of employees and foremen subject to checkoff.

The Union shall indemnify EPSCA and the Employers for any liability arising from the deduction of initiation fees and dues.

The Union, through its International Office, will notify EPSCA, in writing, of the appropriate initiation fees and Union dues and of any changes to such fees and dues. Within three (3) weeks of receipt of an acceptable written notice, any changes to such fees and dues will be implemented. The effective date will be the date of implementation.

The Employer will check off initiation fees on receipt from the Union of authorization signed by the employee.

8.3 The Union may designate dues from any of the following options:

- a fixed dollar amount per month,
- a fixed percentage of vacationable gross earnings per month,
- a fixed cents per hour worked or paid,
- a fixed cents per hour worked or paid plus a fixed dollar amount per week or month,
- a fixed dollar amount per month plus a percentage of vacationable gross earnings.

Regardless of the option selected, the Employer will only remit monies to a single location. Any redistribution is the responsibility of the Union. By mutual agreement with the Union, an Employer may elect to continue current administrative practices relative to the deduction of union dues.

Article 9

BENEFITS

9.1 The Employer agrees to pay into operative welfare, pension and supplementary unemployment benefit plans the amount specified for welfare, pension, and supplementary unemployment benefits as set forth in the wage schedules, attached hereto, for employees covered by this agreement.

9.2 The Union agrees to supply the Employer with all information regarding the welfare, pension and supplementary unemployment benefit plans and also all administrative material that is required for the implementation of them.

9.3 Any changes in welfare, pension or S.U.B. plan contributions recognized under this Agreement will be confirmed, in writing, by the Union to EPSCA before such changes are put into effect. Within three (3) weeks of receipt of an acceptable written notice, such changes will be implemented. The effective date will be the date of implementation. Should the welfare or pension plan contributions change during the term of this Agreement, then an adjustment may be made to the base rate. The total wage package will not be changed.

9.4 In the event an Employer is more than fifteen (15) days in arrears of the requirement to forward contributions and/or deductions to the Trustees by the fifteenth of the month following, the Employer shall pay as liquidated damages and not as a penalty an amount equal to two (2%) percent (equivalent to 24%) per annum for each month or part thereof that the contributions and/or deductions are in default for greater than fifteen (15) days provided the Employer has received five (5) days' written notice to correct such default. The trustees may require a delinquent Employer to pay for the costs, legal or otherwise, of collecting the amount owing, as outlined in the operative benefit plan trust documents.

9.5 The Trustees of the Employee Benefit Plans referred to in this Collective Agreement shall promptly notify the Union of the failure by the Employer to pay any employee benefit contributions required to be made under this Collective Agreement and which are owed under the said plans in order that the program administrator of the Employee Wage Protection Program may deem that there has been an assignment of compensation under the said program in compliance with the Regulation to the *Employment Standards Amendment Act, 1991* in relation to the Employee Wage Protection Program.

Article 10

EMPLOYMENT

10.1 (a) For purposes of this Article, a geographic area will be established for each Major Project and geographic areas for the Construction and Services Division. The size of these geographic areas will be dependent upon the location of the work and the trade concerned.

(b) The boundaries of the geographic areas will be jointly established at prejob conferences.

10.2 An office will be established by EPSCA, or the Employer with the approval of EPSCA, for each Major Project and the Construction and Services Division. A purpose of this office will be to co-ordinate employment as specified in this Article.

10.3 EPSCA, or the Employer with the approval of EPSCA, and the Union will exchange the names of their representatives in each of the areas described in 10.1(a), who will be responsible for co-operating in the referral and employment of reliable and competent union members.

10.4 EPSCA, or the Employer with the approval of EPSCA, will notify the Union of future manpower requirements for all employees coming within the scope of this Agreement.

10.5 Employers reserve the right to transfer employees from one location to another to effectively utilize their special skills, having regard for the special requirements of thermal, nuclear or hydraulic generation and transmission and transformation construction.

Where possible, the number of key tradesmen to be transferred shall be determined at a pre-job conference.

The employers reserve the right to transfer employees providing these employees are from the same listed municipality union hiring hall where the project is located.

10.6 The employment of additional tradesmen and apprentices, excluding key tradesmen and employees transferred to the project, shall be carried out on the following basis and sequence:

(i) Referrals from the out of work list up to the number of transferred employees

(ii) Fifty percent (50%) name-hire from the local municipal hiring hall

(iii) The EPSCA office, or the Employer with the approval of EPSCA, will request the local union office for tradesmen and apprentices required. The request will include a description of the work, the number of qualified tradesmen and apprentices required, and the name of the Employer for whom the tradesmen and apprentices will be working.

(iv) The Union members who are resident in the designated geographic area will be referred by the Union for employment through the EPSCA office. As much as their out-of-work lists will permit, the Unions will supply members on a fan-out basis from the project or work location.

The Employers will either hire such persons or substantiate their reasons, in writing, for not doing so.

The Union will co-operate with the Employer and advise the EPSCA office of the name, address and telephone number of members being referred for work with Hydro One (Lines and Stations Construction) as soon as they are known.

(v) If, after a request has been made, the Union is unable to supply sufficient tradesmen and apprentices to meet the manpower requirements of the Employers, the Employers may employ tradesmen and apprentices who are resident within the geographic area. Such tradesmen and apprentices shall comply with the requirements of Article 8 of this Agreement. EPSCA shall promptly notify the Accredited Union Representative, in writing, of the names, addresses, date of hire, social insurance numbers, telephone numbers, job location and classification of the persons hired.

(vi) Once the supply of suitable tradesmen and apprentices within the geographic area has been exhausted and additional tradesmen and apprentices are required, EPSCA will contact the International Representative for the trade concerned, or his designee, in order to determine whether suitable union tradesmen and apprentices are available outside of the geographic area. EPSCA will co-operate in providing employment to such union tradesmen and apprentices on the basis that they be supplied from the nearest location where they are available.

10.7 Notwithstanding the provisions of Articles 10.5 and 10.6, re-employment as required by the Workers Compensation Board shall not be a violation of this collective agreement nor be subject to the provisions of Articles 27 and 28.

Article 11

EMPLOYMENT - EMERGENCY SITUATIONS

11.1 When the Union has failed to supply the required number of competent and qualified employees (including the appropriate term apprentices for asbestos removal) after two (2) working days following a written request by an Employer, the Employer may declare that an emergency situation exists. Notice of such declaration shall be made, in writing, or by telegram to the Union.

When an emergency situation is declared the Employer shall have the right to procure workmen from available sources other than the Union on jobs located within the geographic jurisdiction of the Union. Immediately upon being hired, such employees shall be classified as temporary help.

11.2 An emergency situation shall be deemed terminated when the Union has notified the Employer of the Union's ability to fulfill the Employer's manpower requirements. The Employer shall agree to hire such available Union members and agree to lay off temporary help within two (2) working days of such notice.

11.3 The Employer shall notify the Union each time a temporary employee is hired. Upon receiving such notice the Union will immediately issue referral cards to the Employer on behalf of such employees.

Article 12

EMPLOYMENT - ASBESTOS REMOVAL OPERATIONS

12.1 Asbestos removal work shall be performed by crews of mechanics and apprentices maintaining a one (1) to five (5) ratio. The first hire must be a mechanic. Every crew of (5) apprentices shall consist of a maximum of one (1) 4th year, and a minimum of two (2) 1st year (or 2 temporary helpers). Any deviation from the above mix must be approved in advance by the local EPSCA representative.

12.2 If the total crew size is less than six (6) on any job, the apprentice crew mix will be mutually agreed upon by the Union, Employer and the local EPSCA representative.

12.3 In the event the Union is unable to provide the required manpower as provided in the above paragraph, Article 11 of this Agreement will apply.

Article 13

LAYOFF PROCEDURE

13.1 In the event of a reduction of staff, the Employer shall layoff employees in the following sequence:

(i) Temporary Help
(ii) Travel Card Members from Out-of-Province
(iii) Members of Local Union

During a reduction of staff, the normal ratio of apprentices to journeymen shall be maintained.

Article 14

WAGES

14.1 Effective May 1, 2000 and until April 30, 2004, the rates of pay for employees in the classifications listed in Article 1 of this Appendix shall be as set forth in the wage schedules, attached hereto.

14.2 The rate for subforemen covered by this Agreement shall be the appropriate mechanic rate plus $1.50 per hour and shall be set forth in the wage schedules, attached hereto.

Article 15

SHIFT DIFFERENTIAL

15.1 Employees required to work shift work other than the regular day shift will receive a shift differential of one-seventh (1/7) for normal scheduled shift hours worked.

Employees required to work shift work on the third shift of a three shift operation shall receive a shift differential of one-fifth (1/5) for normal scheduled hours worked.

Article 16

OVERTIME RATES

16.1 Overtime will be paid at two times the basic rate for work performed outside of normal hours as defined in the "Hours of Work" article of this Agreement and for work performed on Saturday, Sunday and the Statutory Holidays listed in Article 24 of this Agreement. Overtime rates shall be set forth in the wage schedules, attached hereto.

Article 17

PAY PROCEDURE

17.1 NORMAL

(a) Employees shall be paid weekly and payment for any given week will be made not later than the sixth working day after the close of the payroll period, but in any event not later than Thursday of the following week. Except as provided for in 17.1(c) employees who are at work on Thursday and are not paid will be paid on Friday. Such employees will be released one (1) hour, with pay, prior to normal quitting time on Friday to enable them to cash their cheque.

(b) Wages shall be paid by the Employers on the job site, before quitting time, in cash or by cheque, payable at par in the locality of the job site. Accompanying each payment of wages shall be a statement, in writing, which can be retained by the employee, setting forth:

(i) the period of time or the work for which the wages are being paid;
(ii) the rate of wages to which the employee is entitled;
(iii) the amount of wages to which the employee is entitled;
(iv) the amount of each deduction from the wages of the employee and the purpose for which each deduction is made;
(v) any allowance or other payment to which the employee is entitled;
(vi) the amount of vacation pay for which the employee is being credited;
(vii) the amount of statutory holiday pay for which the employee is being credited; and
(viii) the net amount of money being paid to the employee.

(c) In cases of inclement weather being declared on payday, employees will receive their pay before leaving the site provided it is available on the site.

17.2 ON TERMINATION

(a) An employee who voluntarily terminates his employment will be provided his final pay on the next regular payday.

(b) An employee who is laid off from a Generation Project will have his final pay and termination documents mailed to his last known address on file with the Employer by Priority Post within five (5) working days of termination. An employee who is laid off from a Hydro One (Lines and Stations) construction site will have his final pay and termination documents mailed to his last known address on file with the Employer within eight (8) working days of termination. This does not preclude an employee being issued his final pay and termination documents on the job prior to the five or eight-day period. After 48 hours of notifying the Employer, the Employee will be entitled to four (4) hours at straight time for each normal workday for which there is non-compliance thereafter.

(c) An employee who is discharged shall be provided with his final pay immediately if the Employer's pay facilities are on site or as per 17.2 (b) if the Employer's pay facilities are not on site.

(d) Employers will provide one hour's notice of layoff or one hour's pay in lieu of notice to employees who are to be laid off.

When possible, the Employer shall notify the Local Union three (3) days prior to layoff.

(e) When an employee is laid off, he will be paid for a reasonable amount of time by the Employer if he is required to travel or wait unduly before he receives his final pay.

(f) In established cases of long-term sickness, compensable accident or jury duty, an employee will be maintained on the Employer's payroll until his normal date of layoff.

Article 18

INCLEMENT WEATHER PAY

18.1 When an employee reports for work at the beginning of a shift and inclement weather is declared, an employee shall be entitled to the following payment unless notified not to report by his Employer:

(a) If not put to work, a minimum of two (2) hours' pay at the appropriate rate, providing he remains at his place of work for two (2) hours unless given his Employer's permission to leave;

OR

(b) If put to work, a minimum of four (4) hours' pay at the appropriate rate.
If inclement weather is declared during the shift, an employee shall receive a minimum of two (2) hours' pay at the appropriate rate;

OR

(c) Pay for the actual time worked for that shift, whichever is the greater.

Article 19

PREMIUMS

19.1 When work is performed from a bosun chair or swing stage, the following premium shall be paid:

over 15 meters above a
working floor or platform - 20¢ per hour worked

over 30 meters above a
working floor or platform - 50¢ per hour worked

19.2 *Construction Radiation Protection Assistant (R.P.A.)* is a Construction Trades Person who has achieved the full radiation qualification via the approved Ontario Power Generation Training Program. This requires successful completion of the construction R.P.A. training and checkouts and the performance of R.P.A. functions while under the supervision of a fully qualified construction R.P.A. to the satisfaction of the Construction Site Safety Officer and the Station Health Physics Unit.

R.P.A. will be paid the appropriate equivalent foreman's rate when performing an R.P.A. function and will report to the Site Safety Unit. An R.P.A. is a "qualification" and not a "trade function" irrespective of union or trade affiliation.

19.3 In the case of a recall to work, Employers reserve the right to recall Green qualified Atomic Radiation Workers (R.P.A.) in sequence from the out-of-work list to the location from where they were laid off. Recalled Greenmen (R.P.A.) will perform sufficient Greenman work to maintain their skill level, or be laid off.

Article 20

CALL-IN PAY

When an employee is called in to work outside of his normal hours of work, he shall receive a minimum of four (4) hours' work at the appropriate premium rate plus travel allowance where applicable.

If the employee's normal hours of work commence within this four (4) hour period, the employee will be paid premium time from the time he commences work until the start of his normal hours and will revert to his normal hourly rate at the commencement of his normal hours of work.

Article 21

REPORTING PAY

Article 21 is applicable to work at Existing Generating Sites where work involves construction of a new facility (new function) and/or new (additional) generating unit(s) and at New Generating Sites (ie: Greenfield Work).

For work at Hydro One and at Existing Generating Sites excluding work involving construction of a new facility (new function) and/or new (additional) generating unit(s) please refer to Appendix A, Section 3 – Modified Provisions of this Construction Agreement.

21.1 An employee who reports for work, unless directed not to report the previous day by his Employer, shall receive a minimum of four (4) hours' pay at the applicable rate when he reports for work, but is given no opportunity to work because none is available. This allowance will be paid to an employee if he is requested to report for work for any part of the first half of a shift and an additional four (4) hours on the first and second shifts or two and one-half (2-1/2) hours on the third shift will also be paid if he is requested to report for work for any part of the second half of the same shift. It is not intended by this Article that an employee receive a reporting pay allowance greater than his pay for normal daily hours.

21.2 An employee in receipt of reporting pay shall also receive travel or board allowance, if applicable.

21.3 Notwithstanding that work is available and an employee is able to commence or continue work, the Employer may shut down a job to avoid the possible loss of human life because of an emergency situation such as H_2S leaks, bomb threats, fire, etc., that could endanger the life and safety of an employee. In such cases, employees will be compensated only for the actual time worked.

Article 22

VACATION PAY

22.1 The Vacation Pay rate shall be four (4) percent of vacationable gross earnings*. Payment shall be made weekly on the employee's regular pay cheque.

A three (3) week leave of absence for the purpose of taking an annual vacation will be granted in the calendar year in which the employee completes one year of continuous service with the Employer. In special circumstances, where the work schedule permits, additional time off may be granted an employee. The additional time off will not be unreasonably denied.

Article 23

STATUTORY HOLIDAYS

23.1 The Statutory Holiday pay rate shall be six (6) percent of vacationable gross earnings. Payment shall be made weekly on the employee's regular pay cheque.

The Statutory Holidays recognized under this Agreement are:

New Year's Day	Civic Holiday
Good Friday	Labour Day
Easter Monday	Thanksgiving Day
Victoria Day	Christmas Day
Canada Day	Boxing Day

EPSCA agrees to recognize Heritage Day when proclaimed by legislation.

* ***"Vacationable gross earnings" means pay for regular hours, overtime, premium pay, shift differential, lines and stations daily travel time, retroactive pay adjustments, reporting pay, inclement weather pay, call-in pay, Saturday and Sunday premiums and trade training, but does not include payment for initial and return travel.***

Recognized holidays falling on a Saturday or Sunday shall be observed on the following Monday. When Christmas Day falls on a Saturday or Sunday, it shall be observed on the following Monday and Boxing Day on the following Tuesday. When New Year's Day falls on a Saturday or Sunday, it shall be observed on either the preceding Friday or the following Monday.

EPSCA reserves the right to change the day of observance of a Statutory Holiday when such a holiday falls on a Tuesday or Thursday.

Article 24

GENERATION PROJECTS DAILY TRAVEL ALLOWANCE AND ROOM AND BOARD

Article 24 is applicable _to_ work at Existing Generating Sites where work involves construction of a new facility (new function) and/or new (additional) generating unit(s) and at New Generating Sites (i.e. Greenfield Work).

For work at Hydro One (Lines and Stations Sites) and Existing Generating Sites excluding work involving construction of a new facility (new function) and/or new (additional) generating unit(s) please refer to _Appendix D, Section 1 - Modified Provisions of this Construction Agreement._

DAILY TRAVEL ALLOWANCE

24.1 The daily travel allowance will be paid by the Employers to employees who are not receiving room and board as referred to in Section 24.2, on the following basis:

(a) If an employee lives within twenty (20) radius kilometers* of the project, no travel allowance will be paid.

(b) If an employee lives within 20 to 40 radius kilometers of the project, he shall receive $15.60 per day effective May 1, 2000 (effective May 1, 2001 $16.10 per day; effective May 1, 2001 $16.60 per day; effective May 1, 2003 $17.10 per day) travel allowance for each day worked or reported for.

* ***For the purpose of this Article, "radius kilometers" shall be measured from the centre of the turbine hall on each project.***

Bruce G.S. "A", Bruce G.S. "B", and the Bruce Heavy Water Plants will be combined to form the Bruce Complex. Travel allowance for the Bruce complex will be calculated from the midpoint of a straight line joining the centres of the Bruce G.S. "A" and Bruce G.S. "B" turbine halls.

(c) If an employee lives within 40 to 56 radius kilometers of the project, he shall receive $18.85 per day effective May 1, 2000 (effective May 1, 2001 $19.35 per day; effective May 1, 2002 $19.85 per day; effective May 1, 2003 $20.35 per day) travel allowance for each day worked or reported for.

(d) If an employee lives within 56 to 80 radius kilometers of the project, he shall receive $22.10 per day effective May 1, 2000 (effective May 1, 2001 $22.60 per day; effective May 1, 2002 $23.10 per day; effective May 1, 2003 $23.60 per day) travel allowance for each day worked or reported for.

(e) If an employee lives within 80 to 97 radius kilometers of the project, he shall receive $25.60 per day effective May 1, 2000 (effective May 1, 2001 $26.10 per day; effective May 1, 2002 $26.60 per day; effective May 1, 2003 $27.10 per day) travel allowance for each day worked or reported for.

(f) If an employee lives greater than 97 radius kilometers from the project and does not qualify for subsistence allowance under Section 16.2 below, he will receive $29.85 per day effective May 1, 2000 (effective May 1, 2001 $30.35 per day; effective May 1, 2002 $30.85 per day; effective May 1, 2003 $31.35 per day) travel allowance provided he continues to travel greater than 97 radius kilometers for each day worked or reported for.

When an employee is directed to report to a location that involves travelling around a natural barrier, the distance around the natural barrier shall be the shortest distance measured by a series of straight lines. The sum of the distances of these straight lines shall be applied to the ring concept to establish the employee's travel allowance entitlement.

A natural barrier is defined as any obstruction or impediment which creates an unreasonable relationship between the radius kilometers and actual kilometers travelled.

ROOM AND BOARD

24.2 The following conditions will apply for employees whose regular residence* is more than 97 radius kilometers from the project:

* ***An employee's 'regular residence' is:***

The place where the employee maintains a self-contained, domestic establishment (a dwelling house, apartment or similar place of residence where a person generally eats and sleeps and for which he can show proof of financial commitment). This is in contrast to a boarding house facility which is not self-contained; and

The employee normally resides in the residence except for those periods of time when, because of the location of the work, the employee is forced to obtain temporary accommodation at that work location.

(a) An Employer may supply either:

(i) Room and board in camp or a good standard of board and lodging within a reasonable distance of a project; or

(ii) a subsistence allowance;

subject to Sections 24.2(b), (c) and (d) below.

(b) An employee may exercise his option not to stay in a camp or accept room and board. An employee who exercises this option and qualifies for subsistence allowance shall receive a subsistence allowance of $56.00 per day effective May 1, 2000 (effective May 1, 2001 $58.00 per day; effective May 1, 2002 $60.00 per day; effective May 1, 2003 $62.00 per day) for each day worked or reported for when employed at a location south of the French River and $70.00 per day effective May 1, 2000 (effective May 1, 2001 $72.00 per day; effective May 1, 2002 $74.00 per day; effective May 1, 2003 $76.00 per day) for each day worked or reported for when employed at a location north of the French River subject to Sections 24.2(c) and 24.2(d) below.

(c) To qualify for subsistence allowance an employee must maintain temporary accommodation at or near a project. Employees who travel daily to locations beyond 97 radius kilometers from the project will be entitled to $31.60 per day effective May 1, 2000 (effective May 1, 2001 $33.60 per day; effective May 1, 2002 $35.60 per day; effective May 1, 2003 $37.60 per day) for each day worked or reported for.

(d) An employee employed at the Pickering or Darlington Project who qualifies for a subsistence allowance as provided for above shall receive a subsistence allowance of $41.50 per day effective May 1, 2000 (effective May 1, 2001 $44.50 per day; effective May 1, 2002 $47.50 per day; effective May 1, 2003 $50.50 per day) for each day worked or reported for.

24.3 An employee shall not qualify for daily travel allowance or room and board allowance as provided for in Sections 24.1 and 24.2 above when such employee reports for work but does not remain at work for his scheduled daily hours unless excused by an authorized representative of his Employer.

24.4 An employee who maintained a regular residence within the geographic area for the purposes of employment and who relocates outside the geographic area will not be entitled to an increase in travel or room and board allowance entitlement as a result of this relocation.

24.5 The Union recognizes the Employer's right to charge for board and other existing services. The Employer fixes the charge for board and other existing services in camps at $25.00 per day. This will be applied on the following basis:

(a) An employee who remains in camp on a normally scheduled work day on which he does not work will be charged $25.00 per day, unless he is excused from work for a legitimate reason by the project medical attendant or an authorized representative of his Employer.

(b) An employee who is absent from work on Friday without approval and who remains in camp and who is still absent from work on the following Monday without approval will be charged for room and board for Friday, Saturday, Sunday and Monday.

(c) An employee who is absent from work without approval on Friday but who works the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

(d) An employee who works the Friday and is absent from work without approval on the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

Article 25

HYDRO ONE (LINES AND STATIONS CONSTRUCTION) DAILY TRAVEL ALLOWANCE AND ROOM AND BOARD

***Article 25* is applicable *to all* work on Hydro One Sites (Lines & Stations) at both existing and new sites**

DAILY TRAVEL ALLOWANCE

25.1 The daily travel allowance will be paid by the Employers to their employees who are not living in camp or receiving a subsistence allowance as referred to in Section 25.3 on the following basis:

(a) Effective May 1, 1996, if an employee lives within forty (40) radius kilometers of the work location or declared assembly point, no travel allowance will be paid.

(b) If an employee lives within 40 to 56 radius kilometers of the work location or declared assembly point, he shall receive $18.60 per day effective May 1, 2000 (effective May 1, 2001 $19.10 per day; effective May 1, 2002 $19.60 per day; effective May 1, 2003 $20.10 per day) for each day worked or reported for.

(c) If an employee lives within 56 to 80 radius kilometers of the work location or declared assembly point, he shall receive $22.10 per day effective May 1, 2000 (effective May 1, 2001 $22.60 per day; effective May 1, 2002 $23.10 per day; effective May 1, 2003 $23.60 per day) for each day worked or reported for.

(d) If an employee lives within 80 to 97 radius kilometers of the work location or declared assembly point, he shall receive $25.60 per day effective May 1, 2000 (effective May 1, 2001 $26.10 per day; effective May 1, 2002 $26.60 per day; effective May 1, 2003 $27.10 per day) for each day worked or reported for.

(e) If an employee lives greater than 97 radius kilometers from the work location or declared assembly point, and does not qualify for subsistence allowance under Section 17.3 below, he shall receive $28.85 per day effective May 1, 2000 (effective May 1, 2001 $29.35 per day; effective May 1, 2002 $29.85 per day; effective May 1, 2003 $30.35 per day) provided he continues to travel greater than 97 radius kilometers daily for each day worked or reported for.

When an employee is directed to report to a location that involves travelling around a natural barrier, the distance around the natural barrier shall be the shortest distance measured by a series of straight lines. The sum of the distances of these straight lines shall be applied to the ring concept to establish the employee's travel allowance entitlement. A natural barrier is defined as any obstruction or impediment which creates an unreasonable relationship between radius kilometers and actual kilometers travelled.

25.2 The Employer reserves the right to base daily travel allowance on the distance in radius kilometers from where an employee lives to either the work location or declared assembly point, depending on where the employee is directed to report.

ROOM AND BOARD

25.3 The following conditions will apply for employees whose regular residence* is more than 97 radius kilometers from the work location:

* ***An employee's 'regular residence' is:***

1. ***The place where the employee maintains a self-contained, domestic establishment (a dwelling house, apartment or similar place of residence where a person generally eats and sleeps and for which he can show proof of financial commitment). This is in contrast to a boarding house facility which is not self-contained; and***
2. ***The employee normally resides in the residence except for those periods of time when, because of the location of the work, the employee is forced to obtain temporary accommodation at that work location.***
3. ***For metro areas (Toronto and Hamilton) the calculation of distance shall be from the employee's regular residence.***
4. ***For all other areas, the calculation of distance shall be based on the location of the city or town hall of the municipality where an employee maintains a self-contained domestic establishment described above. In those municipalities where a city or town hall does not exist, then the post office serving his regular residence will apply.***

(a) An employer may supply either:

(i) room and board in camp or a good standard of board and lodging; or

(ii) a subsistence allowance;

subject to Sections 25.3(b) and (c) below.

(b) An employee may exercise his option not to stay in a camp or accept room and board. An employee who exercises this option and qualifies for subsistence allowance shall receive a subsistence allowance of $69.00 per day effective May 1, 2000 ($71.00 effective May 1, 2001, $73.00 effective May 1, 2002 and $75.00 effective May 1, 2003) for each day worked or reported for subject to Section 25.3(c) below.

(c) To qualify for subsistence allowance an employee must maintain temporary accommodation at or near the work location. Employees who travel daily to locations beyond 97 radius kilometers from the project will be entitled to $29.85 per day effective May 1, 2000 (effective May 1, 2001 $31.85 per day; effective May 1, 2002 $33.85 per day; effective May 1, 2003 $35.85 per day) for each day worked or reported for.

25.4 An employee shall not qualify for daily travel allowance or room and board allowance as provided for in Sections 25.1 and 25.3 above, when such employee reports for work but does not remain at work for his scheduled daily hours unless excused by an authorized representative of his Employer. Such permission shall not be unreasonably denied.

25.5 An employee who maintained a regular residence within the geographic area for the purposes of employment and who relocates outside the geographic area will not be entitled to an increase in travel or room and board allowance entitlement as a result of this relocation.

25.6 The Union recognizes the Employer's right to charge for board and other existing services. The Employer fixes the charge for board and other existing services in camps at $25.00 per day. This will be applied on the following basis:

(a) An employee who remains in camp on a normally scheduled workday on which he does not work will be charged $25.00 per day unless he is excused from work by an authorized representative of his Employer.

(b) An employee who is absent from work on Friday without approval and who remains in camp and who is still absent from work on the following Monday without approval will be charged for room and board for Friday, Saturday, Sunday and Monday.

(c) An employee who is absent from work without approval on Friday but who works the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

(d) An employee who works the Friday and is absent from work without approval on the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

Article 26

HYDRO ONE (LINES AND STATIONS CONSTRUCTION) DAILY TRAVEL TIME

26.1 All travel time will be outside of normal working hours.

26.2 (a) An employee will be paid his straight-time rate for all time spent travelling from his assembly point to his work location on normal working days.

An employee will be paid premium time for all time spent travelling from his assembly point to his work location on days other than normal working days.

(b) An employee will travel up to a maximum of one hour on his own time when returning from his work location to his assembly point. An employee will be paid his straight-time rate for all time spent travelling in excess of one hour.

26.3 All time in excess of one hour spent travelling from the work location to the assembly point on non-working days shall be compensated for at the appropriate premium rates of pay.

26.4 The Employer will supply transportation between the assembly points and work locations.

26.5 When an employee's regular residence is more than five hundred (500) radius kilometers from the project, and the job or project is worked on a four ten (4x10) hour work week, the employee shall receive room and board allowance on a five day basis for a regular work week. If the employee is required to work an additional ten (10) hour shift beyond the normal four ten (4x10) hour shift, the employee will be entitled to room and board allowance for an additional ten (10) hour shift worked to a maximum of seven (7) days room and board in a week

TRAVEL AND TRANSPORTATION

27.1 INITIAL EMPLOYMENT

On recruitment of tradesmen whose regular residence* or place of recruitment, whichever is closer to the project, is between 81 to 161 radius kilometers from the project, the Employer shall pay $26.00 for the initial trip effective May 1, 2000 (effective May 1, 2001 $27.00; effective May 1, 2002 $28.00; effective May 1, 2003 $29.00) to the project.

**** As defined in Article 24 of this Agreement.***

27.2 ONTARIO RESIDENTS

On recruitment of tradesmen whose regular residence is beyond 161 radius kilometers from the project, the Employer shall pay mileage based on 27¢ per radius kilometer effective May 1, 2000 (effective May 1, 2001 28¢; effective May 1, 2002 29¢; effective May 1, 2003 30¢) plus an allowance for travel time equivalent to one (1) hour's pay for each 80 radius kilometers of travel to a maximum of eight (8) hours' pay for the initial trip to the project from the tradesman's regular residence or place of recruitment, whichever is closer to the project.

27.3 NON-ONTARIO RESIDENTS

On recruitment of tradesmen whose regular residence is beyond 161 radius kilometers from the project, the Employer shall pay the equivalent of the cost of rail fare, plus an allowance for travel time equivalent to one (1) hour's pay for each 80 radius kilometers of travel to a maximum of eight (8) hours' pay for the initial trip to the project from the tradesman's regular residence or place of recruitment, whichever is closer to the project.

27.4 To qualify for payment in 27.1, 27.2 or 27.3, the employee must remain at the project for a minimum of fifteen (15) working days or the duration of his job, whichever is lesser.

27.5 On termination of employment due to a reduction of staff, an employee entitled to payment under 27.1, 27.2 or 27.3 shall be entitled to return expenses calculated in the same manner as in 27.1, 27.2 or 27.3 above, for the return trip from the project to the tradesman's regular residence or place of recruitment whichever is closer to the project. An employee whose employment terminates for any reason other than reduction of staff shall not be eligible for return payment.

27.6 On the Thunder Bay and Atikokan projects, an employee shall qualify for a return air fare from the project every sixty (60) calendar days, to place of recruitment or his regular residence, whichever is closer to the project; however, to qualify, the regular residence or place of recruitment must be more than 402 radius kilometers from the project.

Article 28

STANDOFF

28.1 When unable to proceed with his work, an Employer may elect to Standoff part or all of his crew. The parties agree Standoff is not intended to circumvent the layoff procedure.

The Employer reserves the right to Standoff its employees without pay up to a maximum of ten (10) consecutive working days. Notification of Standoff will be made by the Employer during normal working hours. A Record of Employment will be issued upon the commencement of the Standoff. No travel allowance will be paid to an employee for the Standoff period.

28.2 An employee who qualifies for subsistence allowance and who is placed on Standoff will be paid subsistence allowance up to a maximum of ten (10) consecutive working days.

28.3 If Standoff continues beyond ten (10) consecutive working days, an employee, at his option, may elect to remain on Standoff for an additional twenty (20) consecutive working days or be removed from Standoff. The Employer retains recall rights on employees electing to continue on Standoff. Subsistence allowance will cease after ten (10) consecutive working days on Standoff.

28.4 If an employee elects layoff beyond the tenth (10th) consecutive working day, it shall be carried out in accordance with the terms of the Layoff/Seniority provisions of the appropriate Trade Appendix of this Agreement. An employee laid off will be issued a Record of Employment form on his date of layoff indicating "Layoff – Shortage of Work". The Employer does not retain recall rights if the employee elects Layoff.

28.5 Standoff shall only continue beyond thirty (30) consecutive working days with the mutual consent of the Employer and the Union, in writing.

- For the purpose of this Article, when working on a 4 x 10 hour shift arrangement, the following will apply:
- eight (8) scheduled working days will be considered the equivalent of ten (10) consecutive working days.
- sixteen (16) scheduled working days will be considered the equivalent of twenty (20) consecutive working days.
- twenty-four (24) scheduled working days will be considered the equivalent of thirty (30) consecutive working days.

Article 29

REST PERIOD

29.1 For employees working normal hours, a fifteen (15) minute rest period will be allotted, at the time and in a reasonable location as directed by the Employer, for each half shift worked. Where a half shift is less than four (4) hours, there shall be no rest period.

29.2 For employees required to work overtime, a ten (10) minute rest period will be allotted prior to the end of the normal shift before commencing overtime work.

29.3 For employees working overtime, a fifteen (15) minute rest period will be allotted, at the time directed by the Employer, after each two hours of overtime worked.

Article 30

LUNCHROOM FACILITIES

Adequately heated accommodation separate from changerooms and washrooms shall be provided by the Employer on each project when necessary and where such accommodation can be reasonably provided for. Such accommodation shall be weatherproof and shall be kept reasonably clean. A table and sufficient benches or seats for the employees on the job shall be provided in the accommodation. Trailerized or portable accommodation shall include tables, benches, light, heat maintained at a minimum sixty-eight (68) degrees Fahrenheit, proper access and egress, and shall not be used for material storage.

Article 31

MEALS ON OVERTIME

Article 31 is applicable to work at Existing Generating Sites where work involves construction of a new facility (new function) and/or new (additional) generating unit(s) and at New Generating Sites (ie: Greenfield Work).

For work at Hydro One and at Existing Generating Sites excluding work involving construction of a new facility (new function) and/or new (additional) generating unit(s) please refer to Appendix D, Section 4 – Modified Provisions of this Construction Agreement.

31.1 If an employee is notified during the time he is working that he will be required to continue working for more than two (2) hours past the normal quitting time of the first or second shifts or for more than three and one-half (3-1/2) hours beyond the normal quitting time of the third shift, the Employer will provide a free meal to the employee after approximately two (2) hours of overtime worked (first or second shifts) or three and one-half (3-1/2) hours of overtime worked (third shift) and for each four (4) hours of overtime worked thereafter. The employee will be allowed thirty (30) minutes paid at the straight time rate to eat each meal at the time directed by the Employer. When a paid meal period overlaps a rest period, the paid meal period will supplant the rest period. The Employer will supply a hot meal when possible. When a free meal is not provided, the Employer will pay the employee one-half (1/2) hour at his appropriate rate.

31.2 To qualify for the above-noted on a Friday for work on the first and second shifts, an employee will be required to work for more than four (4) hours beyond the normal quitting time of his shift.

31.3 The above-noted is not applicable to the first eight (8) hours worked on Saturdays, Sundays or Statutory Holidays for employees who normally work the first or second shifts, nor is it applicable to the first six and one-half (6-1/2) hours worked on Sundays or recognized holidays for employees who normally work the third shift.

31.4 Where an employee has been notified the previous day, no meal will be provided but the employee will be allowed thirty (30) minutes paid at the straight time rate to eat each meal at the time directed by the Employer.

Article 32

TOOLS AND CLOTHING

32.1 An employee shall be required to provide himself with the ordinary hand tools of his trade as specified in the tool list attached hereto. Each Employer will provide, insofar as is practical, separate facilities for storing the tools of each trade, but shall not be held responsible for losses, except as noted hereunder:

(a) When personal tools valued in excess of $15.00 are lost due to fire, the Employer will consider the full estimated value on the merit of each case in determining replacement or payment. This will include only personal tools that a tradesman is required to have to perform his normal duties with his Employer.

(b) Each Employer will compensate his employees for ordinary hand tools and clothing lost by theft from locked storage provided by him for his employees. Claims must be submitted, in writing, and must provide substantiating evidence of forcible entry to locked storage. Payment or replacement for personal clothing lost by theft on the work site shall be limited to clothing that a tradesman is required to have to perform his normal duties with his Employer.

(c) In the event of loss by fire at an Employer's camp or on the work site in an Employer designated storage area, replacement or payment of the full estimated value in excess of $15.00 but not exceeding $500.00 for the loss of personal clothing will be made by the Employer. Payment or replacement for personal clothing lost by fire on the work site shall be limited to clothing that a tradesman is required to have to perform his normal duties with his Employer.

32.2 An employee who has obtained tools from his Employer shall be allowed sufficient time, in the opinion of Management, to return such tools to his Employer during working hours. An employee receiving tools from his Employer shall be held responsible for the return of such tools in good condition, subject to normal wear and tear. On layoff, an employee will be allowed reasonable time to return tools to his Employer.

32.3 Gang tools are tools which are issued to a Foreman and are used by one or more member of the crew. Such tools are not identified on the trades tool list, nor are they the tools and equipment identified in 24.1 and 24.2 of this Article.

32.4 If an employee requires a set of banding tools to perform his work, the Employer will supply these tools, and the employee shall sign for the same. Failure to return such tools upon termination of employment will result in the employee being charged the replacement cost of these tools.

32.5 Employees working in a radiation area, in plastic suits or replacement material of the fully enveloping type with an independent air supply, will receive $8.00 per day. A day for the purposes of this item shall be defined as any period up to twelve (12) hours.

Article 33

PROTECTIVE CLOTHING AND EQUIPMENT

Employees are required to wear protective clothing and use protective equipment, as determined by the Employer, for the work being done.

The protective clothing and equipment that is provided by the Employer shall be charged out to the employee and the employee shall be responsible for the return of such clothing and equipment to his Employer.

Article 34

APPRENTICESHIP AND TRAINING PROGRAMS

34.1 The Employer agrees to pay into operative apprenticeship or training funds the amounts specified for apprenticeship or training as set forth in the wage schedules, attached hereto, for employees covered by this Agreement during the time they are employed.

34.2 The Union agrees to supply EPSCA with all pertinent information regarding the funds including all administrative material that is required for their implementation and provide EPSCA with the opportunity to participate in the training committees.

34.3 Training programs established by the Employers to provide skills required in the electrical power systems sector shall be funded by reducing the Employers' contributions to the training fund in the specific locality where the training is taking place by an amount of money equivalent to the cost of such programs.

34.4 For the purposes of continued employment and/or training the Employer, with agreement of the Union, may transfer apprentices to any work location.

Article 35

HOURS OF WORK

Article 35 is applicable _to_ work at Existing Generating Sites where work involves construction of a new facility (new function) and/or new (additional) generating unit(s) and at New Generating Sites (i.e. Greenfield Work).

For work at Hydro One (Lines & Stations) Sites and at Existing Generating Sites excluding work involving construction of a new facility (new function) and/or new (additional) generating unit(s) please refer to _Appendix D, Section 2 - Modified Provisions of this Construction Agreement._

35.1 The normal weekly hours of work for all employees of Employers covered by this Agreement shall be thirty-eight (38), except as described in Section 36.2.

The weekly hours shall be worked in four (4) eight (8) hour days, Monday to Thursday inclusive, with the remaining six (6) hours to be worked on Friday.

35.2 The normal weekly hours of work for employees working the third shift shall be thirty-two and one-half (32-1/2), made up of five (5) days of six and one-half (6-1/2) hours each.

The hours of work at Miscellaneous Projects (excluding Lakeview and R.L. Hearn Generating Stations), shall be 40 hours per week made up of five (5) days of eight (8) hours each, Monday to Friday inclusive. The normal daily hours are to be worked between 7:30 am and 5:00 pm.

A Miscellaneous Project is any work undertaken by Ontario Power Generation Projects Division which will require less than one year to complete and comprise a total project work force of not more than one hundred men at one time.

35.3 PROJECT DAILY HOURS

(a) Day Work Only

The normal starting time for day work hours shall be 8:00 a.m. By mutual agreement between EPSCA and the Union, the starting time may be varied by one-half hour either way. This variance will be established at the prejob conference or while the job is in progress.

(b) Shift Work

(i) Shift work will be deemed to be established providing there are at least four consecutive days of shifts to be worked excluding Saturdays, Sundays and Statutory Holidays.

(ii) The normal starting time for day shift hours shall be the same as the day work hours described in Section 35.3(a).

(iii) Where shift work is established, the normal shift hours for the first (day) and second shifts shall be the same as the day hours. The third shift normal hours shall be six and one-half (6-1/2) hours' work, to be worked between 1:00 a.m. and 8:00 a.m., with an unpaid one-half (1/2) hour lunch period.

(iv) On Monday to Thursday inclusive, the second shift hours shall start at 4:30 p.m. or a variance of one-half hour either way, to coincide with the end of the day shift. On Friday, the second shift hours may start at 4:30 p.m. or at the end of the day shift.

(v) The third shift to start at 1:00 a.m. Monday.

(vi) Where the third shift is established as starting at 1:00 a.m. Monday, it shall be worked between 1:00 a.m. and 8:00 a.m. Monday, Tuesday, Wednesday, Thursday and Friday.

(c) Hours of Work - Special Circumstances

It may be necessary from time to time to vary the hours of work established in Sections 35.3(a) and (b). Any amendments to the hours of work will be established by mutual agreement between EPSCA and the Union at the prejob conference or while the job is in progress.

35.4 The shift rate will be based on the day in which the shift begins.

35.5 LUNCH PERIODS FOR MAJOR PROJECTS, AND CONSTRUCTION AND SERVICES DIVISION

A lunch period will be given no earlier than four (4) hours and no more than five (5) hours after the start of the shift and will be one-half (1/2) hour in duration.

A lunch period will be given no earlier than three and one-half (3-1/2) hours and no more than five (5) hours after the start of the third shift and will be one-half (1/2) hour in duration.

35.6 When an employee is required to return to work without an eight (8) hour break, all work performed shall be at the premium rate until such time as the employee receives an eight (8) hour break. This provision does not apply when a change in an employee's normal shift (as defined in this Article) occurs or to call-in situations.

Article 36

GRIEVANCE PROCEDURE

36.1 Grievances within the meaning of the grievance and arbitration procedure shall consist only of disputes about the interpretation or application of particular clauses of this Agreement and about alleged violations of this Agreement. In the event of any dispute concerning the meaning or application of any provision of this Agreement or a dispute concerning an alleged violation of this Agreement, there shall be no suspension or disruption of work, but such dispute shall be treated as a grievance and shall be settled, if possible, by EPSCA and the Union. In the interests of expediting the procedure, the parties shall process grievances in the following manner:

The grievance procedure and arbitration procedure in Article 36 do not apply to jurisdictional disputes.

36.2 PRELIMINARY DISCUSSION

Disputes arising out of the interpretation or alleged violation of this Agreement should, if possible, be settled by discussion between the employee and/or his steward and the employee's supervisor. If the employee affected is a foreman, the preliminary discussion will be between the Accredited Union Representative and the foreman's supervisor.

36.3 FIRST STEP

If a dispute cannot be resolved by this method, the Accredited Union Representative for the trade concerned may file a formal grievance on the prescribed form with the Manager of Construction or the Field Construction Manager within fifteen (15) working days of the alleged grievous act.

Within ten (10) working days of the filing of the grievance, the Manager of Construction or Field Construction Manager shall investigate the grievance and convene a First Step meeting which he or the Accredited Union Representative considers necessary to resolve it.

The Management Committee shall be comprised of the Manager of Construction or the Field Construction Manager or their designate plus at least one representative of the Employer named in the grievance. The Union Committee shall include at least two persons, one of whom shall be the Accredited Union Representative for the grievor.

The Manager of Construction or Field Construction Manager shall give his reply on the prescribed form to the Accredited Union Representative within five (5) working days from the date of the First Step meeting.

Copies of completed grievance forms signed by the appropriate parties shall be filed by the Manager of Construction or the Field Construction Manager with the General Manager of EPSCA. The Accredited Union Representative for the grievor will file a copy with the Union.

The EPSCA Representative will send a copy of any signed first step grievance settlement between the Accredited Union Representative and EPSCA to the Union and the EPSCA office.

36.4 SECOND STEP

Within ten (10) working days after the disposition has been issued under the First Step of this procedure, the Accredited Union Representative may refer the grievance on the prescribed form to EPSCA's Grievance Officer. A copy of the grievance form shall be forwarded by the Accredited Union Representative to the International Representative of the Union.

The EPSCA Grievance Officer shall investigate the grievance and convene a meeting which he or the International Representative considers necessary to resolve it and give his reply on the prescribed form to the International Representative of the Union within five (5) working days from the receipt of the grievance form which was completed at First Step.

The Management Committee shall comprise the EPSCA Grievance Officer plus two other Management Representatives, one of whom shall be a representative of the Employer named in the grievance. The Union Committee shall be comprised of at least the International Representative or his designate for the grievor. If the International Representative elects to appoint a designate, he shall inform EPSCA, in writing, of the name of the designate and the duration of appointment.

36.5 EPSCA GRIEVANCES

The processing of EPSCA grievances will begin at the Second Step. EPSCA may submit either policy or specific grievances. Such policy or specific grievances shall be submitted within thirty (30) days of the alleged grievous act.

36.6 TIME LIMITS

The time limits as to both documents and procedures set out in the above sections shall be complied with by the parties to this Agreement provided, however, that the parties may mutually agree, in writing, in respect to an extension or waiver of any of the time limits imposed. Where no answer is given within the time limits specified in the grievance procedure, the employee concerned, the Union or EPSCA shall be entitled to submit the grievance to the next step of the grievance procedure. Any grievance not processed within the time limits specified in the grievance procedure shall be deemed to have been settled and ineligible for arbitration.

36.7 Alleged unjustified termination, discharge, suspension or disciplinary action may be grieved beginning at First Step.

36.8 GRIEVANCE FACILITIES

EPSCA shall provide the necessary facilities for all grievance meetings.

Article 37

ARBITRATION

37.1 If any dispute about the interpretation or application of particular clauses of this Agreement or about an alleged violation of this Agreement cannot be settled through the grievance procedure outlined in Article 37, the matter may be submitted within thirty (30) days of its failure of settlement by grievance procedure by either EPSCA or the Union to a Board of Arbitration for adjudication.

The party desiring to submit the dispute to arbitration shall notify the other party, in writing, of its desire and the notice shall contain the name of the first party's nominee to an arbitration board. The recipient of the notice shall, within five (5) working days, inform the other party of the name of its nominee to the arbitration board. The two nominees so selected shall, within ten (10) working days of the appointment of the second of them, appoint a third person who shall be the Chairman. If the recipient of the notice fails to appoint a nominee, or if the nominees fail to agree upon a Chairman, the appointment shall be made by the Minister of Labour for Ontario upon the request of either party. The arbitration board, when selected or appointed, will proceed as soon as practicable to hear and determine the dispute and it shall issue a decision which is final and binding upon the parties and upon their respective members. The decision of a majority is the decision of the arbitration board, but if there is no majority, the decision of the Chairman governs.

37.2 The arbitration board shall have no power to add to or subtract from or modify any of the terms of this Agreement. The arbitration board shall not substitute its discretion for that of the parties except where the board determines that an employee has been discharged or otherwise disciplined for cause when this Agreement does not contain a specific penalty for the infraction that is the subject matter of the arbitration. In such cases, the arbitration board may substitute such other penalty for the discharge or discipline as to the arbitration board seems just and reasonable in all circumstances. The arbitration board shall not exercise any responsibility or function of the parties. The arbitration board shall not deal with any matter not contained in the original statement of grievance filed by the party referring the matter to arbitration.

37.3 In arbitration proceedings, each party shall pay the fees and expenses of its nominee, whether appointed by the party or by the Minister of Labour for Ontario, and the fees and expenses of the Chairman shall be shared equally by the parties.

37.4 The time limits as to both documents and procedure set out in the above sections shall be observed by the parties to this Agreement provided, however, that the parties may mutually agree, in writing, in respect to an extension or waiver of any of the time limits imposed.

Article 38

NO STRIKE - NO LOCKOUT

There shall be no strikes or lockouts so long as this Agreement continues to operate.

Article 39

ASSOCIATION FUND

Each Employer bound by this agreement shall contribute to the Electrical Power Systems Construction Association Fund, the amount specified on the wage schedules attached hereto for each hour worked by each employee covered by this agreement.

The Employer shall remit such contribution together with the supporting information as required on the reporting forms.

EPSCA shall indemnify the Union for any liability arising from an Employer's failure to remit such contributions.

Article 40

RADIATION WORK

(a) Local Union to be provided with a copy of Ontario Power Generation Radiation Protection Regulations and any revisions.

(b) Local Union to be provided with a copy of Ontario Power Generation Radiation Protection Procedures and any revisions.

(c) Each employee will have access to his personal radiation exposure record.

(d) Long-term employees who reach their exposure limit will be given alternate employment until they can resume radiation work.

(e) Short-term employees will be given a guaranteed period of employment at their time of hire.

Article 41

ABORIGINAL CONTENT COMMITMENT

Where an aboriginal commitment has been established on a project, the Union will co-operate in meeting the content commitments.

For a project, or jobs within a project, that are less than $100,000 field labour, and have aboriginal content commitments, the terms of the collective agreement will not apply to those aboriginal content commitments.

Article 42

TERM OF AGREEMENT

This Agreement shall continue in full force and effect from May 1, 2000 until April 30, 2004 inclusive, and thereafter it shall be considered automatically renewed for successive periods of two (2) years unless at least sixty (60) days prior to the end of any two (2) year period, either party serves written notice upon the other that it desires termination, revision or modification of any provision or provisions of this Agreement.

In Witness Whereof, EPSCA and the Union have caused this Agreement to be executed in their names by duly authorized representatives at *Toronto* this *30th* day of *May*, 2000

For the Electrical Power Systems Construction Association

Joe Dotchin

Jim Coathup

For the International Association of Heat and Frost Insulators and Asbestos Workers

Joe de Wit

APPENDIX A

MOOSE RIVER BASIN: NORTHERN ONTARIO

Where the Employer elects to establish a camp, the following conditions will apply for employees working in the Moose River Basin:

Camp Conditions

(a) An Employer may elect to provide free room and board in camp at no cost to the employee. Where the Employer elects to provide a camp such employees will not be entitled to receive a daily travel or room & board allowance.

(b) When an Employer does not elect to provide free room and board in camp, the employee will be entitled to receive a daily travel or room and board allowance as set out in Articles 24.1 and 24.2.

(c) An employee who remains in camp on a normally scheduled work day on which he does not work will be charged $25.00 per day unless he is excused from work for a legitimate reason by the project medical attendant or an authorized representative of his Employer.

(d) An employee who is absent from work without approval and who remains in camp and is still absent from work the following day without approval will be charged $25.00 for the day of absence and each successive day of unapproved absence.

Hours of Work

(1) The hours of work will consist of a twenty-one (21) day cycle of fourteen (14) consecutive work days followed by seven (7) consecutive days off.

(2) Regularly scheduled hours of work of ten (10) hours per day shall be paid at straight time hourly rates.

(3) Regularly scheduled hours of work on Saturday, Sunday, Recognized Holidays, and the fifth (5th) consecutive weekday shall be paid at two times the straight time hourly rate.

Wrap Around

An employee shall qualify for a return trip from the project every second twenty-one (21) day cycle he is on the project on the following basis:

(a) If an employee lives within 161 radius kilometres from the project, the Employer shall pay forty dollars ($40.00).

(b) If an employee lives greater than 161 radius kilometres from the project, the Employer shall pay as an allowance, forty dollars ($40.00) plus travel time based on the equivalent of one (1) hour's base rate of pay for each eighty (80) kilometres from where the employee lives or place of recruitment, whichever is closer to the project.

APPENDIX B

7-DAY COVERAGE

When working under the provisions of this 7-day shift schedule, all conditions listed below will supersede those in the other Articles/Sections of this Collective Agreement. Where this shift schedule is silent, the appropriate Article/Section in the Collective Agreement applies.

These provisions would only apply to work performed on a Nuclear Facility and the work must be covered by the "Modified Provisions of this Construction Agreement".

This shift schedule is intended for work of at least five (5) weeks in duration; however, it is recognized that unforeseen circumstances may require the cancellation of this schedule.

If in the transition onto or off this 7-day shift schedule an employee would receive less than 40 paid hours in a pay period, the employee shall receive the difference between the total paid hours for that pay period and 40 hours' pay. This does not apply to those employees who are laid off during or at the end of the schedule.

The employee(s) shift schedule consists of four consecutive shifts (day, afternoon, or night) followed by four scheduled days off. Shift overlap may be required.

Shift work may be established by the Employer to provide seven days per week work coverage, on a two or three ten (10) hour per day shift basis. When this occurs, a specific shift arrangement will be established by the Employer detailing the shift schedule to be worked.

Notice Provision

If this shift schedule is to be used for work on a "planned outage", the Employer will provide the Union with two (2) weeks' notice prior to the implementation of these shift provisions.

Shift Provisions

Day Shift

Regularly scheduled hours of work per shift, Monday to Friday inclusive, shall be paid at straight time hourly rates.

Afternoon Shift

Regularly scheduled hours of work per shift, Monday to Friday inclusive, shall be paid at straight time hourly rates, plus a shift differential of one-seventh (1/7) for normal scheduled shift hours worked.

Night Shift

Regularly scheduled hours of work per shift, Monday to Friday inclusive, shall be paid at straight time hourly rates, plus a shift differential of one-fifth (1/5) for normal scheduled shift hours worked.

All Shifts

Regularly scheduled hours of work on Saturday, Sunday, Statutory and Recognized Holidays shall be paid at the appropriate overtime rate. Recognized Holidays will be observed on the actual day on which the holiday occurs or as declared by legislation.

The rate for the shift will be based on the day in which the shift begins.

An unpaid lunch period of one-half hour shall be allowed to be taken no later than five hours after the commencement of a shift.

For employees working regularly scheduled hours, two fifteen (15) minute rest periods will be allotted at a time and location directed by the Employer for employees to rest.

It may be necessary, from time to time, to vary the established shift arrangements. When this occurs, a revised shift arrangement will be established.

APPENDIX C

7-DAY COVERAGE
HYDRO ONE (LINES AND STATIONS)

This shift schedule is intended for work greater than two (2) weeks in duration; however, it is recognized that unforeseen circumstances may require the cancellation of this schedule.

These provisions will only apply to work performed on Lines and Stations as follows:

"for emergency work until the system is restored to the pre-emergent state"

If in the transition onto or off this 7-day shift schedule an employee would receive less than 40 paid hours in a pay period, the employee shall receive the difference between the total paid hours for that pay period and 40 hours' pay. This does not apply to those employees who are laid off during or at the end of the schedule.

The employee(s) shift schedule consists of four consecutive shifts (day, afternoon, or night) followed by four scheduled days off. Shift overlap may be required.

Shift work may be established by the Employer to provide seven days per week work coverage, on a one, two, or three shift per day basis. When this occurs, a specific shift arrangement will be established by the Employer detailing the shift schedule to be worked. The Employer will provide the Union with 48 hours' notice prior to the implementation of these shift provisions.

First Shift

Regularly scheduled hours of work, Monday to Friday inclusive, shall be paid at straight time hourly rates.

Second Shift

Regularly scheduled hours of work, Monday to Friday inclusive, shall be paid at straight time hourly rates, plus a shift differential of one-seventh (1/7) the normal scheduled hours worked.

Third Shift

Regularly scheduled hours of work, Monday to Friday inclusive, shall be paid at straight time hourly rates, plus a shift differential of one-fifth (1/5) the normal scheduled hours worked.

All Shifts

Regularly scheduled hours of work on Saturday, Sunday, Statutory and Recognized Holidays shall be paid the appropriate overtime rate. Recognized Holidays will be observed on the actual day on which the holiday occurs or as declared by legislation.

The rate for the shift will be based on the day in which the shift begins.

An unpaid lunch period of one-half hour shall be allowed to be taken no later than five hours after the commencement of a shift.

For employees working regularly scheduled hours, two fifteen (15) minute rest periods will be allotted at a time and location directed by the Employer for employees to rest.

It may be necessary, from time to time, to vary the established shift arrangements. When this occurs, a revised shift arrangement will be established.

APPENDIX D

MODIFIED PROVISIONS OF THIS CONSTRUCTION AGREEMENT

These provisions will apply to:

(a) all work on Hydro One (Lines and Stations), and

(b) all work on existing generating sites except the construction of:

- a new facility which provides a new function
- a new (i.e. additional) generating unit

Definitions:

Facility	Something that is built composed of multi-systems which serves a specific function
Function	Examples - Generation, Administration, Warehousing, Heavy Water Production, Flue Gas Desulphurization, Tritium Removal, Site Services (e.g. Shops)

Dispute Resolution Process

A dispute as to whether the 'Modified Provisions of this Construction Agreement' apply to the construction of a new facility will be referred to the Executive Committee for resolution and the Executive Committee will meet within 5 (five) working days. If the Executive Committee is unable to resolve the dispute, the dispute will be referred to a single arbitrator within 10 (ten) working days for a final and binding resolution. The arbitrator shall give an oral decision within 5 (five) working days, and a written decision, if requested, within 20 (twenty) working days.

All terms of this collective agreement shall apply to work covered by this Appendix, with the exception of Article 21 – Reporting Pay, Article 24 – Generation Projects Daily Travel Allowance and Room and Board, Article 31 – Meals on Overtime and Article 35 – Hours of Work.

EPSCA/INSULATOR COLLECTIVE AGREEMENT

APPENDIX D

MODIFIED PROVISIONS

OF THIS CONSTRUCTION AGREEMENT

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SECTION 1

GENERATION PROJECTS DAILY TRAVEL ALLOWANCE AND ROOM AND BOARD

DAILY TRAVEL ALLOWANCE

1.1 The daily travel allowance will be paid by the Employers to employees who are not receiving room and board as referred to in Article 24.2, on the following basis:

(a) Effective May 1, 1996, if an employee lives within forty (40) radius kilometers* of the project, no travel allowance will be paid.

(b) If an employee lives within 40 to 56 radius kilometers of the project, he shall receive $18.85 per day effective May 1, 2000 (effective May 1, 2001 $19.35 per day; effective May 1, 2002 $19.85 per day; effective May 1, 2003 $20.35 per day) travel allowance for each day worked or reported for.

(c) If an employee lives within 56 to 80 radius kilometers of the project, he shall receive $22.10 per day effective May 1, 2000 (effective May 1, 2001 $22.60 per day; effective May 1, 2002 $23.10 per day; effective May 1, 2003 $23.60 per day) travel allowance for each day worked or reported for.

(d) If an employee lives within 80 to 97 radius kilometers of the project, he shall receive $25.60 per day effective May 1, 2000 (effective May 1, 2001 $26.10 per day; effective May 1, 2002 $26.60 per day; effective May 1, 2003 $27.10 per day) travel allowance for each day worked or reported for.

(e) If an employee lives greater than 97 radius kilometers from the project and does not qualify for subsistence allowance under Section 33.5.2 below, he will receive $29.85 per day effective May 1, 2000 (effective May 1, 2001 $30.35 per day; effective May 1, 2002 $30.85 per day; effective May 1, 2003 $31.35 per day) travel allowance provided he continues to travel greater than 97 radius kilometers for each day worked or reported for.

* ***For the purpose of this Article, "radius kilometers" shall be measured from the centre of the turbine hall on each project.***

Bruce G.S. "A", Bruce G.S. "B", and the Bruce Heavy Water Plants will be combined to form the Bruce Complex. Travel allowance for the Bruce complex will be calculated from the midpoint of a straight line joining the centres of the Bruce G.S. "A" and Bruce G.S. "B" turbine halls.

When an employee is directed to report to a location that involves travelling around a natural barrier, the distance around the natural barrier shall be the shortest distance measured by a series of straight lines. The sum of the distances of these straight lines shall be applied to the ring concept to establish the employee's travel allowance entitlement.

A natural barrier is defined as any obstruction or impediment which creates an unreasonable relationship between the radius kilometers and actual kilometers travelled.

ROOM AND BOARD

1.2 The following conditions will apply for employees whose regular residence* is more than 97 radius kilometers from the project:

(a) An Employer may supply either:

(i) Room and board in camp or a good standard of board and lodging within a reasonable distance of a project; or

(ii) a subsistence allowance;

subject to Sections 1.2(b), (c) and (d) below.

(b) An employee may exercise his option not to stay in a camp or accept room and board. An employee who exercises this option and qualifies for subsistence allowance shall receive a subsistence allowance of $56.00 per day effective May 1, 2000 (effective May 1, 2001 $58.00 per day; effective May 1, 2002 $60.00 per day; effective May 1, 2003 $62.00 per day) for each day worked or reported for when employed at a location south of the French River and $70.00 per day effective May 1, 2000 (effective May 1, 2001 $72.00 per day; effective May 1, 2002 $74.00 per day; effective May 1, 2003 $76.00 per day) for each day worked or reported for when employed at a location north of the French River subject to Sections 1.2(c) and 1.2(d) below.

* ***An employee's 'regular residence' is:***

The place where the employee maintains a self-contained, domestic establishment (a dwelling house, apartment or similar place of residence where a person generally eats and sleeps and for which he can show proof of financial commitment). This is in contrast to a boarding house facility which is not self-contained; and

The employee normally resides in the residence except for those periods of time when, because of the location of the work, the employee is forced to obtain temporary accommodation at that work location.

(c) To qualify for subsistence allowance an employee must maintain temporary accommodation at or near a project. Employees who travel daily to locations beyond 97 radius kilometers from the project will be entitled to $31.60 per day effective May 1, 2000 (effective May 1, 2001 $33.60 per day; effective May 1, 2002 $35.60 per day; effective May 1, 2003 $37.60 per day) for each day worked or reported for.

(d) An employee employed at the Pickering or Darlington Project who qualifies for a subsistence allowance as provided for above shall receive a subsistence allowance of $41.50 per day effective May 1, 2000 (effective May 1, 2001 $44.50 per day; effective May 1, 2002 $47.50 per day; effective May 1, 2003 $50.50 per day) for each day worked or reported for.

1.3 An employee shall not qualify for daily travel allowance or room and board allowance as provided for in Sections 1.1 and 1.2 above when such employee reports for work but does not remain at work for his scheduled daily hours unless excused by an authorized representative of his Employer.

1.4 An employee who maintained a regular residence within the geographic area for the purposes of employment and who relocates outside the geographic area will not be entitled to an increase in travel or room and board allowance entitlement as a result of this relocation.

1.5 The Union recognizes the Employer's right to charge for board and other existing services. The Employer fixes the charge for board and other existing services in camps at $25.00 per day. This will be applied on the following basis:

(a) An employee who remains in camp on a normally scheduled work day on which he does not work will be charged $25.00 per day, unless he is excused from work for a legitimate reason by the project medical attendant or an authorized representative of his Employer.

(b) An employee who is absent from work on Friday without approval and who remains in camp and who is still absent from work on the following Monday without approval will be charged for room and board for Friday, Saturday, Sunday and Monday.

(c) An employee who is absent from work without approval on Friday but who works the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

(d) An employee who works the Friday and is absent from work without approval on the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

SECTION 2

HOURS OF WORK

2.1 One (1) or Two (2) Shift Operation

The weekly hours of work for all employees may be arrived at by having the employees work four (4) consecutive ten-hour shifts, either Monday –Thursday or Tuesday – Friday but not concurrently on the same project, or by having the employees work five (5) consecutive eight-hour shifts. Weekly hours of work will be established for a minimum period of thirty (30) days. If an employer, with the approval of the owner, intends to change the weekly hours of work, a minimum of fifteen (15) days written notice shall be sent to the Local Union.

The start time for the day shift shall be 8:00 a.m. with a possible one (1) hour variance either way. The start time for the afternoon shift shall be immediately following the day shift or within one (1) hour either way to coincide with the end of the day shift

The shift differential for those employees working the afternoon shift when a two shift operation has been established by the Employer will be one-seventh (1/7) for scheduled hours worked on that shift.

Three (3) Shift Operation

When a three (3) shift operation is established by the Employer, the following conditions will apply:

Those employees working on the day shift shall work eight (8) hours per shift at the straight time rate.

Those employees working on the afternoon shift shall work seven and one-half (7 1/2) hours per shift at the straight time plus the appropriate shift differential.

Those employees working on the night shift shall work seven (7) hours per shift plus the appropriate shift differential.

2.2 Shift Change

A shift will be deemed to be established providing at least four (4) consecutive days of a shift are to be worked excluding Saturdays, Sundays and recognized holidays. If an employee is removed from their scheduled shift prior to completing four (4) consecutive shifts, the employee will be paid shift differential for the balance of the four (4) consecutive shifts that would have been worked had the employee not been reassigned.

2.3 It may be necessary from time to time to vary the hours of work established in this Article. Any amendments to the hours of work will be established by mutual agreement between EPSCA and the Union.

2.4 A lunch period will be given no earlier than four (4) hours and no more than five (5) hours after the start of the shift and will be one-half (1/2) hour in duration.

A lunch period will be given no earlier than three and one-half (3-1/2) hours and no more than five (5) hours after the start of the third shift and will be one-half (1/2) hour in duration.

2.5 When an employee is required to return to work without an eight (8) hour break, all work performed shall be at the premium rate until such time as the employee receives an eight (8) hour break. This provision does not apply when a change in an employee's normal shift (as defined in this Article) occurs or to call-in situations.

SECTION 3

REPORTING PAY ON 8 HOUR AND 10 HOUR SHIFTS

3.1 An employee who reports for work, unless directed not to report the previous day by his Employer, shall receive a minimum of a half shifts pay (4 hours or 5 hours) at the applicable rate when he reports for work, but is given no opportunity to work because none is available. This allowance will be paid to an employee if he is requested to report for any part of the first half of a shift and an additional half shifts pay (4 hours or 5 hours) will also be paid if he is requested to report for work for any part of the second half of the same shift. It is not intended by this Section that an employee receive a reporting pay allowance greater than his pay for normal daily hours.

An employee in receipt of reporting pay shall also receive travel or board allowance, if applicable.

Notwithstanding that work is available and an employee is able to commence or continue work, the Employer may shut down a job to avoid the possible loss of human life because of an emergency situation such as H2S leaks, bomb threats, fire, etc., that could endanger the life and safety of an employee. In such cases, employees will be compensated only for the actual time worked."

SECTION 4

MEALS ON OVERTIME

4.1 Scheduled Eight (8) Hour Shifts

When an employee has not been notified the previous day that he will be required to work for more than two (2) hours beyond the normal quitting time of the first or second shifts or for more than three and one half (3 ½) hours beyond the normal quitting time of the third shift, he shall be provided with a meal and be allowed thirty (30) minutes to consume same and the employee shall be paid at the base hourly rate of pay. This meal break will be taken following the first two (2) hours of overtime worked. After each additional four (4) is worked and when work is required beyond that four (4) hour period, the employee shall be allowed thirty (30) minutes to eat and be paid at the base hourly rate of pay and he shall be provided with a meal. The Employer will supply a hot meal when possible. Where an employee has been notified the previous day, no meal will be provided after the first two (2) hours of overtime worked, but the employee will be allowed thirty (30) minutes to eat and be paid at the base hourly rate of pay. After each additional four (4) hours is worked and when work is required beyond that four (4) hour period, the employee shall be allowed thirty (30) minutes to eat and be paid at the base hourly rate of pay and he shall be provided with a meal.

When a paid meal period overlaps a rest period, the paid meal period will supplant the rest period.

The above-noted is not applicable to the first eight (8) hours worked on Saturdays, Sundays or Recognized Holidays for employees who normally work the first or second shifts.

The above-noted is not applicable to the first six and one half (6 ½) hours worked on Saturdays, Sundays or Recognized Holidays for employees who normally work the third shift.

4.2 Scheduled Ten (10) Hour Shifts

When an employee has not been notified the previous day that he will be required to work beyond his normal quitting time, prior to commencing the overtime work, he shall be provided with a meal and be allowed thirty (30) minutes to consume same and the employee shall be paid at the base hourly rate of pay. After each additional four (4) hours is worked and when work is required beyond that four (4) hour period, the employee shall be allowed thirty (30) minutes to eat and be paid at the base hourly rate of pay and he shall be provided with a meal. The Employer will supply a hot meal when possible. Where an employee has been notified the previous day, no meal will be provided prior to commencement of overtime work, but the employee will be allowed thirty (30) minutes to eat and be paid at the base hourly rate of pay. After each additional four (4) hours is worked and when work is required beyond that four (4) hour period, the employee shall be allowed thirty (30) minutes to eat and be paid at the base hourly rate of pay and he shall be provided with a meal.

The above-noted is not applicable to the first ten (10) hours worked on Saturdays, Sundays or Recognized Holidays for employees who normally work the first and second shifts.

When a paid meal period overlaps a rest period, the paid meal period will supplant the rest period.

SECTION 5

WORKING FOREMEN

When the crew size is five (5) or less, including the foreman, the foreman may be required to work with the tools of the trade.

STATEMENT OF UNDERSTANDING NO. 1

Between

THE ELECTRICAL POWER SYSTEMS
CONSTRUCTION ASSOCIATION

And

INTERNATIONAL ASSOCIATION OF HEAT AND FROST
INSULATORS AND ASBESTOS WORKERS

EMPLOYMENT REFERRALS

It is agreed by the Parties to this understanding, that prior to any member being referred for employment under this agreement, the member must submit to a security check. Only members who successfully obtain security clearance will be referred for employment. Once a member has been hired on, they will receive an allowance of $50.00 on their first weeks pay cheque, in consideration of their time spent filling out the security clearance forms.

The union will be notified, as soon as possible, whether or not an individual has successfully obtained security clearance. This pre-clearance does not prohibit the Union from filing a grievance against the Employer on behalf of any member who is refused employment due to his/her failure to obtain security clearance.

Dated at Toronto, this 30th day of May, 2000.

Joe de Wit

INTERNATIONAL ASSOCIATION OF
HEAT AND FROST INSULATORS
AND ASBESTOS WORKERS

Barry Roberts

EPSCA

STATEMENT OF UNDERSTANDING NO. 2

Between

THE ELECTRICAL POWER SYSTEMS
CONTRUCTION ASSOCIATION

And

INTERNATIONAL ASSOCIATION OF HEAT AND FROST
INSULATORS AND ASBESTOS WORKERS

It is agreed that an employer may refuse to hire former employees who have retired and signed a waiver that they will not be re-employed.

Dated at Toronto, this 30th day of May, 2000.

Joe de Wit

INTERNATIONAL ASSOCIATION
OF HEAT AND FROST INSULATORS
AND ASBESTOS WORKERS

Barry Roberts

EPSCA

INTERNATIONAL ASSOCIATION OF
HEAT AND FROST INSULATORS
AND ASBESTOS WORKERS

TOOL LIST

1 Flat trowel

1 Claw hammer

2 Pointing trowels (1 large and 1 small)

1 10" knife

1 Pair pliers with side cutters

1 Pair end cutters

1 Pruning saw

1 4" brush

1 12' Steel tape measure

1 Pair 8" scissors

1 Pair 10" tinsnips

2 Pairs metal master cutters (1 left and 1 right)

1 Metal punch or ice pick

Block insulation springs or bands

Phillips, Robertson and slot screwdrivers

Coveralls

Shoes

Rubber gloves

Tool Box

MAP CODE:
IN-1

ISSUED:
FEBRUARY 5, 2003

REVISED:
JANUARY 27, 2005

INSULATORS
Local 95
Zone 1

EPSCA WAGE SCHEDULE FOR PROJECTS WITHIN THE GEOGRAPHIC AREA OF THIS LOCAL
(52), (57), (62), (66), (70), (82)

GRADE AND STEP	CLASSIFICATIONS, OCCUPATION CODES & EFFECTIVE DATES	BASE HOURLY RATE	VACATION & STAT. HOLIDAY	PENSION (1)	UNION FUNDS (1)	TOTAL WAGE PACKAGE	EPSCA ASSOC. FUND(1)
	FOREMAN - 445665						
22-9	2004-08-24	33.80	3.38	5.00	2.15	44.33	0.15
	2005-02-01	33.57	3.36	5.00	2.40	44.33	0.15
	2005-05-01	34.57	3.46	5.00	2.40	45.43	0.15
	2006-05-01	35.66	3.57	5.00	2.40	46.63	0.15
	SUBFOREMAN - 445655						
22-8	2004-08-24	32.30	3.23	5.00	2.15	42.68	0.15
	2005-02-01	32.07	3.21	5.00	2.40	42.68	0.15
	2005-05-01	33.07	3.31	5.00	2.40	43.78	0.15
	2006-05-01	34.16	3.42	5.00	2.40	44.98	0.15
	INSULATING MECHANIC - 445635						
22-6	2004-08-24	30.80	3.08	5.00	2.15	41.03	0.15
	2005-02-01	30.57	3.06	5.00	2.40	41.03	0.15
	2005-05-01	31.57	3.16	5.00	2.40	42.13	0.15
	2006-05-01	32.66	3.27	5.00	2.40	43.33	0.15
	TEMPORARY HELPER - 445605						
22-5	2004-08-24	18.79	1.88			20.67	0.15
	2005-02-01	18.79	1.88			20.67	0.15
	2005-05-01	19.26	1.93			21.19	0.15
	2006-05-01	19.92	1.99			21.91	0.15
	APPRENTICE - 445615						
	1st Year Probationary (1-800 hrs)						
22-0	2004-08-24	15.78	1.58			17.36	0.15
	2005-02-01	15.78	1.58			17.36	0.15
	2005-05-01	16.28	1.63			17.91	0.15
	2006-05-01	16.83	1.68			18.51	0.15
	1st Year (801-1599 hrs)						
22-1	2004-08-24	15.00	1.50	4.00	2.15	22.65	0.15
	2005-02-01	14.77	1.48	4.00	2.40	22.65	0.15
	2005-05-01	15.50	1.55	4.00	2.40	23.45	0.15
	2006-05-01	16.05	1.61	4.00	2.40	24.06	0.15
	2nd Year						
22-2	2004-08-24	18.54	1.85	4.00	2.15	26.54	0.15
	2005-02-01	18.31	1.83	4.00	2.40	26.54	0.15
	2005-05-01	18.91	1.89	4.00	2.40	27.20	0.15
	2006-05-01	19.56	1.96	4.00	2.40	27.92	0.15

(1) = per hour worked; (2) = per hour paid

MAP CODE:	ISSUED:	REVISED:	PAGE:
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INSULATORS
Local 95
Zone 1

EPSCA WAGE SCHEDULE FOR PROJECTS WITHIN THE GEOGRAPHIC AREA OF THIS LOCAL
(52), (57), (62), (66), (70), (82)

GRADE AND STEP	CLASSIFICATIONS, OCCUPATION CODES & EFFECTIVE DATES	BASE HOURLY RATE	VACATION & STAT. HOLIDAY	PENSION (1)	UNION FUNDS (1)	TOTAL WAGE PACKAGE	EPSCA ASSOC. FUND(1)
	3rd Year						
22-3	**2004-08-24**	22.11	2.21	4.00	2.15	30.47	0.15
	2005-02-01	21.88	2.19	4.00	2.40	30.47	0.15
	2005-05-01	22.58	2.26	4.00	2.40	31.24	0.15
	2006-05-01	23.34	2.33	4.00	2.40	32.07	0.15
	4th Year						
22-4	**2004-08-24**	25.68	2.57	4.00	2.15	34.40	0.15
	2005-02-01	25.45	2.55	4.00	2.40	34.40	0.15
	2005-05-01	26.25	2.63	4.00	2.40	35.28	0.15
	2006-05-01	27.12	2.71	4.00	2.40	36.23	0.15

(1) = per hour worked; (2) = per hour paid

OVERTIME

Mon - Fri = 2x
Sat = 2x
Sun & Hol = 2x

UNION FUNDS

Union Funds include the following items:

Joint Apprenticeship -	$0.30	per hour worked
Welfare -	$1.82	per hour worked
	$2.07	per hour worked - effective February 1st, 2005
Bill 162 (WSIB) -	$0.03	per hour worked

UNION DUES:

Union Dues are not included in Union Funds.
Union Dues - $ 1.07 ($ 1.00 Dues and $ 0.07 Apprenticeship) per hour worked
Union Dues are to be remitted as noted below, along with all other remittances.
Note: Union Dues are to be deducted from the Base Hourly Rate.

BENEFITS

All remittances (employee deductions, employer contributions and union dues), excluding the EPSCA Association Fund are to be sent to:

Asbestos Workers Local 95 - Benefit Fund
C/O Benefits Plan Administrators
P.O. Box 6020, Station B
135 Queens Plate Drive
ETOBICOKE, ON
M9W 7A3

GEOGRAPHIC AREA: The Province of Ontario, excluding the Districts of Kenora, Rainy River, Thunder Bay, Algoma and Patricia; Ottawa-Carleton(RM); Counties of Renfrew, Lanark, Dundas, Russel, Stormont, Prescott and Glengarry

Bricklayers

PRINCIPAL AGREEMENT

between

ONTARIO POWER GENERATION INC.
(hereinafter called "OPGI" or "The Employer")

and

THE BRICK AND ALLIED CRAFT UNION of CANADA

(hereinafter called the 'BACU')

November 7, 2002 – April 30, 2004

OPGI/BACU COLLECTIVE AGREEMENT
GENERAL NOTE

This Collective Agreement distinguishes between two broad categories of work; namely, work that is covered by the *"modified provisions"* of this construction agreement and work that is not. *"Modified provisions"* apply to most work on existing generating sites. Following is a more detailed explanation:

The *"Modified Provisions"* of this Construction Agreement will apply to:

all work on existing generating sites except the construction of:

- **a new facility which provides a new function**
- **a new (ie. additional) generating unit**

Appendix C contains the *"Modified Provisions of this Construction Agreement"*. All terms of this collective agreement shall apply to work covered by Appendix C, with the exception of Article 20 - Hours of Work, Article 15 - Daily Travel Allowance and Room and Board, Article 16 Overtime and Article 14 Reporting Pay. The above Articles 20, 15, 16 and 14 do not apply when working under the terms and conditions of the *"modified provisions"*, as these Sections are replaced by Appendix C.

When work does not fall within the scope of Appendix C, all terms of this agreement, with the exception of Appendix C, apply.

A chart to illustrate the above applications follows:

Generating - Existing Sites Excluding construction of new facility (new function) &/or new (additional) generating unit(s)	Generating – Existing Sites Involving construction of new facility (new function) and/or new (additional) generating unit(s)	Generating - New Sites (ie. Greenfield Work)
Use Appendix C - Modified Provisions	Use all the provisions of the Collective Agree ment, *except* Appendix C.	Ue all the provisions of the Collective Agreement *except* Appendix C.

November 7/02

OPGI/BACU COLLECTIVE AGREEMENT

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COLLECTIVE AGREEMENT

by and between

ONTARIO POWER GENERATION Inc

(hereinafter called 'OPGI' or "the employer"

and

BRICK AND ALLIED CRAFT UNION of CANADA

(hereinafter called 'BACU')

WHEREAS it is the desire of the parties to conclude an agreement with a new concept designed to bring stability, harmony, and an effective method to amicably resolve problems in the electrical power systems sector of the construction industry, in the Province of Ontario;

NOW THEREFORE the parties hereby agree as follows:

Article 1

RECOGNITION

1.1 OPGI recognizes BACU as the exclusive bargaining agent of all bricklayers, stonemasons and plasterers, their respective apprentices, improvers and working foremen in the employ of OPGI engaged in all construction industry work performed in the province of Ontario on Ontario Power Generation property for the bulk power system, save and except the building of commercial-type office facilities at urban locations remote from operating facilities.

1.2 The term 'employee' shall include all employees of OPGI in the classifications set out in 1.3 below:

1.3 The following is a list of classifications covered by this Agreement:

Working foreman
Bricklayer journeyman
Bricklayer improver
Stonemason apprentice
Plasterer journeyman
Plaster improver
Sub-foreman
Bricklayer apprentice
Stonemason journeyman
Stonemason improver
Plasterer apprentice

1.4 The classifications referred to in Section 1.3 do not establish craft jurisdiction. Such jurisdiction is established in Section 10.1.

1.5 OPGI and BACU agree the use of nomenclature is meant to refer to both genders.

1.6 OPGI or any contractor shall only contract or sub-contract work to employers who agree in writing to abide by the terms and conditions of this Agreement. This will be accomplished via the Labour Requirements Clause in OPGI's tendering process or any subsequent process.

1.7 The term "Local Union" in this Agreement refers to local unions identified by the BACU as having specific territorial jurisdiction under this Agreement.

Article 2

TERM OF AGREEMENT

2.1 This Agreement shall continue in full force and effect from November 7, 2002 until April 30, 2004 inclusive, and thereafter it shall be considered automatically renewed for successive periods of two (2) years unless, not more than 120 days and not less than sixty (60) days prior to the end of any two (2) year period, either party serves written notice upon the other that it desires termination, revision or modification of any provision or provisions of this Agreement

Article 3

MANAGEMENT RIGHTS

3.1 BACU agrees and acknowledges that OPGI has the exclusive right to manage the business and to exercise such right without restrictions save and except as such prerogatives of management may be specifically modified by the terms and conditions of this Agreement.

3.2 Without restricting the generality of the foregoing section, it is the exclusive function of OPGI:

(a) to hire, direct, promote, demote, lay off, transfer, discipline and discharge any employee and to increase and decrease working forces, provided that a claim that an employee has been discharged or disciplined without cause may be the subject of a grievance and dealt with, as herein provided;

(b) to determine the materials to be used, design of the products to be handled, the facilities and equipment required, scheduling of work and location of equipment.

Article 4

SAFETY

4.1 It is mutually agreed by both OPG and BACU that they shall comply with The Occupational Health and Safety Act and Regulations for Construction Projects and as amended from time to time.

4.2 Mason lines, paper cups and potable drinking water shall be supplied to the employees, from a clean covered container having a drain faucet, and an adequate supply of potable drinking water and paper cups shall be readily accessible for the workmen at all times. All such cups shall be deposited in receptacles, as provided.

OPG agrees to supply all special tools and equipment which are not normally contained in the tool kits of the employees covered by this Agreement.

4.3 It is agreed that when using 20 cm solids (100%), 25 cm and 30 cm regular, semi-solid (75%) and solid (100%) standard aggregate concrete blocks, two (2) employees shall work in pairs to lay said blocks. This shall not, however, apply to L.W. block, such as cinder, haydite or slag, other than 25 cm (100% solid) and 30 cm semi-solid (75%) or solid (100%) haydite, cinder and slag.

Article 5

APPRENTICES

5.1 OPG and BACU mutually agree that, in the best interests of the Industry, Apprentices ought to be hired and properly trained, and further agree that a provincial training trust fund shall be established immediately.

5.2 Indentured Apprentices must be registered with the Industrial Training Branch, Ministry of Colleges and Universities.

5.3 The minimum rate for Apprentices and Improvers shall be:

50% of a Journeyman's rate for the first period
65% of a Journeyman's rate for the second period
80% of a Journeyman's rate for the third period
90% of a Journeyman's rate for the fourth period.

The minimum rate for Apprentices who successfully complete the modified Apprenticeship Program at the Ontario Masonry Training Centre shall be as follows:

65% of a Journeyman's rate for the first "400 hours" on the job site
72% of a Journeyman's rate for the next "400 hours" (401-800)
80% of a Journeyman's rate for the next "400 Hours" (801-1200)
90% of a Journeyman's rate for the next "400 Hours" (1201-1600)
100% of a Journeyman's rate after 1600 hours on the job site.

5.4 No Apprentice shall operate a Masonry Saw for more than eight (8) hours in any one work week.

5.5 For the purpose of continued employment Apprentices or Improvers may be transferred to any Local of the Union, providing that the Local Union in which the Apprentice is to work does not have any Apprentices or Improvers available for employment.

5.6 The ratio of Apprentices or Improvers to be applicable to any one project shall be one (1) Apprentice or Improver for the first Journeyman employed plus an additional Apprentice or Improver for each additional five (5) Journeymen employed; said Apprentices or Improvers will be registered with the Union and will be paid a rate of wages not less than stated above.

5.7 OPG's participation in wages while the Apprentice is attending trade school shall be a minimum of twenty-five dollars ($25.00) per week. However, an Apprentice shall apply and if eligible to receive EI benefits, this provision shall not be applicable when such benefits commence.

Article 6

OLDER MEMBERS

6.1 OPG agrees that where six (6) or more employees are employed, that OPG shall hire, if available, one (1) employee who comes within the category of "Older Member". The Union further agrees that the Older Member may be hired either before the work force reaches the number of six (6) or when a seventh employee is required and similarly as the employee work force increases.

6.2 It is understood and agreed that the employment of Older Members means that the ratio applicable is in terms of the total number of the Bricklayer, Stonemason or Plasterer work force employed by Trade by a single Employer.

Article 7

RECOGNIZED HOLIDAYS

7.1 The Holidays recognized under this Agreement are:

New Year's Day	Civic Holiday
Good Friday	Labour Day
Easter Monday	Thanksgiving Day
Victoria Day	Christmas Day
Canada Day	Boxing Day

and Heritage Day when it is declared a holiday by the Government of Ontario under the Employment Standards Act.

7.2 OPGI reserves the right to change the day of observance of a recognized holiday when such holiday falls on a Tuesday or Thursday.

7.3 Recognized holidays falling on a Saturday or Sunday shall be observed on the following Monday. When Christmas Day falls on a Saturday or Sunday, it shall be observed on the following Monday and Boxing Day on the following Tuesday. When New Year's Day falls on a Saturday or Sunday, it shall be observed on either the preceding Friday or the following Monday.

Article 8

ACCREDITED UNION REPRESENTATIVES

8.1 BACU will designate local union representatives as Accredited Union Representatives to handle the day-to-day administration of this Agreement. BACU will notify OPGI in writing of the names of such Union representatives, or alternates in the event of illness or unavailability, so that they may be issued identification cards to permit entry to the site. Such representatives, after identifying themselves to OPGI upon entering the job site, will be free to observe the progress and conduct of the work and to conduct normal union business. BACU undertakes that these representatives will not hinder or interfere in any way with the said work.

Article 9

UNION STEWARDS

9.1 Accredited Union Representatives shall inform OPGI of the steward, in writing, of the names of all stewards, one of whom shall be designated Chief Steward, as they are appointed and when they cease to act as stewards. A steward shall obtain permission from his immediate supervisor before leaving his work area for union business. Such permission shall not be unreasonably denied.

Only in situations where an accredited Union Representative is unable to attend pre-job and/or mark-up meetings, may the Chief Steward be designated and attend, as part of the Chief Steward's duties, on behalf of the accredited union representative.

9.2 BACU shall receive written notice before the employment of a steward is terminated and provided the steward is able to perform the work required, he will be one of the last 2 employees to be retained in a layoff/standoff situation.

Should the work resume, he shall be one of the first employees recalled.

9.3 The chief steward will be informed of all scheduled overtime. Where practical, a steward shall be given the first opportunity to work the overtime providing he is qualified to perform the work.

9.4 No foreman or subforeman shall be permitted to act as a steward.

Article 10

WORK ASSIGNMENT

10.1 OPGI recognizes the traditional work jurisdiction of the union and when making assignments agrees to assign in accordance with this.

10.2 (a) A markup process will be utilized when OPGI intends to perform work on a project site*. The purpose of this markup process is to indicate to BACU the work which is planned to be carried out by OPGI in order to minimize the potential for jurisdictional disputes.

(b) When work is to be performed on a project site and it meets the following criteria: same employer, same work, same project site, the markup process will not be required. This procedure shall not preclude BACU's right to contest previously disputed work.

(c) When OPG has work that is less than a 3 week duration and there are ten (10) or fewer employees employed on this specific work, BACU will be notified of the scope of work and OPG's proposed work assignments. BACU will have two (2) weeks from the date of notification to submit jurisdictional claims and supporting evidence to OPG for consideration. OPG will notify BACU of the final work assignments prior to the commencement of the work.

(d) All work that does not meet the criteria set out in clauses 10.2(b) or 10.2(c) will be reviewed and assigned at a markup meeting.

(e) OPG will provide written notice to BACU as far in advance as possible of markup meetings. The Union may attend these markup meetings, and every effort will be made to settle questions of jurisdiction before the work is expected to commence.

(f) OPG shall make a proposed assignment of the work involved. OPGI shall be responsible for providing copies of proposed assignments to those attending the markup meeting. OPGI will specify a reasonable time limit for BACU to submit evidence of their claims. OPGI will evaluate all evidence submitted and make a final assignment of the work involved. OPGI will advise BACU of the final assignments prior to the work commencing.

(g) OPGI will record the proposed assignments and jurisdictional claims and forward a copy of them within fifteen (15) working days to BACU.

(h) The parties recognize that circumstances may arise, particularly with discovery and emergency work, where the process set out above may not be practical or possible, however reasonable effort will be made by OPGI to adhere to the appropriate trade jurisdiction.

* ***For the purposes of this Article, Nanticoke, Lambton, Lakeview/Hearn, Pickering, Darlington and the 5 Electricity Production Zones are each considered individual project sites.***

Article 11

JURISDICTIONAL DISPUTES

11.1 In the event that a jurisdictional dispute arises over a work assignment, such assignments will remain in effect until the dispute is resolved, if necessary, by the Ontario Labour Relations Board, and will not interfere in any way with the progress of the work.

11.2 In the event the Union elects to pursue or respond to the Jurisdictional Dispute, the Board pursuant to the Act is not authorized to award damages in respect of a mis-

assignment of work only in circumstances where the other union(s) involved in the proceedings is (are) equally restricted in their ability to claim for damages. However, this paragraph shall not apply when the Jurisdictional Dispute and the mis-assignment of work results from a bad faith assignment on the same work that was previously the subject of a Jurisdictional Dispute before the OLRB.

11.3 OPGI shall have direct recourse to the Ontario Labour Relations Board when the Board has under its consideration a dispute involving the assignment of work being done by employees covered by this agreement.

Article 12

EMPLOYMENT AND UNION SECURITY

12.1 An office will be established by OPGI for each Project. A purpose of this office will be to coordinate employment, as specified in this Article.

12.2 OPGI and BACU will exchange the names of their representatives in each areas. These individuals wiill be responsible for cooperating in the referral and employment of reliable and competent union members.

12.3 The employment of tradesmen, apprentices and improvers shall be carried out on the following basis and sequence:

(a) OPGI agrees to first hire members of the Local Union on projects within the territorial area of the Local Union. The Employer shall hire through the Local Union office 100% of all Bricklayers, Masons and Plasterers who are members of the Union as long as the Local Union is able to supply members in sufficient numbers to take care of the needs of the Employer. 50% of this number may be name requests. This ratio shall be maintained at all times. It is agreed that the Employer may transfer members from one job to another within the territorial jurisdiction of the Local Union. It is agreed that all members must produce a referral slip signed by the Business Representative before being hired or starting work.

(b) This also applies to the out-of-town men coming to work within the jurisdiction of the Local Union and no other means of hiring will be allowed. All employees in the employ of OPG shall be members in good standing as long as they are employed by OPGI. It is agreed that the Union will give preference to OPGI in the employment of its union members and OPGI agrees to first hire and to employ Local Union members.

(c) Should OPGI's requirements still not be complied with, it shall have the right to hire employees from other sources, providing such employees make application to become members of BACU prior to commencement of work.

12.4 **Union Membership**

As a condition of employment, all employees and working foremen covered by this Agreement shall either be members of, or will apply for membership in, the Union and, with respect to initiation fees and dues, will maintain such membership in good standing.

12.5 OPGI shall deduct union dues from each employee's and working foreman's wages. Such dues shall be deducted monthly and forwarded to the designated officials of the Union on or before the 15th day of the month following the month in which the deductions are made. The Union will indemnify OPGI for any liability arising from the deduction of union dues.

BACU will notify OPGI in writing of any changes in BACU dues or Local Union dues.

12.6 It is agreed that if a company is comprised of two or more Principals or Owners not more than one Principal or Owner shall be permitted to work with the tools of the trade on any one project. Any Principal or Owner working with the tools of the trade or any member of the Union shall only do so in compliance with the same working conditions having particular regard to the hours of work and other related working conditions.

Article 13

PAY PROCEDURE

13.1 NORMAL

Employees shall be paid weekly and payment for any given week will be made not later than the sixth working day after the close of the payroll period, but in any event not later than Thursday of the following week. Any employee failing to receive his pay on his regular payday shall give notice to his Employer or his representative. If the Employer does not make payment of wages before twelve-noon on the following working day, the Employer shall pay two (2) hours' pay at the applicable straight time hourly rate in addition to his wages to the employee.

(b) Wages shall be paid by OPGI on the job site, before quitting time, in cash or by cheque, payable at par in the locality of the job site. Accompanying each payment of wages shall be a statement, in writing, which can be retained by the employee, setting forth:

(i) the period of time or the work for which the wages are being paid;
(ii) the rate of wages to which the employee is entitled;
(iii) the amount of wages to which the employee is entitled;

(iv) the amount of each deduction from the wages of the employee and the purpose for which each deduction is made;
(v) any allowance or other payment to which the employee is entitled;
(vi) the amount of vacation pay for which the employee is being credited;
(vii) the amount of statutory holiday pay for which the employee is being credited; and
(viii) the net amount of money being paid to the employee.

(c) In cases of inclement weather being declared on payday, employees will receive their pay before leaving the site provided it is available on the site.

(d) The parties recognize that electronic pay may be introduced during the term of this Agreement.

13.2 ON TERMINATION

(a) An employee who voluntarily terminates his employment will be provided his final pay on the next regular payday.

(b) Employees who do not receive their pay, record of employment and hospitalization forms per (a) above shall receive two (2) hours' pay at the regular hourly rate for each working day or designated shift until such time as OPGI mails the employee's pay by registered or certified mail. The days for which the allowance of two (2) hours is paid shall not include the day on which the employee's pay was mailed.

(c) An employee who is discharged shall be provided with his final pay immediately if OPGI's pay facilities are on site or as per 14.2(b) if OPGI's pay facilities are not on site.

(d) Employers will provide one hour's notice of layoff or one hour's pay in lieu of notice to employees who are to be laid off.

When possible, the Employer shall notify BACU three (3) days prior to layoff.

(e) When an employee is laid off, he will be paid for a reasonable amount of time by the Employer if he is required to travel or wait unduly before he receives his final pay.

(f) In established cases of long-term sickness, compensable accident or jury duty, an employee will be maintained on OPGI's payroll until normal date of layoff.

Article 14

REPORTING PAY

Article 14 is applicable to work at Existing Generating Sites where work involves construction of a new facility (new function) and/or new (additional) generating unit(s) and at New Generating Sites (ie: Greenfield Work).

For work at Existing Generating Sites <u>excluding</u> work involving construction of a new facility (new function) and/or new (additional) generating unit(s) please refer to Section 4, Appendix C – Modified Provisions of this Construction Agreement.

14.1 An employee who reports for work, unless directed not to report the previous day by OPGI, shall receive a minimum of four (4) hours' pay at the applicable rate when he reports for work, but is given no opportunity to work because none is available. This allowance will be paid to an employee if he is requested to report for work for any part of the first half of a shift and an additional four (4) hours on the first and second shifts or two and one-half (2-1/2) hours on the third shift will also be paid if he is requested to report for work for any part of the second half of the same shift. It is not intended by this Article that an employee receive a reporting pay allowance greater than his pay for normal daily hours.

14.2 An employee in receipt of reporting pay shall also receive travel or board allowance, if applicable.

14.3 Notwithstanding that work is available and an employee is able to commence or continue work, OPGI may shut down a job to avoid the possible loss of human life because of an emergency situation such as H_2S leaks, bomb threats, fire, etc., that could endanger the life and safety of an employee. In such cases, employees will be compensated only for the actual time worked.

Article 15

DAILY TRAVEL ALLOWANCE AND ROOM AND BOARD

***Article 15* is applicable *to* work at Existing Generating Sites where work involves construction of a new facility (new function) and/or new (additional) generating unit(s) and at New Generating Sites (i.e. Greenfield Work).**

For work at Existing Generating Sites <u>excluding</u> work involving construction of a new facility (new function) and/or new (additional) generating unit(s) please refer to Section 1, Appendix C - Modified Provisions of this Construction Agreement.

DAILY TRAVEL ALLOWANCE

15.1 The daily travel allowance will be paid by OPGI to employees who are not receiving room and board as referred to in Section 17.2, on the following basis:

(a) If an employee lives within twenty (20) radius kilometers* of the project, no travel allowance will be paid.

(b) If an employee lives within 20 to 40 radius kilometers of the project, he shall receive $15.60 per day travel allowance effective May 1, 2000 ($16.10 effective May 1, 2001, $16.60 effective May 1, 2002, $17.10 effective May 1, 2003) for each day worked or reported for.

(c) If an employee lives within 40 to 56 radius kilometers of the project, he shall receive $18.85 per day travel allowance effective May 1, 2000 ($19.35 effective May 1, 2001, $19.85 effective May 1, 2002, $20.35 effective May 1, 2003) for each day worked or reported for.

(d) If an employee lives within 56 to 80 radius kilometers of the project, he shall receive $22.10 per day travel allowance effective May 1, 2000 ($22.60 effective May 1, 2001, $23.10 effective May 1, 2002, $23.60 effective May 1, 2003) for each day worked or reported for.

(e) If an employee lives within 80 to 97 radius kilometers of the project, he shall receive $25.60 per day travel allowance effective May 1, 2000 ($26.10 effective May 1, 2001, $26.60 effective May 1, 2002, $27.10 effective May 1, 2003) for each day worked or reported for.

(f) If an employee lives greater than 97 radius kilometers from the project and does not qualify for subsistence allowance under Section 17.2 below, he will receive $29.85 per day travel allowance effective May 1, 2000 ($30.35 effective May 1, 2001, $30.85 effective May 1, 2002, $31.35 effective May 1, 2003) provided he continues to travel greater than 97 radius kilometers for each day worked or reported for.

When an employee is directed to report to a location that involves travelling around a natural barrier, the distance around the natural barrier shall be the shortest distance measured by a series of straight lines. The sum of the distances of these straight lines shall be applied to the ring concept to establish the employee's travel allowance entitlement.

A natural barrier is defined as any obstruction or impediment which creates an unreasonable relationship between the radius kilometers and actual kilometers travelled.

* ***For the purpose of this Article, "radius kilometers" shall be measured from the centre of the turbine hall on each project.***

ROOM AND BOARD

15.2 The following conditions will apply for employees whose regular residence* is more than 97 radius kilometers from the project:

(a) OPGI may supply either:

(i) Room and board in camp or a good standard of board and lodging within a reasonable distance of a project; or

(ii) a subsistence allowance;

subject to Sections 17.2(b), (c) and (d) below.

(b) An employee may exercise his option not to stay in a camp or accept room and board. An employee who exercises this option and qualifies for subsistence allowance shall receive a subsistence allowance of $56.00 per day effective May 1, 2000 ($58.00 effective May 1, 2001, $60.00 effective May 1, 2002, $62.00 effective May 1, 2003) for each day worked or reported for when employed at a location south of the French River and $70.00 per day effective May 1, 2000 ($72.00 effective May 1, 2001, $74.00 effective May 1, 2002, $76.00 effective May 1, 2003) for each day worked or reported for when employed at a location north of the French River subject to Sections 17.2(c) and 17.2(d) below.

* ***An employee's 'regular residence' is:***

1. ***The place where the employee maintains a self-contained, domestic establishment (a dwelling house, apartment or similar place of residence where a person generally eats and sleeps and for which he can show proof of financial commitment). This is in contrast to a boarding house facility which is not self-contained; and***

2. ***The employee normally resides in the residence except for those periods of time when, because of the location of the work, the employee is forced to obtain temporary accommodation at that work location.***

(c) To qualify for subsistence allowance an employee must maintain temporary accommodation at or near a project. Employees who travel daily to locations beyond 97 radius kilometers from the project will be entitled $31.60 per day effective May 1, 2000 ($33.60 effective May 1, 2001, $35.60 effective May 1, 2002, $37.60 effective May 1, 2003) worked or reported for.

(d) An employee employed at the Pickering or Darlington Project who qualifies for a subsistence allowance as provided for above shall receive a subsistence allowance of $41.50 per day effective May 1, 2000 ($44.50 effective May 1, 2001, $47.50 effective May 1, 2002, $49.50 effective May 1, 2003) worked or reported for.

15.3 An employee shall not qualify for daily travel allowance or room and board allowance as provided for in Sections 17.1 and 17.2 above when such employee reports for work but does not remain at work for his scheduled daily hours unless excused by an authorized representative of his Employer.

15.4 An employee who maintained a regular residence within the geographic area for the purposes of employment and who relocates outside the geographic area will not be entitled to an increase in travel or room and board allowance entitlement as a result of this relocation.

15.5 BACU recognizes OPGI's right to charge for board and other existing services. OPGI fixes the charge for board and other existing services in camps at $25.00 per day. This will be applied on the following basis:

(a) An employee who remains in camp on a normally scheduled work day on which he does not work will be charged $25.00 per day, unless he is excused from work for a legitimate reason by the project medical attendant or an authorized representative of his Employer.

(b) An employee who is absent from work on Friday without approval and who remains in camp and who is still absent from work on the following Monday without approval will be charged for room and board for Friday, Saturday, Sunday and Monday.

(c) An employee who is absent from work without approval on Friday but who works the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

(c) An employee who works the Friday and is absent from work without approval on the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

* ***An employee's 'regular residence' is:***

1. ***The place where the employee maintains a self-contained, domestic establishment (a dwelling house, apartment or similar place of residence where a person generally eats and sleeps and for which he can show proof of financial commitment). This is in contrast to a boarding house facility which is not self-contained; and***

2. ***The employee normally resides in the residence except for those periods of time when, because of the location of the work, the employee is forced to obtain temporary accommodation at that work location.***

3. ***For metro areas (Toronto and Hamilton) the calculation of distance shall be from the employee's regular residence.***

4. ***For all other areas, the calculation of distance shall be based on the location of the city or town hall of the municipality where an employee maintains a self-contained domestic establishment described above. In those municipalities where a city or town hall does not exist, then the post office serving his regular residence will apply.***

Article 16

OVERTIME

***Article 16* is applicable to work which is *not* covered by Section 3**
Appendix C - Modified Provisions of this Construction Agreement.
Please refer to the *GENERAL NOTE* preceding
the Index Page of this Agreement

16.1 Work performed in excess of regular hours of work Monday to Friday shall be paid at the rate of one and one-half (1-1/2) times the basic wage rate as defined in Article 24 - Wages for the first two (2) hours worked. Work performed in excess of the first two (2) hours shall be paid at the rate of two (2) times the basic wage rate, as defined in Article 26 - Wages.

16.2 Notwithstanding Section 16.1 above, work performed in excess of regular hours of work Monday to Friday shall be paid at two (2) times the basic wage rate, as defined in Article 24 - Wages in the following Local Union Areas.

#1	Hamilton	#23	Sarnia
#5	Windsor and London	#29	Thunder Bay
#12	Kitchener	#29	Sault Ste. Marie

16.3 Work performed on Saturdays, Sundays and Holidays recognized under this Agreement, shall be paid at two (2) times the basic wage rate, as defined in Article 26 - Wages.

16.4 All employees shall cooperate with the Employer in performing overtime work when such is reasonably required.

16.5 Wherever practical, the Chief Steward will be informed of all overtime.

Article 17

WORK BREAK

17.1 It is agreed that employees shall be given two (2) fifteen (15) minute breaks on each regular shift, with no loss of pay, to be taken at a place designated by OPGI. OPGI shall exercise its discretion as to when the breaks shall occur, but every reasonable effort shall be made to schedule such breaks at the midway points of each half shift. Where a normal half shift is less than four (4) hours, there shall be no rest period in that half shift.

17.2 OPGI shall provide accommodation with adequate tables and seating facilities for employees covered by this Collective Agreement. This shelter shall be provided at the

commencement of the work. Adequately heated accommodation separate from changerooms and washrooms shall be provided by OPGI on each project when necessary and where such accommodation can be reasonably provided for. Such accommodation shall be weatherproof and shall be kept reasonably clean. A table and sufficient benches or seats for the employees on the job shall be provided in the accommodation. Trailerized or portable accommodation shall include tables, benches, light, heat maintained at a minimum sixty-eight (68) degrees Fahrenheit, proper access and egress, and shall not be used for material storage.

17.3 Employees shall receive a one half hour unpaid lunch break

Article 18

STANDOFF

18.1 When unable to proceed with his work, OPGI may elect to Standoff part or all of a crew. The parties agree Standoff is not intended to circumvent the layoff procedure.

The Employer reserves the right to Standoff its employees without pay up to a maximum of ten (10) consecutive working days. Notification of Standoff will be made by OPGI during normal working hours. A Record of Employment will be issued upon the commencement of the Standoff. No travel allowance will be paid to an employee for the Standoff period.

18.2 An employee who qualifies for subsistence allowance and who is placed on Standoff will be paid subsistence allowance up to a maximum of ten (10) consecutive working days.

18.3 If Standoff continues beyond ten (10) consecutive working days, an employee, at his option, may elect to remain on Standoff for an additional twenty (20) consecutive working days or be removed from Standoff. OPGI retains recall rights on employees electing to continue on Standoff. Subsistence allowance will cease after ten (10) consecutive working days on Standoff.

18.4 If an employee elects layoff beyond the tenth (10th) consecutive working day, it shall be carried out in accordance with the Collective Agreement. An employee laid off will be issued a Record of Employment form on his date of layoff indicating "Layoff – Shortage of Work". The Employer does not retain recall rights if the employee elects Layoff.

18.5 Standoff shall only continue beyond thirty (30) consecutive working days with the mutual consent of OPGI and the Union, in writing.

- For the purpose of this Article, when working on a 4 x 10 hour shift arrangement, the following will apply:

- eight (8) scheduled working days will be considered the equivalent of ten (10) consecutive working days.

- sixteen (16) scheduled working days will be considered the equivalent of twenty (20) consecutive working days.

- twenty-four (24) scheduled working days will be considered the equivalent of thirty (30) consecutive working days.

Article 19

TOOLS AND CLOTHING

19.1 Employees' tools and clothing lost by fire or theft from an OPGI designated storage area shall be compensated for by OPGI on written proof of loss. This provision will include only personal tools and clothing that a tradesman is required to have to perform his normal duties with his Employer.

19.2 An employee who has obtained tools from OPGI shall be allowed sufficient time, in the opinion of Management to return such tools to his Employer during working hours. An employee receiving tools from OPGI shall be held responsible for the return of such tools in good condition, subject to normal wear and tear. On layoff, an employee will be allowed reasonable time to return tools to OPGI.

Employees will immediately report the theft or loss of any OPGI-supplied tools, and OPGI will charge any employee who fails to do so, the value of such tools or clothing.

Gang tools shall be the responsibility of OPGI.

19.3 Employees working in a radiation area, in plastic suits or replacement material of the fully enveloping type with an independent air supply, will receive $8.00 per day. A day for the purpose of this item shall be defined as any period up to twelve (12) hours.

Article 20

HOURS OF WORK

***Article 20* is applicable to work which is *not* covered by Section 2 *Appendix C - Modified Provisions of this Construction Agreement.* Please refer to the *GENERAL NOTE* preceding the Index Page of this Agreement.**

20.1 The normal weekly hours of work for all employees of Employers covered by this Agreement shall be thirty-eight (38), except as described in Section 20.2 below.

The weekly hours shall be worked in five (5) days - four (4) eight (8) hour days, Monday to Thursday inclusive, with the remaining six (6) hours to be worked on Friday.

20.2 The hours of work at all Miscellaneous Projects (excluding Lakeview and R.L. Hearn Generating Stations) shall be forty (40) hours per week made up of five (5) days of eight (8) hours each, Monday to Friday inclusive.

A Miscellaneous Project is any work which will require less than one year to complete and comprise a total project work force of not more than one hundred (100) men at one time.

The hours of work for the Moose River Basin: Northern Ontario shall be, as outlined in Appendix A.

20.3 **Shift Schedules for Masonry Work**

(a) **38-Hour Schedules**

(i) Shift schedules for all Local Unions except: Local Unions #1 Hamilton, #5 Windsor and London, #23 Sarnia, #29 Thunder Bay and Sault Ste. Marie.

Working Period	*Starting Time*	*Lunch Break*	*Finish Work*	*Actual Hours Worked*	*Hours to be Paid*	*Sat and Sun*
Regular Hours						
Mon-Thurs	8:00 am	12:00-12:30 pm	4:30 pm	8	8	16
Fri	8:00 am	12:00-12:30 pm	2:30 pm	6	6	N/A

Two-Shift Operation

1st 12 hr	8:00 am	12:00-12:30 pm	8:00 pm	11	15	24
2nd 12 hr	8:00 pm	12:00-12:30 am	8:00 am	11	16	25
1st 10 hr	8:00 am	12:00-12:30 pm	6:30 pm	10	11	20
2nd 10 hr	8:00 pm	12:00-12:30 am	6:30 am	10	12	21
1st 9 hr	8:00 am	12:00-12:30 pm	5:30 pm	9	9-1/2	18
2nd 9 hr	5:30 pm	9:30-10:00 pm	3:00 am	9	10-1/2	19
1st 8 hr	SAME AS REGULAR HOURS					
2nd 8 hr						
Mon-Thurs	4:30 pm	8:30- 9:00 pm	1:00 am	8	9	17
Fri	4:30 pm	8:30- 9:00 pm	11:00 pm	6	7	N/A

Three-Shift Operation

1st Shift						
Mon-Thurs	8:00 am	12:00-12:30 pm	4:00 pm	7-1/2	8	15
Fri	8:00 am	12:00-12:30 pm	2:30 pm	6	6	N/A
2nd Shift						
Mon-Thurs	4:00 pm	8:00- 8:30 pm	12:00 Mid	7-1/2	9	16
Fri	4:00 pm	8:00- 8:30 pm	10:30 pm	6	7	N/A
3rd Shift						
Mon-Thurs	12:00 Mid	4:00- 4:30 am	8:00 am	7-1/2	9	16
Fri	12:00 Mid	4:00- 4:30 am	6:30 am	6	7	N/A

(ii) Shift schedules for Local Unions #1 Hamilton, #5 Windsor and London, #23 Sarnia, #29 Thunder Bay and Sault Ste. Marie.

Working Period	*Starting Time*	*Lunch Break*	*Finish Work*	*Actual Hours Worked*	*Hours to be Paid*	*Sat and Sun*
Regular Hours						
Mon-Thurs	8:00 am	12:00-12:30 pm	4:30 pm	8	8	16
Fri	8:00 am	12:00-12:30 pm	2:30 pm	6	6	N/A
Two-Shift Operation						
1st 12 hr	8:00 am	12:00-12:30 pm	8:00 pm	11	16	24
2nd 12 hr	8:00 pm	12:00-12:30 am	8:00 am	11	17	25
1st 10 hr	8:00 am	12:00-12:30 pm	6:30 pm	10	12	20
2nd 10 hr	8:00 pm	12:00-12:30 am	6:30 am	10	13	21
1st 9 hr	8:00 am	12:00-12:30 pm	5:30 pm	9	10	18
2nd 9 hr	5:30 pm	9:30-10:00 pm	3:00 am	9	11	19
1st 8 hr	SAME AS REGULAR HOURS					
2nd 8 hr						
Mon-Thurs	4:30 pm	8:30- 9:00 pm	1:00 am	8	9	17
Fri	4:30 pm	8:30- 9:00 pm	11:00 pm	6	7	N/A
Three-Shift Operation						
1st Shift						
Mon-Thurs	8:00 am	12:00-12:30 pm	4:00 pm	7-1/2	8	15
Fri	8:00 am	12:00-12:30 pm	2:30 pm	6	6	N/A
2nd Shift						
Mon-Thurs	4:00 pm	8:00- 8:30 pm	12:00 Mid	7-1/2	9	16
Fri	4:00 pm	8:00- 8:30 pm	10:30 pm	6	7	N/A
3rd Shift						
Mon-Thurs	12:00 Mid	4:00- 4:30 am	8:00 am	7-1/2	9	16
Fri	12:00 Mid	4:00- 4:30 am	6:30 am	6	7	N/A

Note: ***Starting time may be adjusted by mutual consent.***

For six (6) hour shifts on Friday, the second and third shifts may start at the scheduled time or at the end of the previous shift.

Times for the third work break on a ten (10) hour shift operation, and the second lunch period and third work break on a twelve (12) hour shift operation will be arranged by mutual agreement.

(b) **40-Hour Schedules**

(h) Shift schedules for all Local Unions except: #1 Hamilton, #5 Windsor and London, #23 Sarnia, #29 Thunder Bay and Sault Ste. Marie.

Working Period	*Starting Time*	*Lunch Break*	*Finish Work*	*Hours Worked*	*to be Paid*	*and Sun*
Regular Hours	8:00 am	12:00-12:30 pm	4:30 pm	8	8	16
Two-Shift Operation						
1st 12 hr	8:00 am	12:00-12:30 pm	8:00 pm	11	15	24
2nd 12 hr	8:00 pm	12:00-12:30 am	8:00 am	11	16	25
1st 10 hr	8:00 am	12:00-12:30 pm	6:30 pm	10	11	20
2nd 10 hr	8:00 pm	12:00-12:30 am	6:30 am	10	12	21
1st 9 hr	8:00 am	12:00-12:30 pm	5:30 pm	9	9-1/2	18
2nd 9 hr	5:30 pm	9:30-10:00 pm	3:00 am	9	10-1/2	19
1st 8 hr	8:00 am	12:00-12:30 pm	4:30 pm	8	8	16
2nd 8 hr	4:30 pm	8:30- 9:00 pm	1:00 am	8	9	17
Three-Shift Operation						
1st Shift	8:00 am	12:00-12:30 pm	4:00 pm	7-1/2	8	15
2nd Shift	4:00 pm	8:00- 8:30 pm	12:00 Mid	7-1/2	9	16
3rd Shift	12:00 Mid	4:00- 4:30 am	8:00 am	7-1/2	9	16

(ii) Shift schedule for Local Unions #1 Hamilton, #5 Windsor and London, #23 Sarnia, #29 Thunder Bay and Sault Ste. Marie.

Working Period	***Starting Time***	***Lunch Break***	***Finish Work***	***Hours Worked***	***to be Paid***	***and Sun***
Regular Hours	8:00 am	12:00-12:30 pm	4:30 pm	8	8	16
Two-Shift Operation						
1st 12 hr	8:00 am	12:00-12:30 pm	8:00 pm	11	16	24
2nd 12 hr	8:00 pm	12:00-12:30 am	8:00 am	11	17	25
1st 10 hr	8:00 am	12:00-12:30 pm	6:30 pm	10	12	20
2nd 10 hr	8:00 pm	12:00-12:30 am	6:30 am	10	13	21
1st 9 hr	8:00 am	12:00-12:30 pm	5:30 pm	9	10	18
2nd 9 hr	5:30 pm	9:30-10:00 pm	3:00 am	9	11	19
1st 8 hr	8:00 am	12:00-12:30 pm	4:30 pm	8	8	16
2nd 8 hr	4:30 pm	8:30- 9:00 pm	1:00 am	8	9	17
Three-Shift Operation						
1st Shift	8:00 am	12:00-12:30 pm	4:00 pm	7-1/2	8	15
2nd Shift	4:00 pm	8:00- 8:30 pm	12:00 Mid	7-1/2	9	16
3rd Shift	12:00 Mid	4:00- 4:30 am	8:00 am	7-1/2	9	16

Note: ***Starting time may be adjusted by mutual consent.***

Times for the third work break on a ten (10) hour shift operation, and the second lunch period and third work break on a twelve (12) hour shift operation will be arranged by mutual agreement.

20.4 **Refractory Conditions**

When refractory work is being performed the hours and conditions of work which shall apply are those established in Appendix 1 of this Agreement.

20.5 **Make-up Time**

By mutual consent of both parties and/or the Local Union and the affected Employer, should inclement weather cause employees to lose eight hours or more, during a Monday to Friday work week, then Saturday may be worked as make-up time at straight time rates. Employees working on the Saturday shall not work in excess of forty hours on Miscellaneous Projects (excluding Lakeview and R.L. Hearn Generating Stations) or thirty-eight hours on the remaining projects on a Monday-to-Saturday basis. If the employee works the regularly scheduled hours then double time rates will be applicable.

It is understood and agreed that make-up time is on a voluntary basis only. Employees not wishing to work the make-up time shall not be subjected to disciplinary action.

Article 21

GRIEVANCE PROCEDURE

21.1 Grievances within the meaning of the grievance and arbitration procedure shall consist only of disputes about the interpretation or application of particular clauses of this Agreement and about alleged violations of this Agreement. In the event of any dispute concerning the meaning or application of any provision of this Agreement or a dispute concerning an alleged violation of this Agreement, there shall be no suspension or disruption of work, but such dispute shall be treated as a grievance and shall be settled, if possible, by OPGI and BACU. In the interests of expediting the procedure, the parties shall process grievances in the following manner:

The grievance procedure and arbitration procedure in Article 27 do not apply to jurisdictional disputes.

21.2 PRELIMINARY DISCUSSION

Disputes arising out of the interpretation or alleged violation of this Agreement should, if possible, be settled by discussion between the employee and/or his steward and the employee's supervisor. If the employee affected is a foreman, the preliminary discussion will be between the Accredited Union Representative and the foreman's supervisor.

21.4 SECOND STEP

If a grievance cannot be resolved at Preliminary Discussion, within ten (10) working the Accredited Union Representative may file a formal grievance on the prescribed form with OPGI.

OPGI shall investigate the grievance and within 10 working days convene a meeting which it or the Accredited Representative considers necessary to resolve it and give his reply on the prescribed form to the Accredited Representative of the Union within five (5) working days from the date of the meeting.

21.5 OPGI GRIEVANCES

OPGI grievances will begin at the Second Step. OPGI may submit either policy or specific grievances. Such policy or specific grievances shall be submitted within thirty (30) days of the alleged grievous act.

21.6 TIME LIMITS

The time limits as to both documents and procedures set out in the above sections shall be complied with by the parties to this Agreement provided, however, that the parties may mutually agree, in writing, in respect to an extension or waiver of any of the time limits imposed. Where no answer is given within the time limits specified in the grievance procedure, OPGI or BACU shall be entitled to submit the grievance to the next step of the grievance procedure. Any grievance not processed within the time limits specified in the grievance procedure shall be deemed to have been settled and ineligible for arbitration.

21.7 Alleged unjustified termination, discharge, suspension or disciplinary action may be grieved beginning at Second Step.

21.8 GRIEVANCE FACILITIES

OPGI shall provide the necessary facilities for all grievance meetings.

Article 22

ARBITRATION

22.1 If any dispute about the interpretation or application of particular clauses of this Agreement or about an alleged violation of this Agreement cannot be settled through the grievance procedure outlined in Article 21, the matter may be submitted within thirty (30) days of its failure of settlement by grievance procedure by either OPGI or BACU to a Board of Arbitration for adjudication.

The party desiring to submit the dispute to arbitration shall notify the other party, in writing, of its desire and the notice shall contain the name of the first party's nominee to an arbitration board. The recipient of the notice shall, within five (5) working days, inform the other party of the name of its nominee to the arbitration board. The two nominees so selected shall, within ten (10) working days of the appointment of the second of them, appoint a third person who shall be the Chairman. If the recipient of the notice fails to appoint a nominee, or if the nominees fail to agree upon a Chairman, the appointment shall be made by the Minister of Labour for Ontario upon the request of either party. The arbitration board, when selected or appointed, will proceed as soon as practicable to hear and determine the dispute and it shall issue a decision which is final and binding upon the parties and upon their respective members. The decision of a majority is the decision of the arbitration board, but if there is no majority, the decision of the Chairman governs.

22.2 The arbitration board shall have no power to add to or subtract from or modify any of the terms of this Agreement. The arbitration board shall not substitute its discretion for that of the parties except where the board determines that an employee has been discharged or otherwise disciplined for cause when this Agreement does not contain a specific penalty for the infraction that is the subject matter of the arbitration. In such cases, the arbitration board may substitute such other penalty for the discharge or discipline as to the arbitration board seems just and reasonable in all circumstances. The arbitration board shall not exercise any responsibility or function of the parties. The arbitration board shall not deal with any matter not contained in the original statement of grievance filed by the party referring the matter to arbitration.

22.3 In arbitration proceedings, each party shall pay the fees and expenses of its nominee, whether appointed by the party or by the Minister of Labour for Ontario, and the fees and expenses of the Chairman shall be shared equally by the parties.

22.4 The time limits as to both documents and procedure set out in the above sections shall be observed by the parties to this Agreement provided, however, that the parties may mutually agree, in writing, in respect to an extension or waiver of any of the time limits imposed.

Article 23

NO STRIKE - NO LOCKOUT

23.1 There shall be no strikes or lockouts so long as this Agreement continues to operate.

Article 24

RADIATION WORK

24.1 (a) Local Union to be provided with a copy of Ontario Power Generation Inc Radiation Protection Regulations and any revisions.

(b) Local Union to be provided with a copy of Ontario Power Generation Inc Radiation Protection Procedures and any revisions.

(c) Each employee will have access to his personal radiation exposure record.

(d) Long-term employees who reach their exposure limit will be given alternate employment until they can resume radiation work.

(e) Short-term employees will be given a guaranteed period of employment at their time of hire.

Article 25

ABORIGINAL CONTENT COMMITMENT

Where an aboriginal commitment has been established on a project, the Union will co-operate in meeting the content commitments.

For a project, or jobs within a project, that are less than $100,000 field labour, and have aboriginal content commitments, the terms of the collective agreement will not apply to those aboriginal content commitments.

Article 26

Wages

26.1 As outlined in the Memorandum of Settlement, dated November 7, 2002.

APPENDIX A

MOOSE RIVER BASIN: NORTHERN ONTARIO

Where OPGI elects to establish a camp, the following conditions will apply for employees working in the Moose River Basin:

Camp Conditions

(a) OPGI may elect to provide free room and board in camp at no cost to the employee. Where OPGI elects to provide a camp such employees will not be entitled to receive a daily travel or room & board allowance.

(b) When OPGI does not elect to provide free room and board in camp, the employee will be entitled to receive a daily travel or room and board allowance as set out in Articles 17.1 and 17.2.

(c) An employee who remains in camp on a normally scheduled work day on which he does not work will be charged $25.00 per day unless he is excused from work for a legitimate reason by the project medical attendant or an authorized OPGI representative.

(d) An employee who is absent from work without approval and who remains in camp and is still absent from work the following day without approval will be charged $25.00 for the day of absence and each successive day of unapproved absence.

Hours of Work

(1) The hours of work will consist of a 21 day cycle of fourteen (14) consecutive work days followed by seven (7) consecutive days off.

(2) Regularly scheduled hours of work of ten (10) hours per day shall be paid at straight time hourly rates.

(3) Regularly scheduled hours of work on Saturday, Sunday, Recognized Holidays, and the fifth (5th) consecutive weekday shall be paid at two times the straight time hourly rate.

Wrap Around

An employee shall qualify for a return trip from the project every second twenty-one (21) day cycle he is on the project on the following basis:

(a) If an employee lives within 161 radius kilometres from the project, the Employer shall pay forty dollars ($40.00).

(b) If an employee lives greater than 161 radius kilometres from the project, the Employer shall pay as an allowance, forty dollars ($40.00) plus travel time based on the equivalent of one (1) hour's base rate of pay for each eighty (80) kilometres from where the employee lives or place of recruitment, whichever is closer to the project.

APPENDIX B

7-DAY COVERAGE

NUCLEAR SITES

When working under the provisions of this 7-day shift schedule, all conditions listed below will supersede those in the other Articles/Sections of this Collective Agreement. Where this shift schedule is silent, the appropriate Article/Section in the Collective Agreement applies.

These provisions would only apply to work performed on a Nuclear Facility and the work must be covered by the "Modified Provisions of this Construction Agreement.

This shift schedule is intended for work of at least five (5) weeks in duration; however, it is recognized that unforeseen circumstances may require the cancellation of this schedule.

If in the transition onto or off this 7-day shift schedule an employee would receive less than 40 paid hours in a pay period, the employee shall receive the difference between the total paid hours for that pay period and 40 hours' pay. This does not apply to those employees who are laid off during or at the end of the schedule.

The employee(s) shift schedule consists of four consecutive shifts (day, afternoon, or night) followed by four scheduled days off. Shift overlap may be required.

Shift work may be established by the Employer to provide seven days per week work coverage, on a two or three ten (10) hour per day shift basis. When this occurs, a specific shift arrangement will be established by the Employer detailing the shift schedule to be worked.

Notice Provision

If this shift schedule is to be used for work on a "planned outage", the Employer will provide the Union with two (2) weeks' notice prior to the implementation of these shift provisions.

Shift Provisions

Day Shift

Regularly scheduled hours of work per shift, Monday to Friday inclusive, shall be paid at straight time hourly rates.

Afternoon Shift

Regularly scheduled hours of work per shift, Monday to Friday inclusive, shall be paid at straight time hourly rates, plus a shift differential which shall be equal to the Shift Differential as found in the appropriate trade appendix for this shift.

Night Shift

Regularly scheduled hours of work per shift, Monday to Friday inclusive, shall be paid at straight time hourly rates, plus a shift differential which shall be equal to the Shift Differential as found in the appropriate trade appendix for this shift.

All Shifts

Regularly scheduled hours of work on Saturday, Sunday, Statutory and Recognized Holidays shall be paid at the appropriate overtime rate for that trade. Recognized Holidays will be observed on the actual day on which the holiday occurs or as declared by legislation.

The rate for the shift will be based on the day in which the shift begins.

An unpaid lunch period of one-half hour shall be allowed to be taken no later than five hours after the commencement of a shift.

For employees working regularly scheduled hours, two fifteen (15) minute rest periods will be allotted at a time and location directed by the Employer for employees to rest.

It may be necessary, from time to time, to vary the established shift arrangements. When this occurs, a revised shift arrangement will be established.

APPENDIX C

MODIFIED PROVISIONS OF THIS CONSTRUCTION AGREEMENT

These provisions will apply to all work on existing generating sites except the construction of:

- a new facility which provides a new function
- a new (i.e. additional) generating unit

Definitions:

Facility	Something that is built composed of multi-systems which serves a specific function
Function	Examples - Generation, Administration, Warehousing, Heavy Water Production, Flue Gas Desulphurization, Tritium Removal, Site Services (e.g. Shops)

Dispute Resolution Process

A dispute as to whether the 'Modified Provisions of this Construction Agreement' apply to the construction of a new facility will be referred to a single arbitrator within 10 (ten) working days for a final and binding resolution. The arbitrator shall give an oral decision within 5 (five) working days, and a written decision, if requested, within 20 (twenty) working days.

All terms of this collective agreement shall apply to work covered by this Appendix, with the exception of Article 16 – Reporting Pay, Article 17 – Generation Projects Daily Travel Allowance and Room and Board, Article 23 – Meals on Overtime and Article 26 – Hours of Work.

OPGI/BACU COLLECTIVE AGREEMENT

APPENDIX C

MODIFIED PROVISIONS

OF THIS CONSTRUCTION AGREEMENT

INDEX

Section 1	Daily Travel Allowance and Room and Board
Section 2	Hours of Work
Section 3	Overtime
Section 4	Reporting Pay on 8 Hour and 10 Hour Shifts
Section 5	Meals on Overtime

Section 1

DAILY TRAVEL ALLOWANCE AND ROOM AND BOARD

DAILY TRAVEL ALLOWANCE

1.1 The daily travel allowance will be paid by the Employers to employees who are not receiving room and board as referred to in Section 1.2, on the following basis:

(a) If an employee lives within forty (40) radius kilometers* of the project, no travel allowance will be paid.

(b) If an employee lives within 40 to 56 radius kilometers of the project, he shall receive $18.85 per day travel allowance effective May 1, 2000 ($19.35 effective May 1, 2001, $19.85 effective May 1, 2002, $20.35 effective May 1, 2003) for each day worked or reported for.

(c) If an employee lives within 56 to 80 radius kilometers of the project, he shall receive $22.10 per day travel allowance effective May 1, 2000 ($22.60 effective May 1, 2001, $23.10 effective May 1, 2002, $23.60 effective May 1, 2003) for each day worked or reported for.

(d) If an employee lives within 80 to 97 radius kilometers of the project, he shall receive $25.60 per day travel allowance effective May 1, 2000 ($26.10 effective May 1, 2001, $26.60 effective May 1, 2002, $27.10 effective May 1, 2003) for each day worked or reported for.

(e) If an employee lives greater than 97 radius kilometers from the project and does not qualify for subsistence allowance under Section 17.2 below, he will receive $29.85 per day travel allowance effective May 1, 2000 ($30.35 effective May 1, 2001, $30.85 effective May 1, 2002, $31.35 effective May 1, 2003) provided he continues to travel greater than 97 radius kilometers for each day worked or reported for.

When an employee is directed to report to a location that involves travelling around a natural barrier, the distance around the natural barrier shall be the shortest distance measured by a series of straight lines. The sum of the distances of these straight lines shall be applied to the ring concept to establish the employee's travel allowance entitlement.

A natural barrier is defined as any obstruction or impediment which creates an unreasonable relationship between the radius kilometers and actual kilometers travelled.

* ***For the purpose of this Article, "radius kilometers" shall be measured from the centre of the turbine hall on each project.***

ROOM AND BOARD

1.2 The following conditions will apply for employees whose regular residence* is more than 97 radius kilometers from the project:

(a) OPGI may supply either:

(i) Room and board in camp or a good standard of board and lodging within a reasonable distance of a project; or

(ii) a subsistence allowance;

subject to Sections 1.2(b), (c) and (d) below.

(b) An employee may exercise his option not to stay in a camp or accept room and board. An employee who exercises this option and qualifies for subsistence allowance shall receive a subsistence allowance of $56.00 per day effective May 1, 2000 ($58.00 effective May 1, 2001, $60.00 effective May 1, 2002, $62.00 effective May 1, 2003) for each day worked or reported for when employed at a location south of the French River and $70.00 per day effective May 1, 2000 ($72.00 effective May 1, 2001, $74.00 effective May 1, 2002, $76.00 effective May 1, 2003) for each day worked or reported for when employed at a location north of the French River subject to Sections 1.2(c) and 1.2(d) below.

(c) To qualify for subsistence allowance an employee must maintain temporary accommodation at or near a project. Employees who travel daily to locations beyond 97 radius kilometers from the project will be entitled $31.60 per day effective May 1, 2000 ($33.60 effective May 1, 2001, $35.60 effective May 1, 2002, $37.60 effective May 1, 2003) worked or reported for.

(d) An employee employed at the Pickering or Darlington Project who qualifies for a subsistence allowance as provided for above shall receive a subsistence allowance of $41.50 per day effective May 1, 2000 ($44.50 effective May 1, 2001, $47.50 effective May 1, 2002, $49.50 effective May 1, 2003) worked or reported for.

* ***An employee's 'regular residence' is:***

1. ***The place where the employee maintains a self-contained, domestic establishment (a dwelling house, apartment or similar place of residence where a person generally eats and sleeps and for which he can show proof of financial commitment). This is in contrast to a boarding house facility which is not self-contained; and***

2. ***The employee normally resides in the residence except for those periods of time when, because of the location of the work, the employee is forced to obtain temporary accommodation at that work location.***

1.3 An employee shall not qualify for daily travel allowance or room and board allowance as provided for in Sections 1.1 and 1.2 above when such employee reports for work but does not remain at work for his scheduled daily hours unless excused by an authorized representative of his Employer.

1.4 An employee who maintained a regular residence within the geographic area for the purposes of employment and who relocates outside the geographic area will not be entitled to an increase in travel or room and board allowance entitlement as a result of this relocation.

1.5 BACU recognizes OPGI's right to charge for board and other existing services. The Employer fixes the charge for board and other existing services in camps at $25.00 per day. This will be applied on the following basis:

(a) An employee who remains in camp on a normally scheduled work day on which he does not work will be charged $25.00 per day, unless he is excused from work for a legitimate reason by the project medical attendant or an authorized representative of his Employer.

(b) An employee who is absent from work on Friday without approval and who remains in camp and who is still absent from work on the following Monday without approval will be charged for room and board for Friday, Saturday, Sunday and Monday.

(c) An employee who is absent from work without approval on Friday but who works the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

(d) An employee who works the Friday and is absent from work without approval on the following Monday will be charged for the day of absence and will not be charged for Saturday and Sunday.

Section 2

HOURS OF WORK

2.1 One (1) or Two (2) Shift Operation

The weekly hours of work shall consist of forty (40) hours, worked between Monday and Friday, for all employees covered by this agreement and working on a one (1) or two (2) shift operation except as described in Sections 2.2, 2.3, 2.4, 2.5 and 2.6.

The weekly hours of work for all employees may be arrived at by having the employees work four (4) consecutive ten-hour shifts, either Monday –Thursday or Tuesday – Friday but not concurrently on the same project, or by having the employees work five (5) consecutive eight-hour shifts. Weekly hours of work will be established for a minimum period of thirty (30) days. If an employer, with the approval of the owner, intends to change the weekly hours of work, a minimum of fifteen (15) days written notice shall be sent to the Local Union.

The start time for the day shift shall be 8:00 a.m. with a possible one (1) hour variance either way. The start time for the afternoon shift shall be immediately following the day shift or within one (1) hour either way to coincide with the end of the day shift.

The shift differential for those employees working the afternoon shift when a two shift operation has been established by the Employer will be one-seventh (1/7) for scheduled hours worked on that shift.

Three (3) Shift Operation

When a three (3) shift operation is established by the Employer, the following conditions will apply:

Those employees working on the day shift shall work eight (8) hours per shift at the straight time rate.

Those employees working on the afternoon shift shall work seven and one-half (7 1/2) hours per shift at the straight time plus the appropriate shift differential as set out in the trade appendices.

Those employees working on the night shift shall work seven (7) hours per shift plus the appropriate shift differential as set out in the trade appendices.

2.2 The hours of work for such work as driveway and parking lot construction, railroad construction, landscaping, tunnelling, precast concrete erection, fencing or demolition, shall be as established in applicable local agreements for the class and character of work.

An applicable local agreement shall be an agreement between a local of any union signatory to this Agreement and a builders' exchange, contractors' association or contractor applicable in the locality of the project for the class and character of the work.

2.3 The weekly hours of work for structural steel erection shall be forty (40) hours made up of five (5) days of eight (8) hours each, Monday to Friday inclusive.

2.4 The weekly hours of work for site preparation and earth dams shall be 45 hours made up of five (5) days of nine (9) hours each, Monday to Friday inclusive.

2.5 The weekly hours of work for Watchmen shall be as set forth in the Laborers' International Union of North America Appendix, attached hereto.

2.6 The weekly hours of work for Operating Engineers engaged in tunnel work shall be as set forth in the International Union of Operating Engineers' Appendix attached hereto.

2.7 Shift Change

A shift will be deemed to be established providing at least four (4) consecutive days of a shift are to be worked excluding Saturdays, Sundays and recognized holidays. If an employee is removed from their scheduled shift prior to completing four (4) consecutive shifts, the employee will be paid shift differential for the balance of the four (4) consecutive shifts that would have been worked had the employee not been reassigned.

2.8 It may be necessary from time to time to vary the hours of work established in this Article. Any amendments to the hours of work will be established by mutual agreement between OPGI and BACUI.

2.9 LUNCH PERIODS FOR MAJOR PROJECTS

A lunch period will be given no earlier than four (4) hours and no more than five (5) hours after the start of the shift and will be one-half (1/2) hour in duration.

A lunch period will be given no earlier than three and one-half (3-1/2) hours and no more than five (5) hours after the start of the third shift and will be one-half (1/2) hour in duration.

2.10 When an employee is required to return to work without an eight (8) hour break, all work performed shall be at the premium rate until such time as the employee receives an eight (8) hour break. This provision does not apply when a change in an employee's normal shift (as defined in this Article) occurs or to call-in situations.

Section 3

OVERTIME

3.1 On Monday to Friday inclusive, overtime work shall be paid at one and one-half (1-1/2) times the basic hourly rate for all hours worked beyond the normal daily scheduled number of hours.

When overtime is scheduled for Friday or Monday when the regular schedule is 4 X 10 hour shifts the time will be compensated as follows:

First 2 hours	Time and a half
Balance of shift	Double Time

Overtime work performed on Saturday, Sunday and Recognized Holidays shall be paid at two (2) times the basic hourly rate.

3.2 All employees shall cooperate with OPGI in performing overtime work.

3.3 Wherever practical, the Chief Steward will be informed of all overtime.

Section 4

REPORTING PAY ON 8 HOUR AND 10 HOUR SHIFTS

4.1 An employee who reports for work, unless directed not to report the previous day by his Employer, shall receive a minimum of a half shifts pay (4 hours or 5 hours) at the applicable rate when he reports for work, but is given no opportunity to work because none is available. This allowance will be paid to an employee if he is requested to report for any part of the first half of a shift and an additional half shifts pay (4 hours or 5 hours) will also be paid if he is requested to report for work for any part of the second half of the same shift. It is not intended by this Section that an employee receive a reporting pay allowance greater than his pay for normal daily hours.

4.2 An employee in receipt of reporting pay shall also receive travel or board allowance, if applicable.

4.3 Notwithstanding that work is available and an employee is able to commence or continue work, the Employer may shut down a job to avoid the possible loss of human life because of an emergency situation such as H2S leaks, bomb threats, fire, etc., that could endanger the life and safety of an

employee. In such cases, employees will be compensated only for the actual time worked.

Section 5

MEALS ON OVERTIME

Scheduled Eight (8) Hour Shifts

When an employee has not been notified the previous day that he will be required to work for more than two (2) hours beyond the normal quitting time of the first or second shifts or for more than three and one half (3 ½) hours beyond the normal quitting time of the third shift, he shall be provided with a meal and be allowed thirty (30) minutes to consume same and the employee shall be paid at the base hourly rate of pay. This meal break will be taken following the first two (2) hours of overtime worked. After each additional four (4) is worked and when work is required beyond that four (4) hour period, the employee shall be allowed thirty (30) minutes to eat and be paid at the base hourly rate of pay and he shall be provided with a meal. The Employer will supply a hot meal when possible. Where an employee has been notified the previous day, no meal will be provided after the first two (2) hours of overtime worked, but the employee will be allowed thirty (30) minutes to eat and be paid at the base hourly rate of pay. After each additional four (4) hours is worked and when work is required beyond that four (4) hour period, the employee shall be allowed thirty (30) minutes to eat and be paid at the base hourly rate of pay and he shall be provided with a meal.

When a paid meal period overlaps a rest period, the paid meal period will supplant the rest period.

The above-noted is not applicable to the first eight (8) hours worked on Saturdays, Sundays or Recognized Holidays for employees who normally work the first or second shifts.

The above-noted is not applicable to the first six and one half (6 ½) hours worked on Saturdays, Sundays or Recognized Holidays for employees who normally work the third shift.

Scheduled Ten (10) Hour Shifts

When an employee has not been notified the previous day that he will be required to work beyond his normal quitting time, prior to commencing the overtime work, he shall be provided with a meal and be allowed thirty (30) minutes to consume same and the employee shall be paid at the base hourly rate of pay. After each additional four (4) hours is worked and when work is required beyond that four (4) hour

period, the employee shall be allowed thirty (30) minutes to eat and be paid at the base hourly rate of pay and he shall be provided with a meal. The Employer will supply a hot meal when possible. Where an employee has been notified the previous day, no meal will be provided prior to commencement of overtime work, but the employee will be allowed thirty (30) minutes to eat and be paid at the base hourly rate of pay. After each additional four (4) hours is worked and when work is required beyond that four (4) hour period, the employee shall be allowed thirty (30) minutes to eat and be paid at the base hourly rate of pay and he shall be provided with a meal.

The above-noted is not applicable to the first ten (10) hours worked on Saturdays, Sundays or Recognized Holidays for employees who normally work the first and second shifts.

When a paid meal period overlaps a rest period, the paid meal period will supplant the rest period.

APPENDIX D

REFRACTORY CONDITIONS*

1.1 Shift Schedule for Refractory Work

Working Period	*Starting Time*	*Lunch Break*	*Finish Work*	*Actual Hours Worked*	*Hours to be Paid*	*Sat and Sun*
Regular Hours	8:00 am	12:00-12:30 pm	4:30 pm	8	8	16
Two-Shift Operation						
1st 12 hr	8:00 am	12:00-12:30 pm	8:00 pm*	11	16	24
2nd 12 hr	8:00 pm	12:00-12:30 am	8:00 am*	11	17	25
1st 10 hr	8:00 am	12:00-12:30 pm	6:30 pm	10	12	20
2nd 10 hr	8:00 pm	12:00-12:30 am	6:30 am	10	13	21
1st 9 hr	8:00 am	12:00-12:30 pm	5:30 pm	9	10	18
2nd 9 hr	5:30 pm	9:30-10:00 pm	3:00 am	9	11	19
1st 8 hr	8:00 am	12:00-12:30 pm	4:30 pm	8	8	16
2nd 8 hr	4:30 pm	8:30- 9:00 pm	1:00 am	8	9	17
Three-Shift Operation						
1st Shift	8:00 am	12:00-12:30 pm	4:00 pm	7-1/2	8	15
2nd Shift	4:00 pm	8:00- 8:30 pm	12:00 Mid	7-1/2	9	16
3rd Shift	12:00 Mid	4:00- 4:30 am	8:00 am	7-1/2	9	16

Note: Starting time may be adjusted by mutual consent.

Times for the third work break on a ten (10) hour shift operation, and the second lunch period and third work break on a twelve (12) hour shift operation will be arranged by mutual consent.

* ***Meaning "Firebrick, Acid Resistant Structural Materials, Carbon Graphite Materials, Gunite, Acid Resistant, Tar Impregnated Brick and All Other Refractory Materials".***

* ***Also to include a hot meal where over ten (10) hour shifts are worked. Time of meal to be arranged by mutual agreement.***

* ***On work over a ten (10) hour shift and a hot meal cannot be provided, the Employer agrees to pay the equivalent of 1/2 hourly wage rate at the regular rate in lieu of the cost of the hot meal.***

** ***All overtime on the regular hours of work shall be paid at the rate of double time the applicable refractory rates.***

1.2 **Sawman**

(a) Employees, while engaged as a Sawman, shall receive a premium rate of thirty cents (30¢) an hour above the basic refractory rate for the hours spent operating the saw and shall wear all safety clothing provided.

(b) All protective equipment to be supplied by the Employer.

(c) Employers will, where practical, assign one Bricklayer for each saw.

1.3 **Stackwork**

(a) For work on a stack the wage rate shall be the base rate, as stipulated in Section 1.5 below, refractory conditions plus a premium of two dollars ($2.00) per hour commencing at the base of the structure and shall cease when the structure is completed. The premium pay shall not apply to reporting pay and further shall not be multiplied by overtime premiums.

(b) The above premium shall not apply to blast furnace work.

1.4 **Facilities**

(a) As warranted when graphite, carbon, acid, tar-impregnated brick, gunite work and on all work on blast furnace relines and coke oven repairs, coveralls and gloves shall be provided by the Employer and such clothing shall remain the property of the Employer.

(b) The Employer agrees to provide clean hot and cold water, soap and clean individual paper towels and provide sufficient time to wash up. Such facilities described herein shall be provided at commencement of the appropriate work herein.

(c) Where dust conditions prevail, adequate ventilation will be provided, and employees will be provided with proper respiratory equipment.

1.5 **Basic Refractory Wages and Premiums**

(a) Minimum basic refractory rate shall be paid at a premium of no less than thirty-five cents (35¢) per hour earned over the established rate as set out in the area rate schedules and the wage schedules, attached hereto.

(b) Employees working with carbon and/or graphite materials shall be paid a premium of fifty cents (50¢) per hour earned over the prescribed basic refractory rate, as set out in Subsection 1.5 (a) above.

(c) Employees working where the temperature of the immediate working area is one hundred and fifty degrees (150□) Fahrenheit or sixty-five degrees (65□) Celsius, shall be paid a premium of fifty cents (50¢) per hour earned over the prescribed basic refractory rate, as set out in Subsection 1.5 (a) above.

(d) When refractory work is carried out in Local #12, the base rate of wages shall be the same as that shown for Local 1, Hamilton.

1.6 **Laid Off or Dismissed**

The Employer agrees to notify the Steward forthwith when an employee has been laid off or dismissed.

1.7 **Local 23, Sarnia**

When refractory work is carried out in the geographic area of Local 23, Sarnia, the following conditions shall apply.

(a) **Wages**

In addition to the rates established in the area rate schedules and wage schedules, an additional one dollar and forty cents ($1.40) per hour shall be paid for the laying of acid and firebrick, also all types of refractory work to include all refractory material. Twenty cents (20¢) per hour (forty cents (40¢) per hour on overtime) above refractory rate of pay to be paid to Nozzle Operators.

(b) **Stacks and Silos**

A premium of two dollars ($2.00) per hour will be paid above the prevailing wage rate for work up to three hundred feet (300'). This shall include overhand work or free fall area. For each additional fifty feet (50') an additional premium of one dollar ($1.00) will be paid.

(c) **Shift Work**

Shift work shall be defined as follows:

(i) an employee or group of employees in relay with one another;

(ii) when work is scheduled to start after the regular starting time it shall be deemed as shift work;

(iii) no bricklayer shall work more than one shift in any twenty-four (24) hour period;

(iv) when it is deemed necessary to change the scheduled shift, the Employer must notify the Business Agent or his Representative;

(v) when Bricklayers report for work and are notified that the length of the shift has been changed, they shall receive a minimum of eight (8) hours' pay;

(vi) employees who are called in to fill a shift but who do not complete five (5) full shifts are to be paid regular overtime rates for all time worked. Employees who quit or are discharged for just cause shall be paid at the regular shift wage rate;

(vii) Bricklayers will be entitled to a smoke break every two (2) hours in a smoking area with no loss of time.

STATEMENT OF UNDERSTANDING

between

OPGII

and

BACU

EMPLOYMENT REFERRALS

It is agreed by the Parties to this understanding, that prior to any member being referred for employment under this agreement, the member must submit to a security check. Only members who successfully obtain security clearance will be referred for employment. Once a member has been hired on, they will receive an allowance of $50.00 on their first weeks pay cheque, in consideration of their time spent filling out the security clearance forms.

The union will be notified, as soon as possible, whether or not an individual has successfully obtained security clearance. This pre-clearance does not prohibit the Union from filing a grievance against the Employer on behalf of any member who is refused employment due to his/her failure to obtain security clearance.

Dated at Toronto, this 7th day of November, 2002.

MEMORANDUM OF SETTLEMENT

Between

Ontario Power Generation Inc.
(OPGI)

and

THE BRICK AND ALLIED CRAFT UNION OF CANADA

(hereinafter called "BACU")

Dated this 3rd day of March 2005

Memorandum of Settlement

1.0 Article 1 - Recognition

Article 1.1 Status quo.

Article 1.6
Replace with attached.

2.0 Article 2 - Term of Agreement

Term of agreement shall be from May 1st, 2004-April 30th, 2010

3.0 Appendix C - Modified Provisions

Modified provisions - hours of work, reporting pay and meals on overtime Sections under Modified provisions are to be removed from (appendix C) Sections 2, 4 and 5 and replace the corresponding language in the main agreement Articles 19, 13 and new 15.6

4.0 Article 12 - Employment and Union Security

(i) Replace paragraph 2 of Article 12. 5 with:

"Wage schedule, dues and remittance changes are to be provided in writing to Ontario Power Generation Inc. and changes shall only take place during the months of April and November of each calendar year. The effective date of such changed wage schedules, dues and remittances shall be within 30 days of change notice. All remittances will be in cents per hour worked."

The first year and the fourth year of the collective agreement will not necessarily be April and November. They will be upon signing of the collective agreements.

5.0 Article 13 - Pay Procedure

(i) Amend article 13.1 (d) to read

"The parties agree to direct deposit for direct hire employees of Ontario Power Generation Inc. An employer will provide assistance to employees who require assistance obtaining bank account. Employers other than Ontario Power Generation Inc. may implement direct deposit with employee consent."

(ii) Amend article 13.1 (b) to include direct deposit.

6.0 Article 18 - Standoff

(i) Amend 2nd paragraph last sentence of Article 18 as follows:

" No travel or subsistence allowance will be paid to an employee for the Standoff period."

(ii) Delete 18.2

(iii) Delete last sentence of Article 18.3

7.0 Section 2/Appendix C - Hours of Work: Modified Provisions to be placed into Article 20 together with the following amendments:

(i) Amend 2nd and 3rd paragraph of Section 2.1 as follows:

The weekly hours of work Monday to Friday inclusive shall consist of forty (40) hours for all employees of Employers covered by this agreement and working on a one (1) or two (2) shift operation. The weekly hours of work may be arrived at by having the employees work either:

- Four (4) consecutive ten-hour shifts, Monday to Thursday
  or;
- Four (4) consecutive ten-hour shifts, Tuesday to Friday
  or;
- Five (5) consecutive eight-hour shifts

but not concurrently on the same work program.*

Employees will not be moved from work program to work program to circumvent overtime. Disputes arising from this Article are subject to the grievance procedure.

Each employer will notify the Local Union of the weekly hours of work for each work program* at the site.

Weekly hours of work will be established for a minimum period of two (2) weeks.

If an employer, with the approval of the owner, intends to change the weekly hours of work, a minimum of seven (7) days written notice shall be sent to the Local Union.

* For the purposes of this section, a work program may be defined as work taking place on a site that could include the following:

- Outages,
- Specific contracted scopes of work,
- Various and different modifications in an operating plant where the owner dictates the hours of work, or
- Subcontracts for a prime contractor where the prime contractor dictates the hours of work.

(ii) Amend start time in 3rd paragraph of section 2.1 to read 7:00 am.

(iii) Amend the second sentence to read: "The start time for the afternoon shift shall be immediately following the day shift or within two (2) hours either way of the end of the day shift."

(iv) Add to Section 2:

"Shift differential will not be paid on overtime hours."

8.0 Monetary

Daily Travel Allowance Room and Board - Section 1

Travel rings and Board and Travel to be increased (and rounded to the nearest 5 cents) as follows:

- Upon signing - 4%
- May 1, 2005 - 2%
- May 1, 2006 - 2%
- May 1, 2007 - 4%
- May 1, 2008 - 2%
- May 1, 2009 - 2%

9.0 Wages - Article 26

Total Wage Packages as Set Out in Article 26 Shall Be Increased As Follows:

Effective October 8, 2004	$2.00
May 1, 2005 Increase of	$1.00
May 1, 2006 increase of	$0.75

Total increase of $3.75 per hour for the first 3 years of the Agreement.

The last 3 years - ICI increase and date.

The increases are incorporated into the appropriate wage schedules.

The allocation of the wage package shall be provided by the applicable Local Union in writing. The parties agree a Local Union may amend the breakdown of the wage package but in no case will it affect the amount of the total wage package. Subject to amended Article 12.5.

(For clarity the parties acknowledge the foreman rate is $2.50 per hour above the journeyman rate)

10.0 Tools and Clothing - Amend Article 19

$12.00 per day upon signing
$15.00 per day effective May 1, 2006

11.0 Employment and Union Security

Amend 12.3 (a) as follows:

"It is agreed that the employer may transfer members from one job to another within the territorial jurisdiction of the local union, but not from one sector to another".

Dated at Toronto Ontario this 3rd day of March, 2005

Ontario Power Generation Inc.	BACU

Memorandum of Settlement

Ontario Power Generation and Bruce Power

March 3, 2005

Article 1.6 to read

1.6

The current collective agreement requires Ontario Power Generation Inc. to contract and subcontract work in accordance with its past practice and the past practice of its predecessor.

For the life of the current collective agreement, the parties acknowledge and agree that such practice is to contract and subcontract work covered by the current collective agreement only to employers who apply all of the terms and conditions of the current collective agreement to the performance of such work.

Contractors and subcontractors are required to sign Appendix E.

The parties agree that this acknowledgement and agreement will end with the expiry of the current collective agreement.