Appendix 2.4(d)- Preliminary Project Specific Site Safety, Security, Public Safety and Emergency Response Plan

[See attached]



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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

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

September 2004

STRABAG AG
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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.

STRABAG

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 KursteilnehmerInnen 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/innerschutzes (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:

STRABAG

Contractor Management

Environment, Health & Safety Qualification

Questionaire

ONTARIO POWER GENERATION

CONTRACTOR MANAGEMENT ENVIRONMENT, HEALTH & SAFETY

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		Yes	No
a. Safe work practices	[X]	[ ]	h. New worker orientation	[X]	[ ]
b. Safety supervision	[X]	[ ]	i. Due diligence	[X]	[ ]
c. Safety regulations	[X]	[ ]	j. Internal responsibility system (IRS)	[X]	[ ]
d. Tailboard meetings	[X]	[ ]	k. Emergency procedures	[X]	[ ]
e. First aid procedures	[X]	[ ]	l. Safe work planning	[X]	[ ]
f. Accident investigation	[X]	[ ]	m. Field verification/observation	[X]	[ ]
g. Fire protection and prevention	[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?

ONTARIO POWER GENERATION

CONTRACTOR MANAGEMENT — ENVIRONMENT, HEALTH, SAFETY AND SECURITY

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

ONTARIO POWER GENERATION

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			

ONTARIO POWER GENERATION

CONTRACTOR MANAGEMENT — ENVIRONMENT, HEALTH & SAFETY

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 (Corrective actions are part of the AIP)

(If "yes" please provide a copy of this program.)

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 - "Exampic 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 Fäbelen Bypass, Road Tunnel, section T1, Switzerland	Peter Pünteners, 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	

ONTARIO POWER GENERATION

CONTRACTOR MANAGEMENT — ENVIRONMENTAL MANAGEMENT SYSTEM

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:	**Reviewer:**	**Date**
Yes [X] No [ ]	(Johannes PESTAL)	September 6th 2004

STRABAG

STRABAG AG
FOLGARGTRASSE 20
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

STRABAG

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.

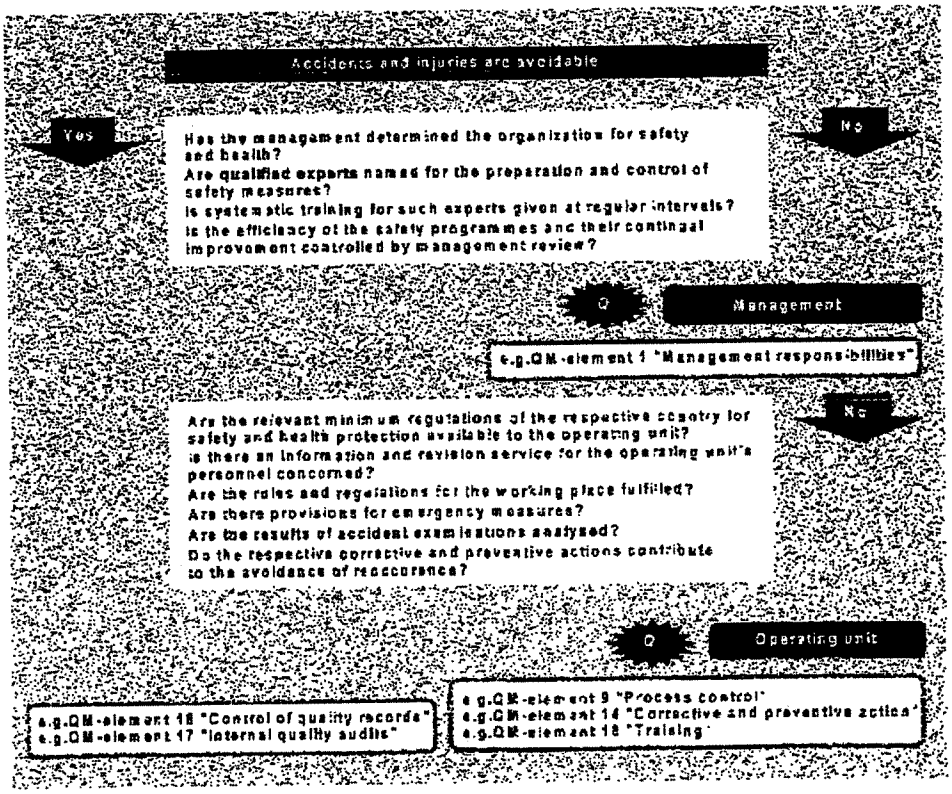
The safety expert appointed by management maintains the specific programmes for safety and health provisions in his area of responsibility and ensures their observance. These programmes are reviewed by management in relation to their capability.

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

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BASIC SAFETY INSTRUCTIONS

CONTENTS

(A) INTRODUCTION

(B) CONDUCT

(C) HOUSEKEEPING

(D) SAFETY EQUIPMENT

(E) HAZARDS

(F) CONSTRUCTION SITES

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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.

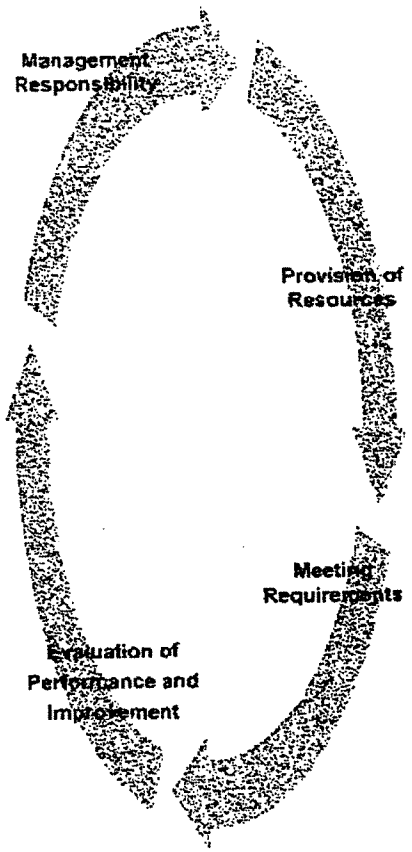
We observe existing laws and recognise the rules of fair competition.

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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Issued by:
Management System Co-ordination Committee of
BAUHOLDING STRABAG Aktiengesellschaft and the
Management System Representative in the Country

The Management Manual is subject to revision

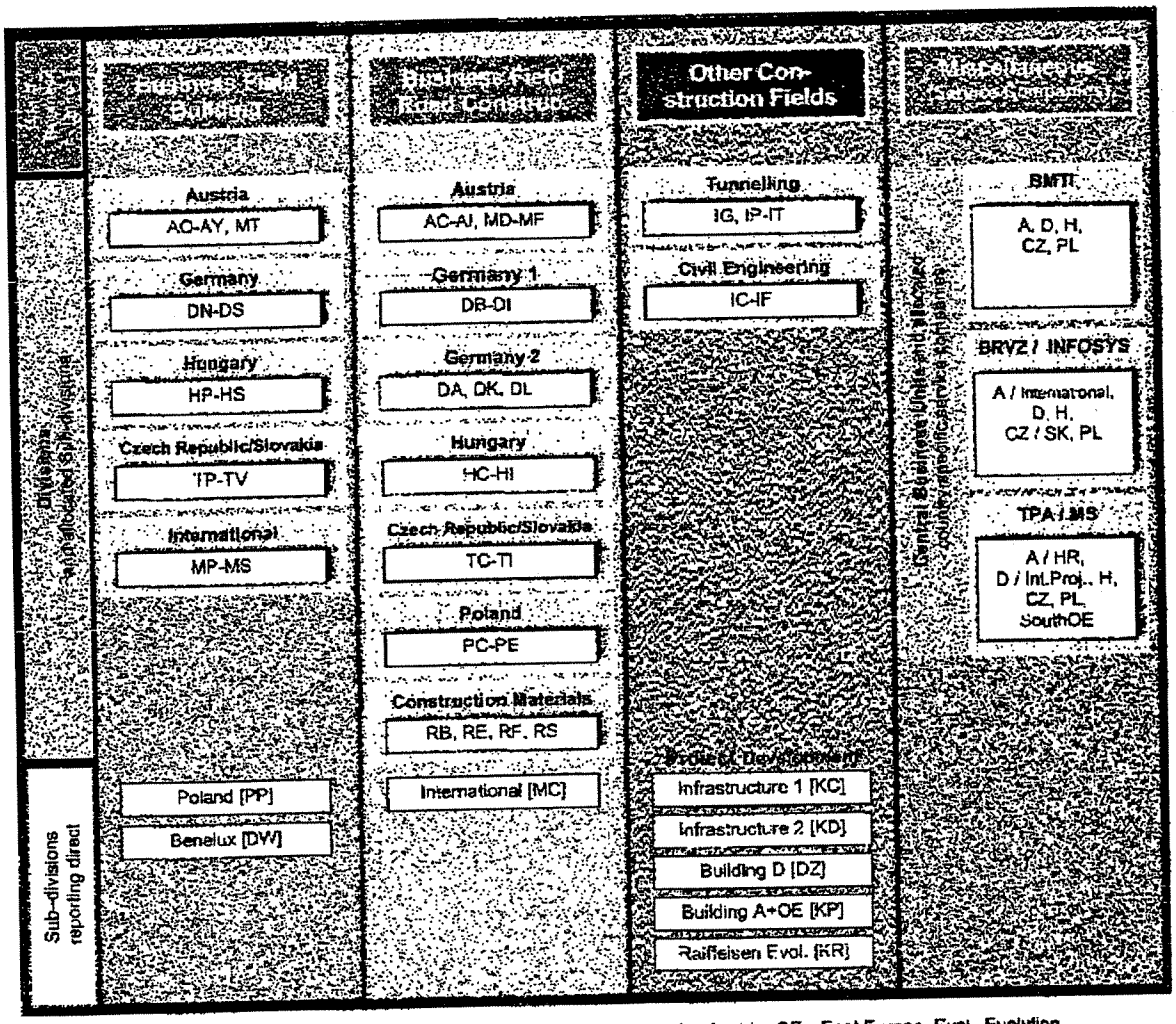
ORGANISATION AND MANAGEMENT

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-ordinator (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	Management System: Group Co-ordinator	Management System: Company Representative	Management System: Sub-division Representative	Number per year
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 fulfils 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

ÖQS

IQNet Partners*

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* 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
Tunnelling 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 Snitschok
President

Konrad Scheiber
General Manager

STRABAG

Safety, Health and Environmental Protection – SCC

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 Ombudsmen
COM	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

	Process Steps	Responsibility	<Interfaces >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	>Remarks / Interfaces
	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 organisation:

STRABAG

STRABAG AG
A-9800 Spittal/Drau, Ortenburgerstraße 27

Scope of application:
Including all Business Units /Groups per until 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 confirms the application and further development of an effective

SAFETY MANAGEMENT SYSTEM OQS
complying with the requirements of standard OQS
SCC** OQS
The security certificate contractors' standard of the Austrian sector committee for workplace protection

Registration No.: 07 I/1
Date of initial issue: 14 July 2003
Valid until: 29 May 2006

Vienna, 14 July 2003

OQS Certification and Evaluation Ltd

TR Ing. Viktor Schuhbek	Konrad Scheiber	Ing. Alfred Huber
President	General Manager	Specialist representative

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

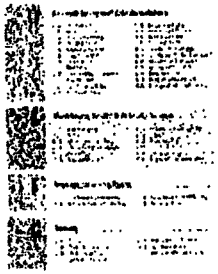
6. OTHER VALID DOCUMENTS

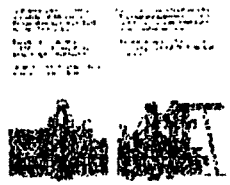
Laws subject to posting in companies
AUVA Folder "Safety on the Building Site"

STRABAG

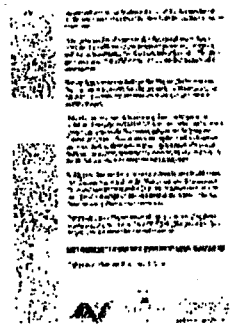
The Blue Book – Safety at Work



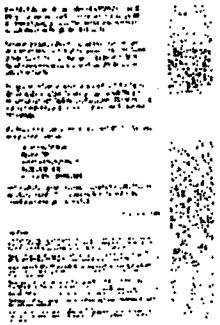




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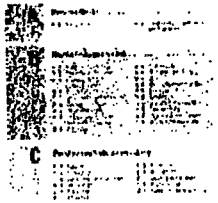


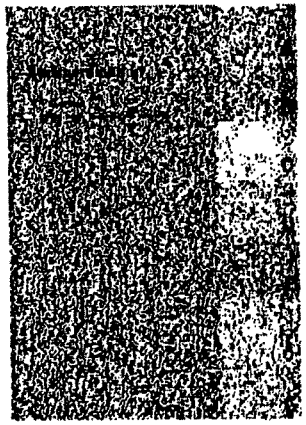
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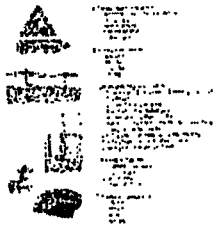
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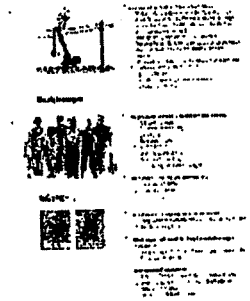


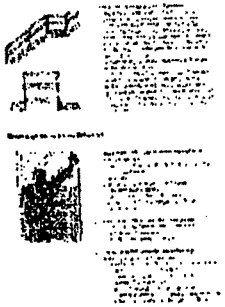


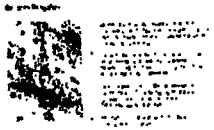


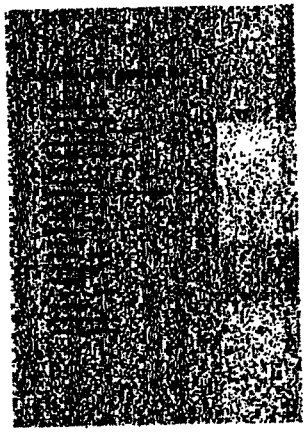
Checkliste für Koordination von Baumaßnahmen







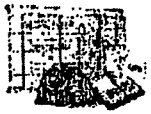


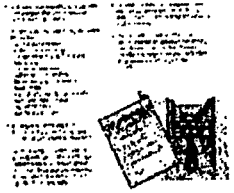


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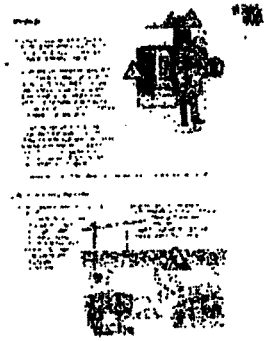


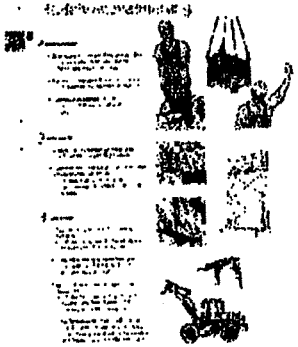


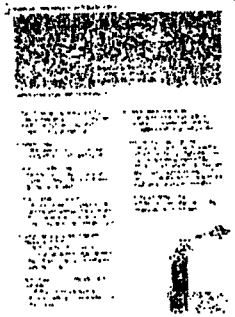




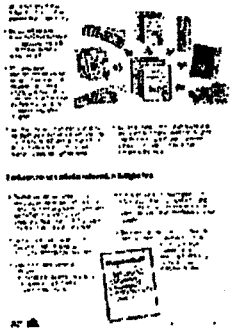




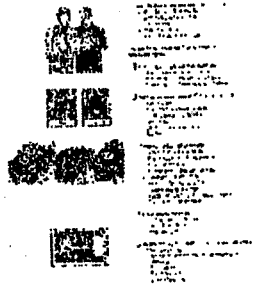


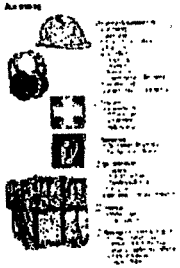


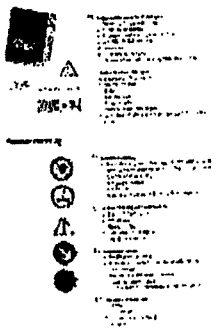


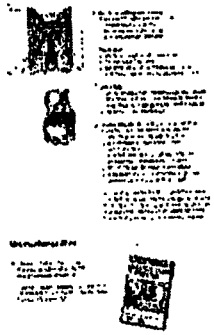


Baustellenvorbereitung

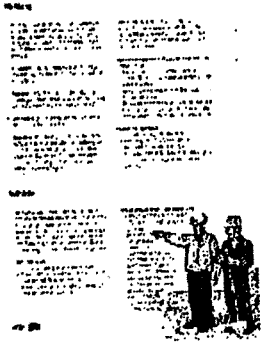








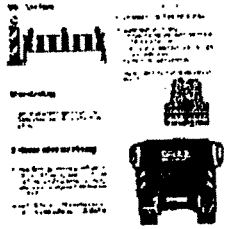
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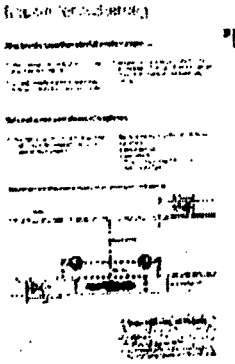




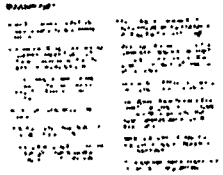
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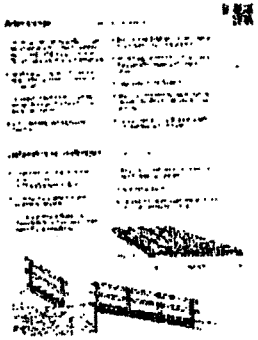




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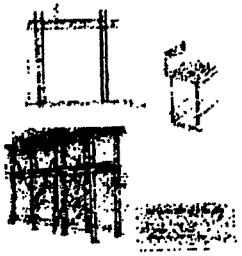


Zugänge und Wege





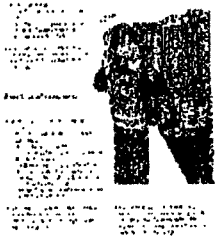






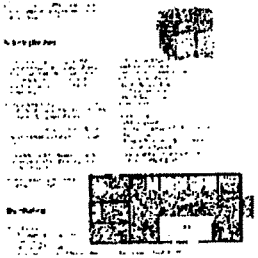
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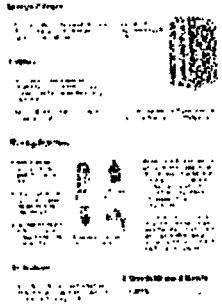




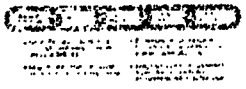


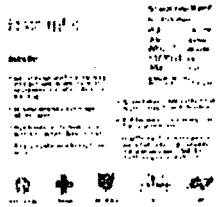
Aufenthaltsräume und Sanitäreinrichtungen



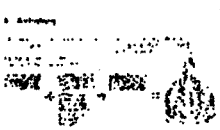


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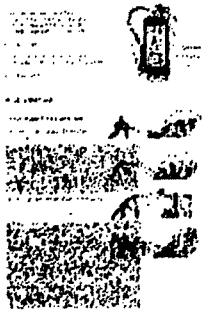




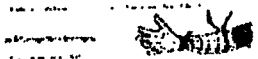
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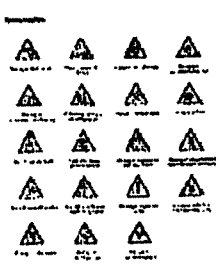


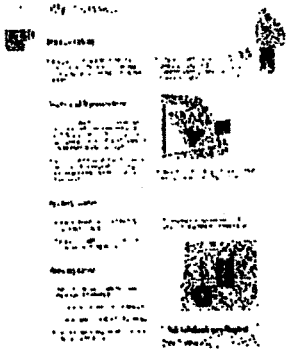




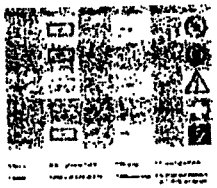


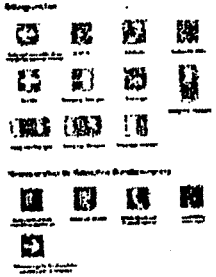




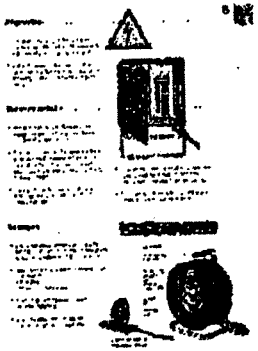


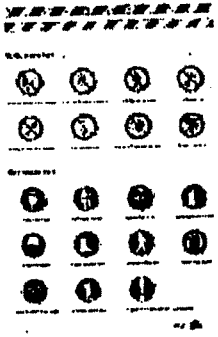
Sicherheitskennzeichnung





Elektrischer Strom am Bau



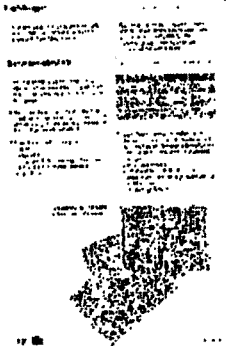


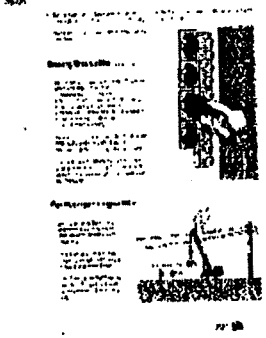
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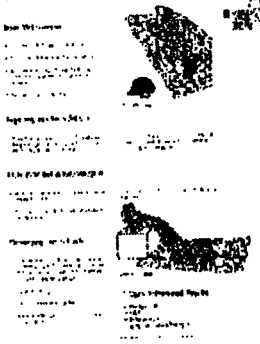


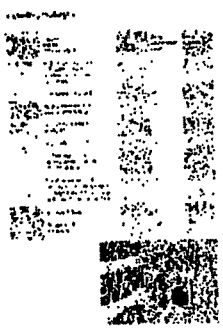




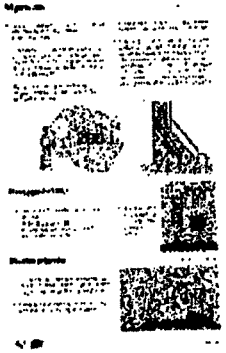


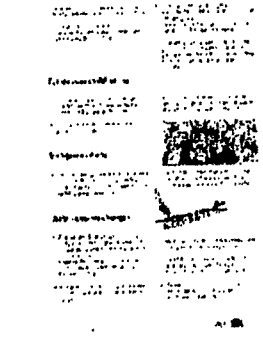


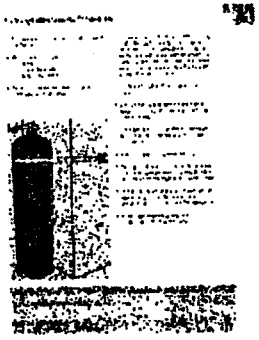


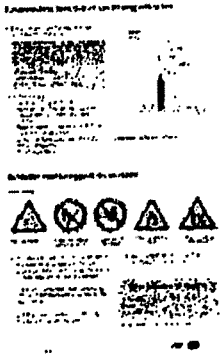


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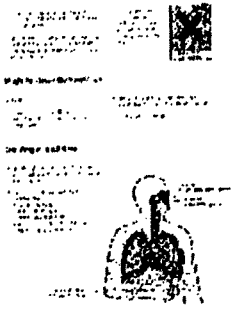


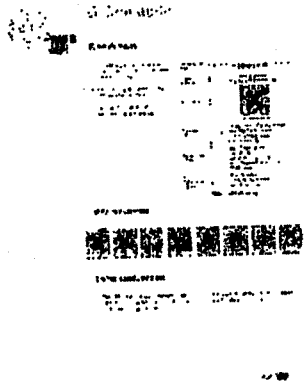


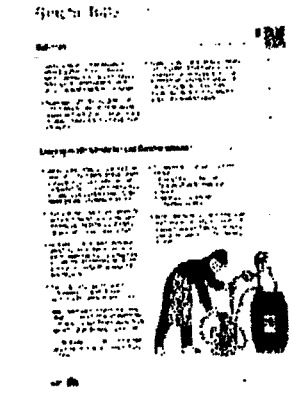




Gefahrstoffe

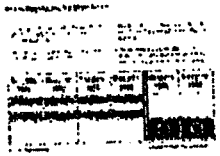


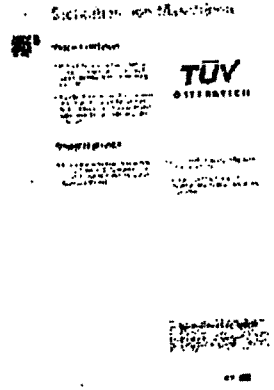




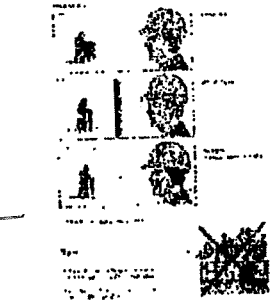


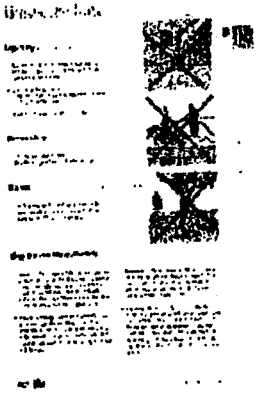
Sicherheit von Maschinen





Umweltschutz

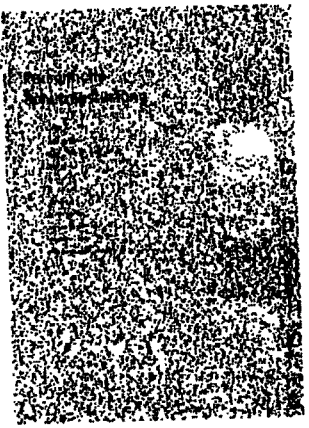




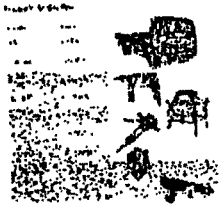
Baurestmassentrennung

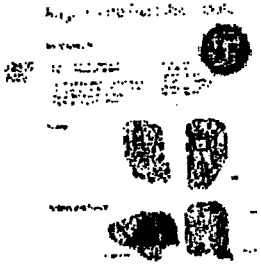


Alkohol und Suchtmittel

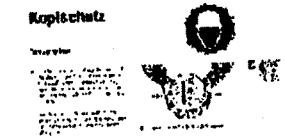


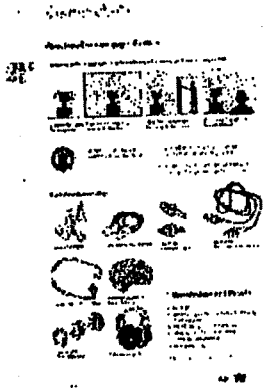
Gehörschutz



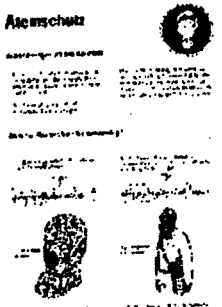


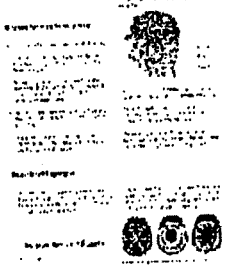
Kopfschutz



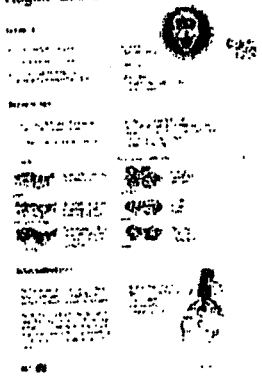


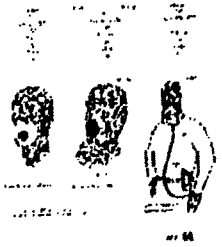
Atemschutz





Augen- und Gesichtsschutz





Handschutz

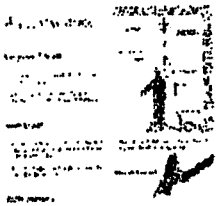
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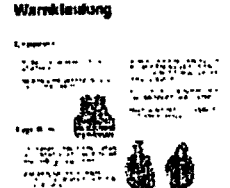
Fußschutz

Augenschutz

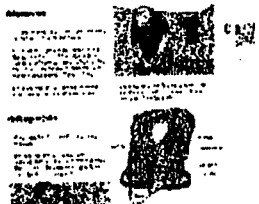
Atemschutz

Absturzsicherung

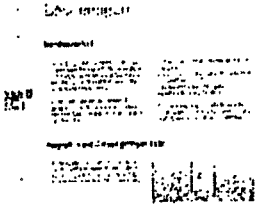


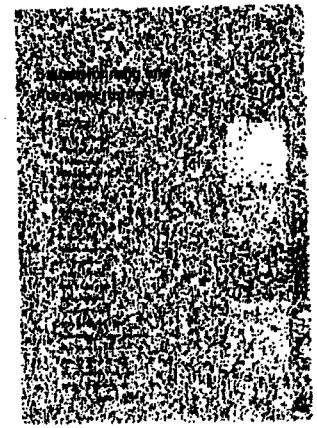




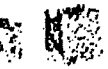












Leitungssicherung

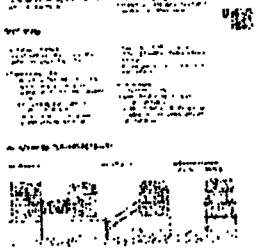


Arbeitsraumleuchten

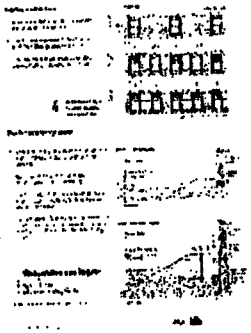


Baugrubenverbau

Unterfangungen

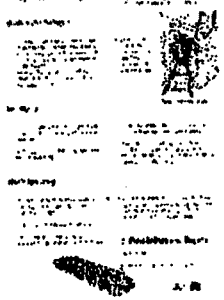


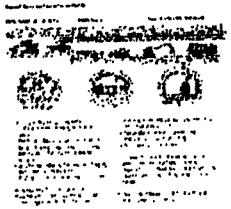
Tunnelbau

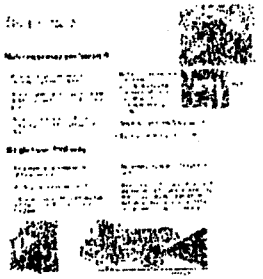


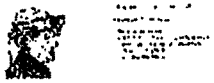
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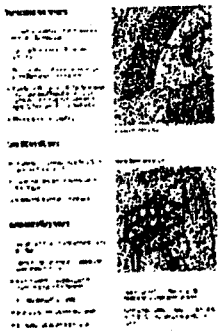


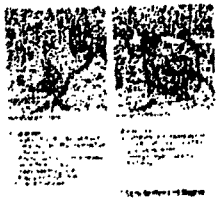












Bohr- und Rammarbeiten



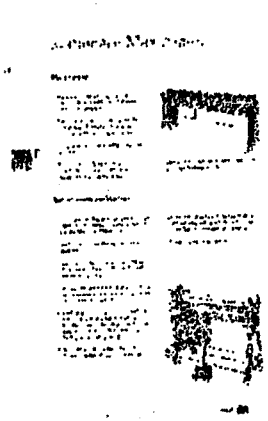
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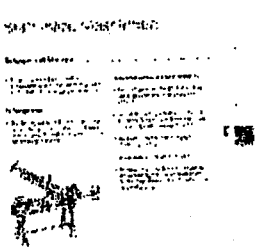


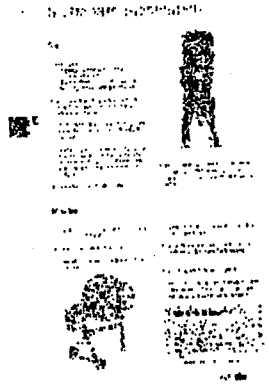
Betonierarbeiten



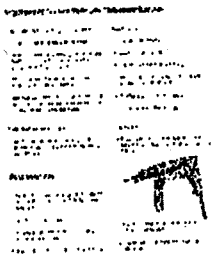


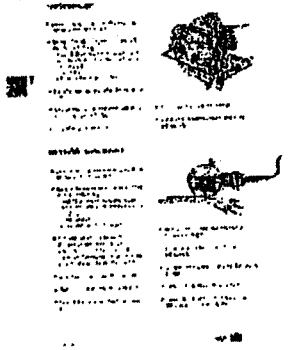


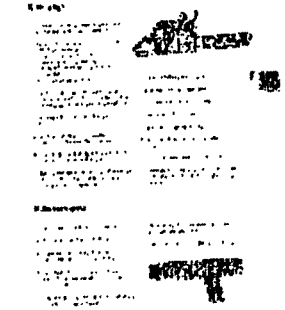


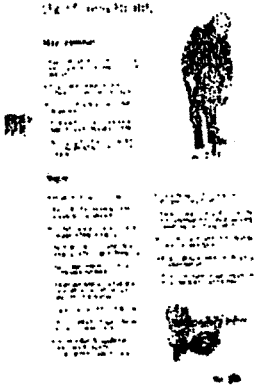


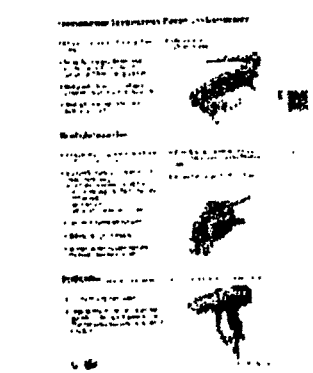
Handmaschinen

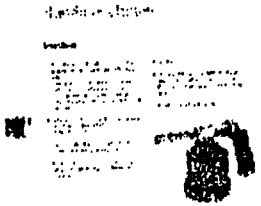


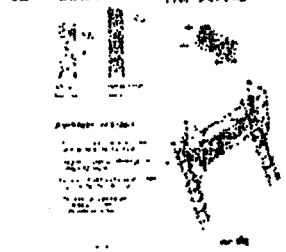












Lärm





Stationäre Maschinen



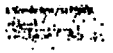








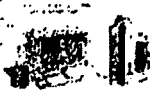


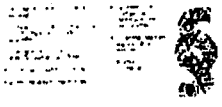






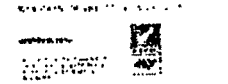


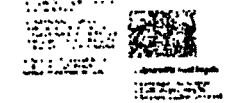


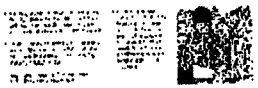


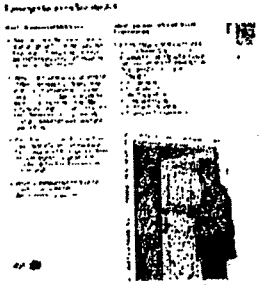




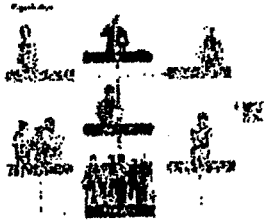


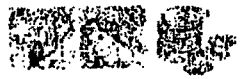


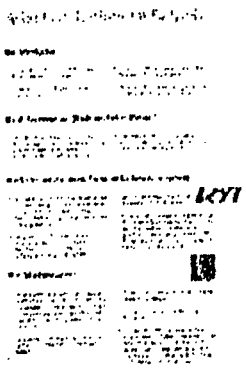




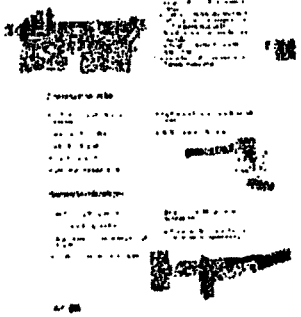
Arbeitssicherheit im Betrieb



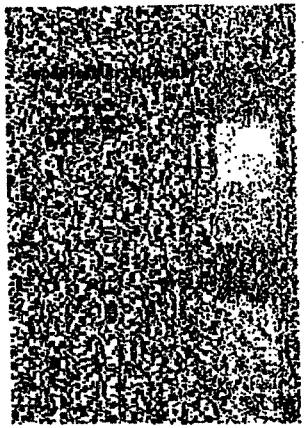


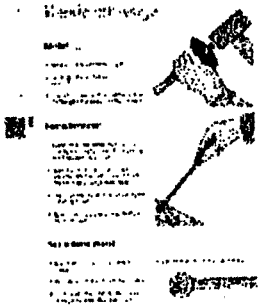


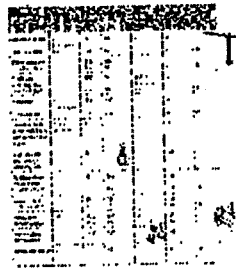
Handwerkzeuge



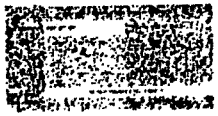
Prüfungen von Maschinen

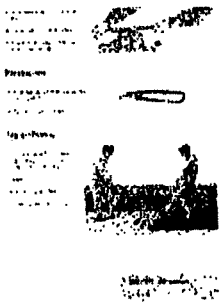


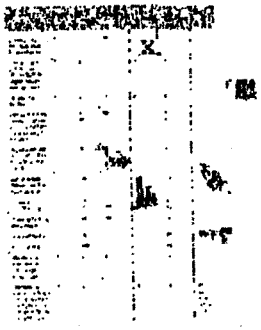


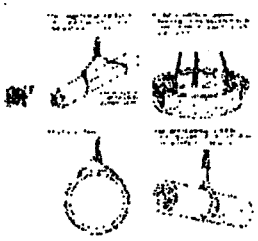


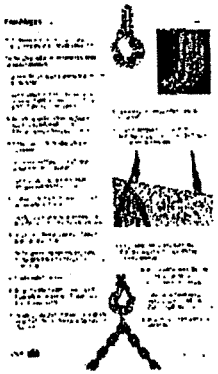
Das Arbeitsschutzsystem

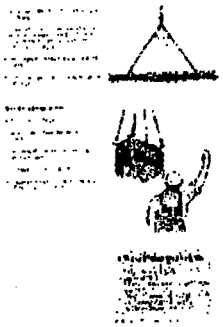




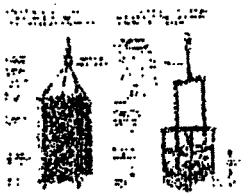




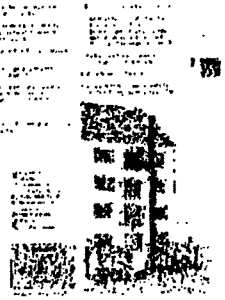


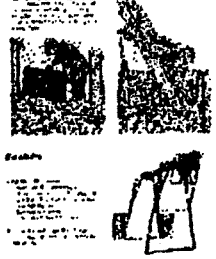


Personenaufnahmemittel



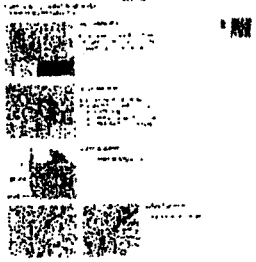
Bauaufzüge



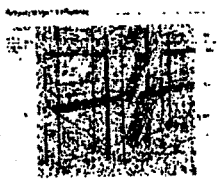




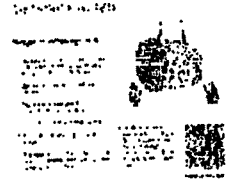
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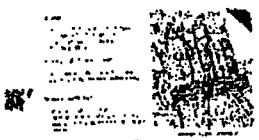


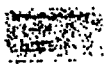
Arbeits- und Schutzgerüste

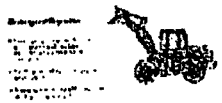






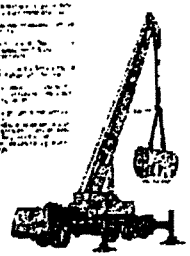


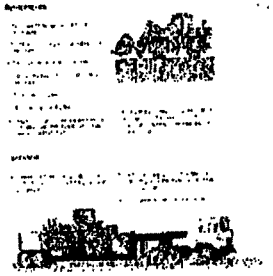


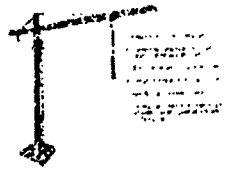


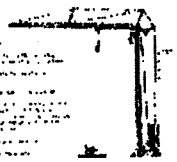


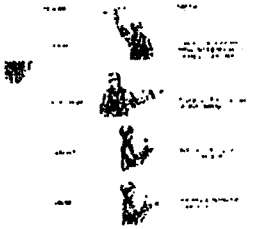
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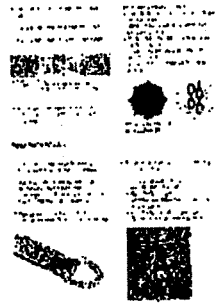


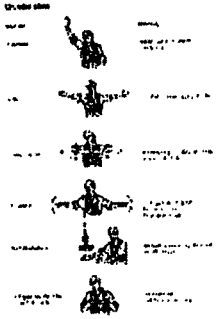




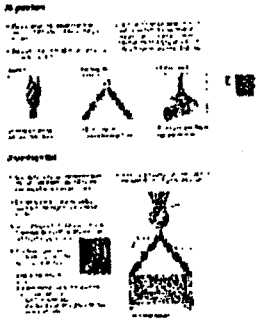


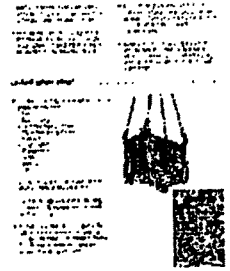


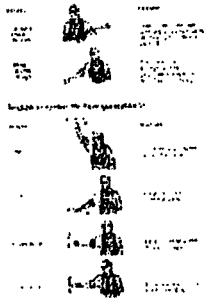


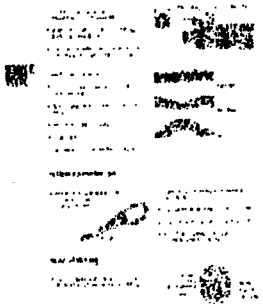


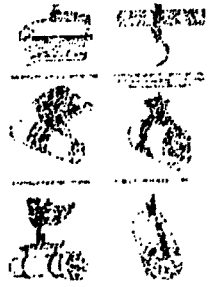
Anschlagen von Lasten

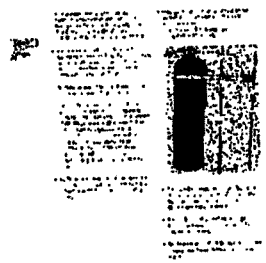


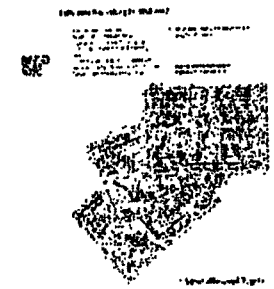






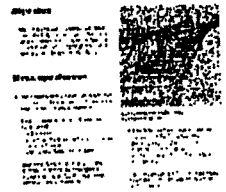






Arbeiten in Behältern

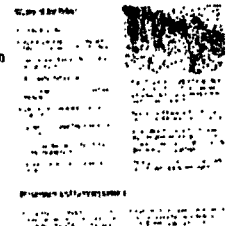






Arbeiten im Freileitungsbereich





Explosionsschutz

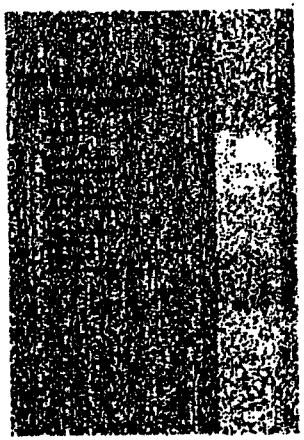


Konturnahrte Bereiche



fmaspert/Ladungssicherung

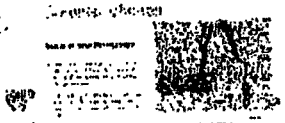


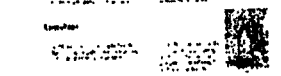


Baumschinen

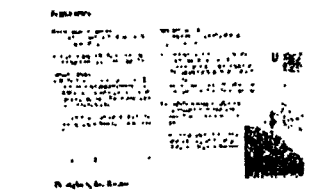


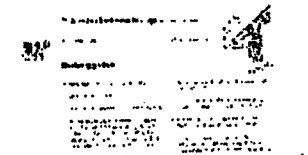






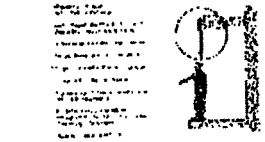
Arbeiten auf Dächern

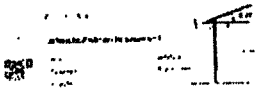


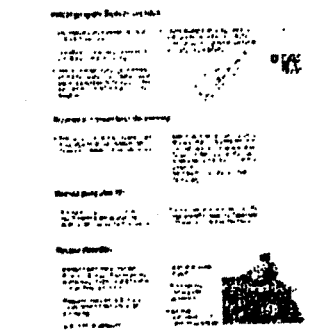


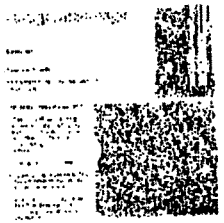
Fertigteilmontage

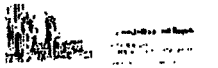


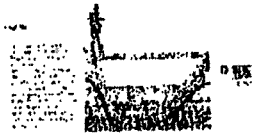




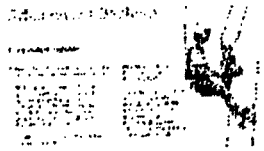


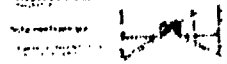


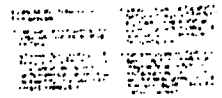




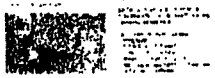


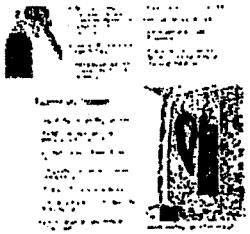










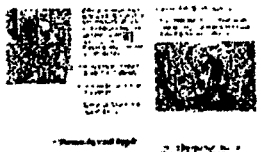


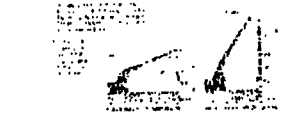
Abbrucharbeiten



Schweißarbeiten

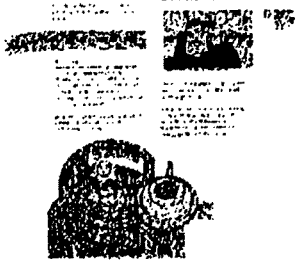








Arbeiten mit Flüssiggas





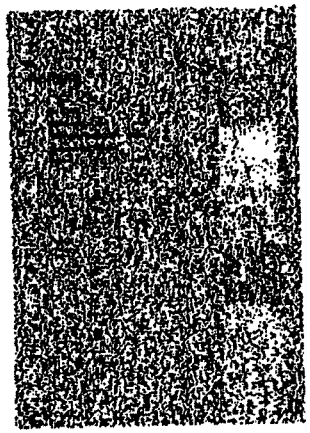


Schwarzarbeit



Verantwortung und Haftung



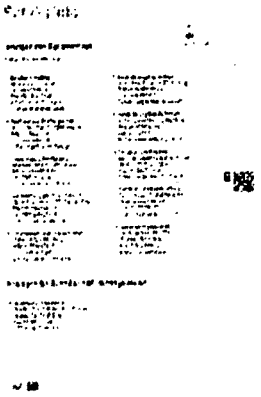


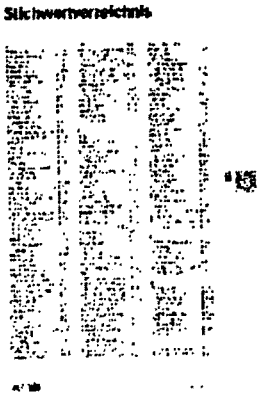


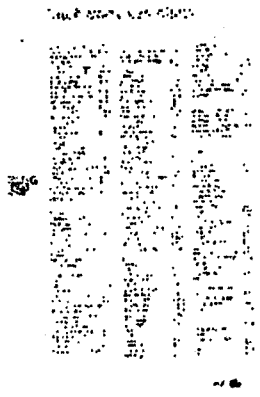
Rat & Hilfe



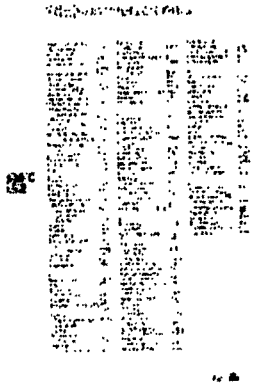


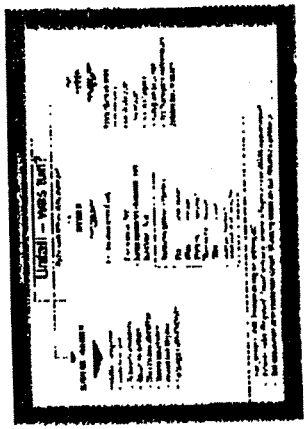


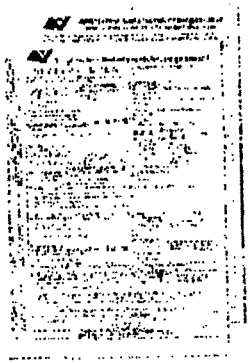

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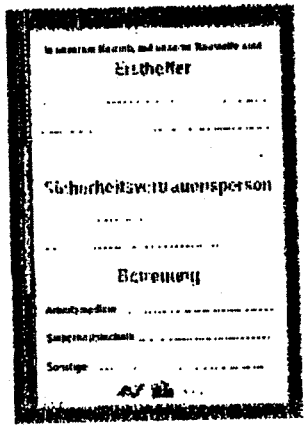







Unfall – was tun?

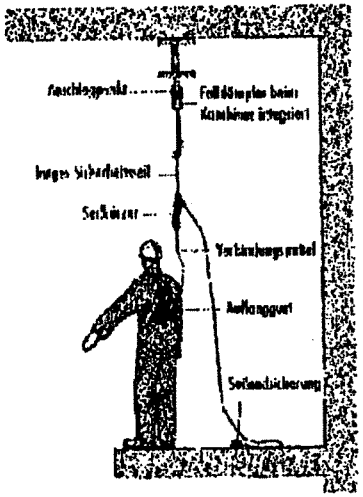



Ersthelfer
Sicherheitsbeauftragte/r
Betreuung

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 Pohl, Dipl.-Ing. Peter Reinsteiner
Ein Produkt der
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?

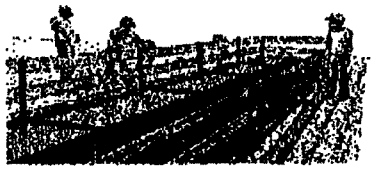
Primäre Absturzsicherungen

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

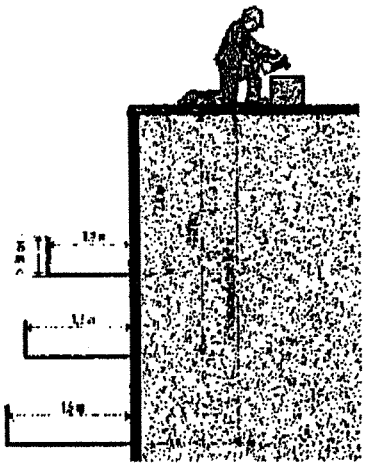


- **Abgrenzungen** durch Brustwehren in 1,00 bis 1,20 m Höhe,
  Abgrenzungen sind bei Loggien und Balkonen an den Zutrittsöffnungen, ansonsten generell in ca. 2 m Entfernung von der Absturzkante anzuordnen.

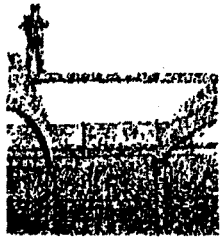
Sekundäre Absturzsicherungen

Wenn primäre Absturzsicherungen aus arbeitstechnischen Gründen nicht verwendet werden können, müssen sekundäre Absturzsicherungen, die abstürzende Arbeitnehmer und Gegenstände auffangen sollen, verwendet werden:

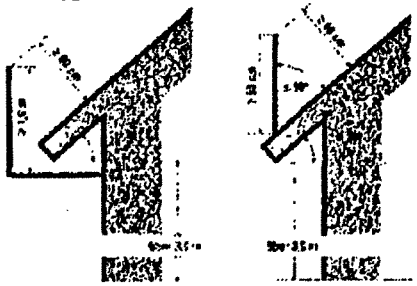
- **Fanggerüste**
  ausgebildet als Ausschussgerüst, als Konsolgerüst oder in Verbindung mit einem Fassadengerüst,



- **Auffangnetze**
  vorwiegend im Hallenbau eingesetzt,



- **Dachfanggerüste und Dachschutzblenden.**



Sonderarbeiten
Nr. 226
M 226

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:

Manchmal genügt die Ausbildung zum Sprengbefugten allein nicht.

- Tiefbohrlochsprengung,
- Unterwassersprengung,
- Sprengen in Serien-Parallelschaltung,
- Lawinensprengung,
- Sprengen von heißen Massen und
- Metallsprengung

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 Schließkiste
- 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

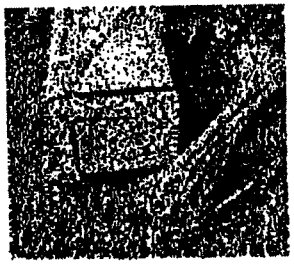
Initialsprengstoffe

- 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

In einer Zünderkette nur gleichartige Zünder verwenden!

Maßnahmen bei elektrischen Zündern

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

Sprengstoffe und Zündmittel auf keinen Fall in der Kleidung tragen!

Transport von Sprengstoffen und Zündmitteln auf öffentlichen Verkehrswegen
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 Schulterrageband (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
Bis 5 kg können diese in Räumen, aber unter sicherem Verschluss gelagert werden; in ihrer Nähe dürfen sich weder Feuerstellen noch feuergefährliche Gegenstände befinden.

Zünder und Sprengstoffe immer voneinander trennen!

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.

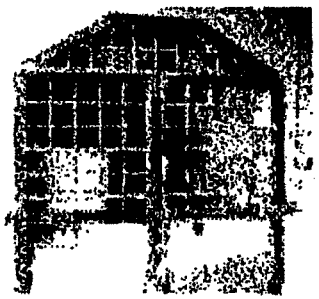
In diesen Räumen dürfen zusätzlich zu den Sprengstoffen und Sprengschnüren höchstens 100 sprengkräftige Zünder gelagert werden. Diese Zünder müssen in einem eigenen, versperrbaren Behälter untergebracht sein, der in möglichst großer Entfernung von den Sprengstoffen und Sprengschnüren steht.

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.

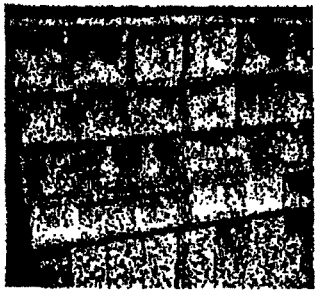
Ausgabe von Sprengmitteln

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

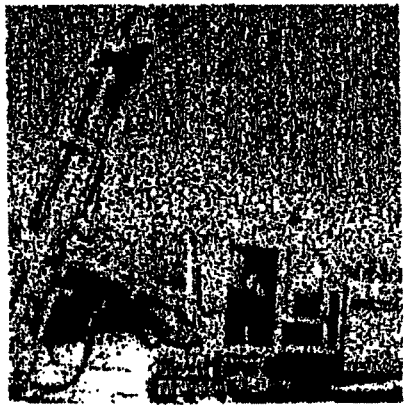
Bohren, Laden, Besetzen

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.



Bohrlafette

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 Dorn 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 Blitzschlag 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

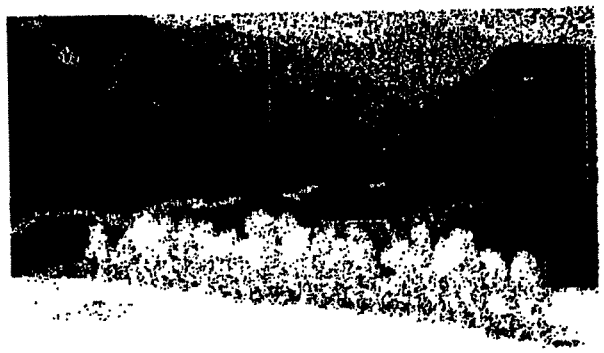
- sich mit Ausnahme der zum Anzünden notwendigen Personen keine weiteren Personen im Streubereich oder außerhalb der Deckung befinden;
- bei elektrischer Zündung die Anlage auf ihren Gesamtwiderstand geprüft und in Ordnung befunden wurde.

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 stehen gebliebenen Bohrlöchern und Lassen ist verboten (Lebensgefahr durch Sprengstoff- oder Zündmittelreste!)

Um Versager zu beseitigen, entfernen Sie zuerst den Besatz. Die stehen gebliebene 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
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.

Wichtig! Wie man den Besatz richtig entfernt.

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 Fleggen, 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

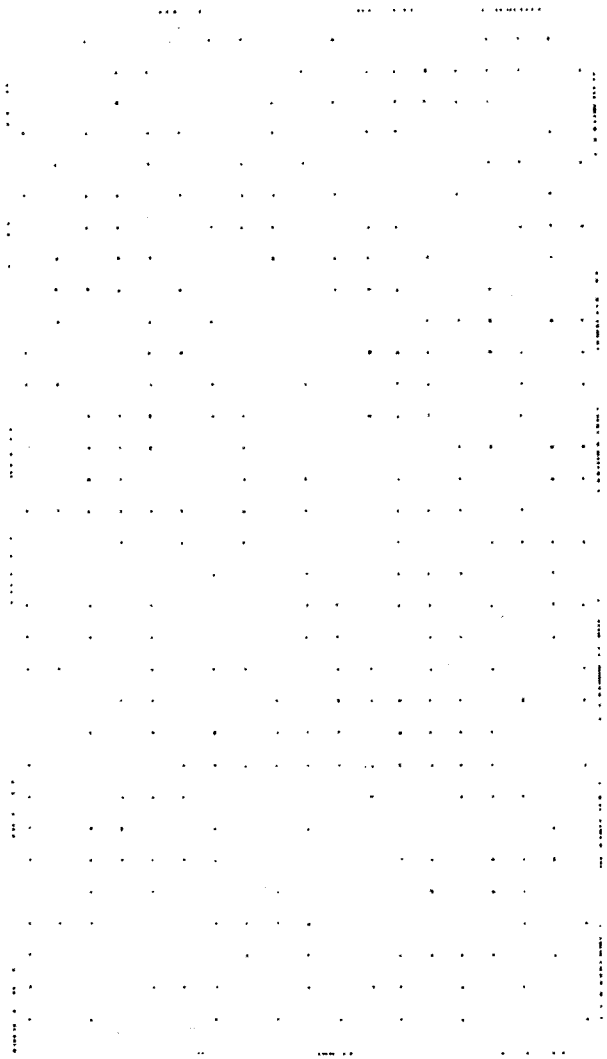
Sprengmittelzulassungsverordnung für den Bergbau

Gefahrgutbeförderungsgesetz für Straße

Gefahrgutbeförderungsgesetz für Eisenbahn

ADR

Notizen



STRABAG

Information Brochure for New Hires

SICHER
GESUND
UMWELTBEWUSST
arbeiten bei der STRABAG AG

SGU-Einführungsbroschüre für
neue STRABAG-Mitarbeiter

STRABAG

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Den Beauftragten für Sicherheitsfragen erreichen Sie in Wien über
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Mobil 0664 / 240 95 43
email johannes.pestal@strabag.at

STRABAG

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.

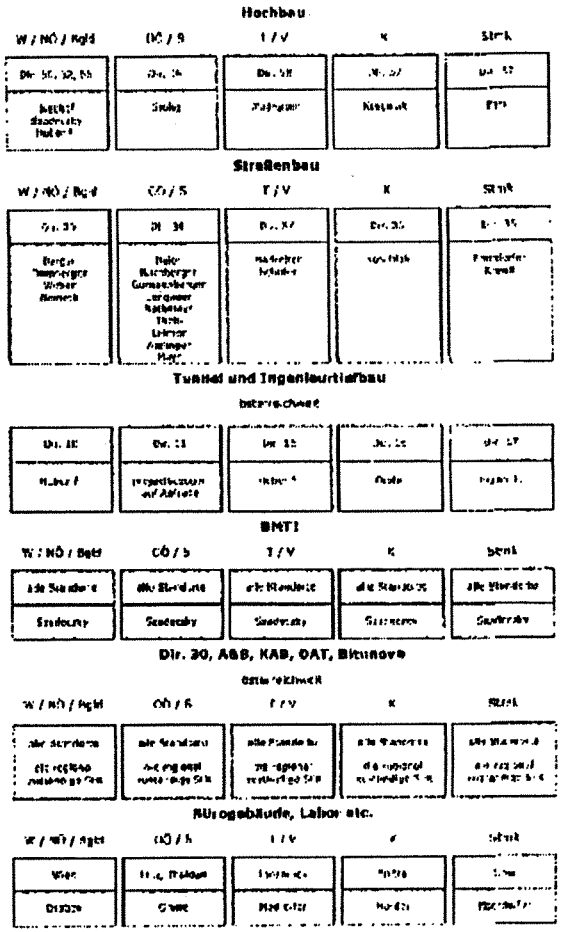
Sicherheits-, Gesundheits- und Umweltbewusstsein sind Aspekte, die jeden betreffen, ständig zu beachten und in einer Gemeinschaft erforderlich sind. Die Ziele können nur dann verwirklicht werden, wenn jeder Mitarbeiter dafür eintritt und sich persönlich Verantwortlich zeigt.

SGU - Eine Sache, die jeden angeht

Wir wünschen Ihnen eine sichere, gesunde und erfolgreiche Zukunft bei der STRABAG AG

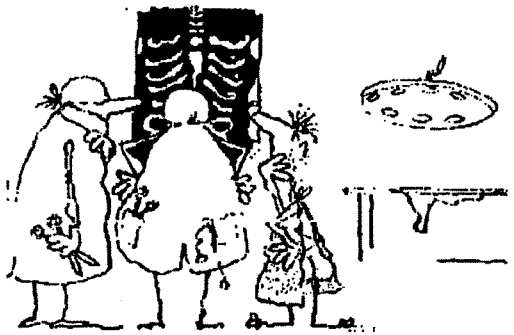
Die Unternehmensleitung

STRABAG





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.

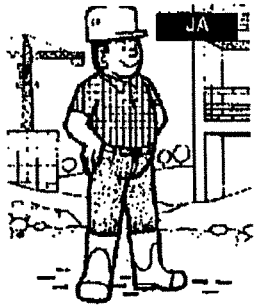
Maschinen dürfen ausschließlich von dazu befugten, beauftragten und angeleiteten Personen bedient werden.

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.

STRABAG

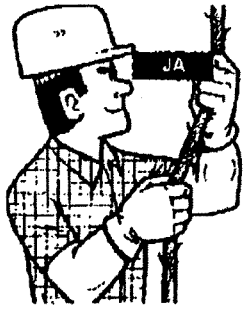


Mit persönlicher Schutzausrüstung (PSA) können Sie Verletzungen an Kopf, Händen, Füßen und Augen vorbeugen.



Gute Arbeitshandschuhe schützen vor

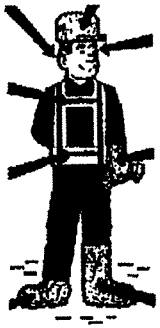
- Stich- und Schnittwunden
- Hautkrankheiten



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.



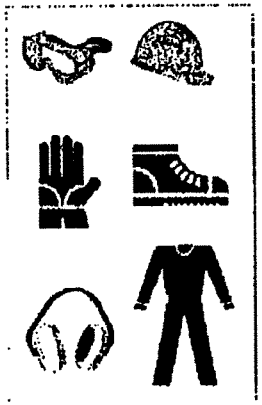
Der Betrieb stellt Ihnen folgende Ausrüstung zur Verfügung:

- 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.

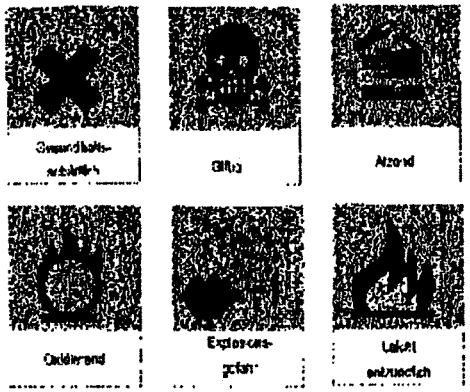
Treppen, die Umgebung von Leitern, Fluchtwegen, Zufahrten sowie der Zugang für Rettungsfahrzeuge müssen stets freigehalten werden.

Halten Sie die Unterkünfte und sanitären Anlagen stets sauber und benutzen Sie die vorgesehenen Abfallbehälter!

6 Gefahrensymbole

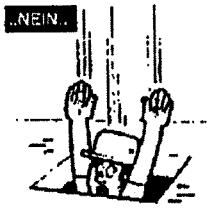
Gefahrensymbole sind notwendig, um auf mögliche Risiken gefährlicher Produkte hinzuweisen. Sie befinden sich auf den Etiketten der entsprechenden Produkte.

Schwarz auf orangem Hintergrund

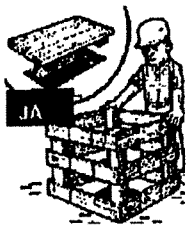


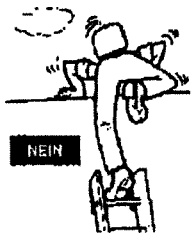
Die nötige Achtsamkeit im Umgang mit diesen Produkten wird von jedem erwartet. Lesen Sie, wenn nötig, die grundlegenden Hinweise auf dem Etikett.

7 Maschinen und Geräte

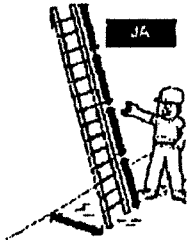


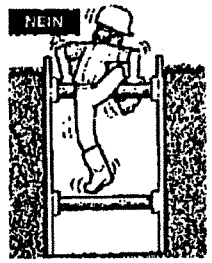
Achten Sie darauf, dass Öffnungen auf der Baustelle ordentlich gesichert sind.



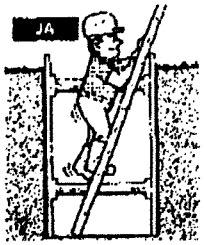


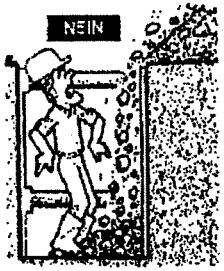
Benutzen Sie Leitern mit ausreichender Länge auf festem Boden



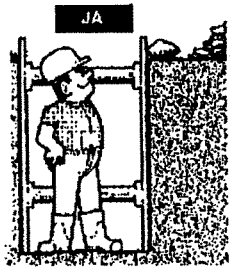


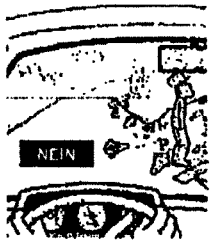
Dies gilt auch für den Ein- und Ausstieg in Gräben.



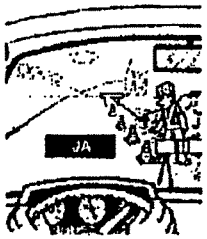


Bei Erdarbeiten besteht die Gefahr, dass Wände einstürzen, deshalb Grubenverbau bis über die Oberfläche führen.



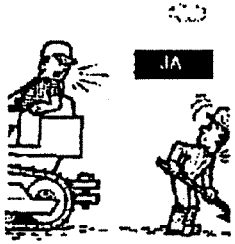


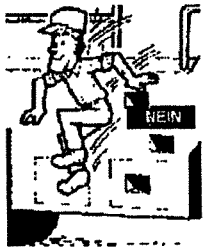
Auf Straßen immer für richtige Absperrung sorgen.



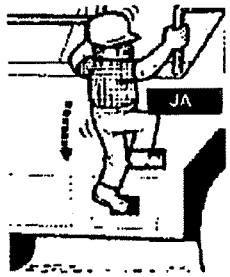


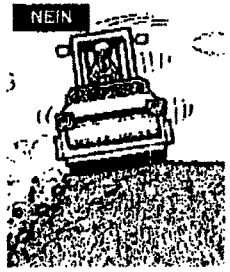
Beim Rückwärtsfahren auf toten Winkel achten, Gefahr für Mitarbeiter.



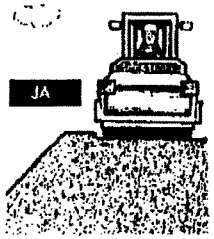


Benutzen Sie die vorgesehenen Tritte, springen Sie nicht ab.





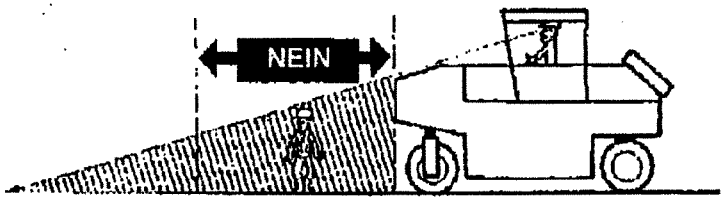
Halten Sie mit Geräten Abstand von Geländekanten.

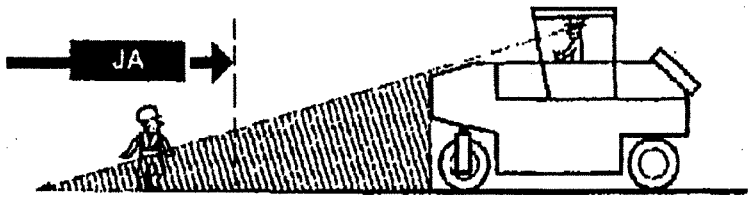




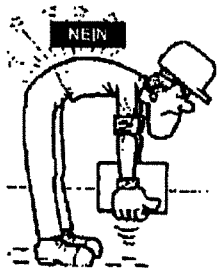
Ordnung und Sauberkeit, für IHRE und MEINE Sicherheit!







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

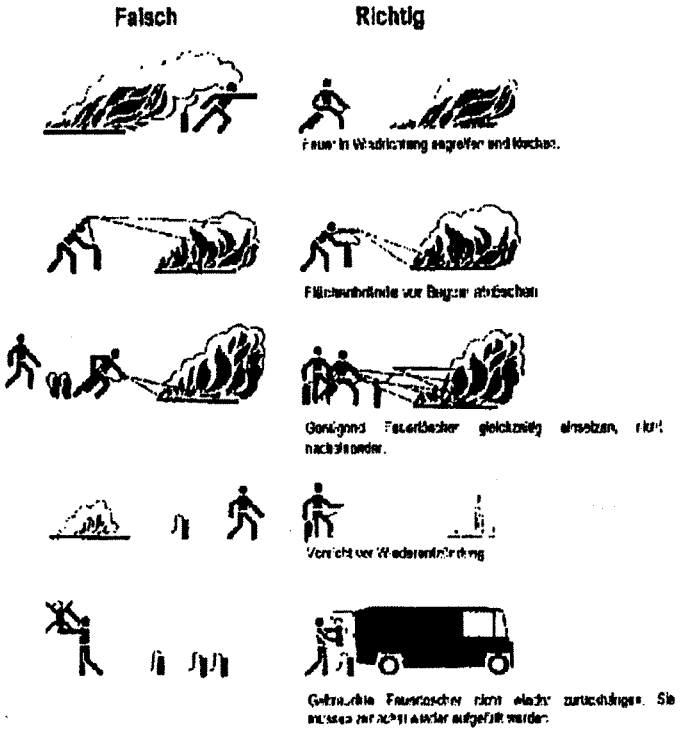
Dies war die erste Information über sicheres, gesundes und umweltbewusstes Arbeiten bei der STRABAG.

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!

STRABAG	STRABAG BETRIEBSANWEISUNG	Kapitel 3 BA 3.3

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.		

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 Anwesenheit 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/geandert: 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 Gerätef0hrers
		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:			Erstunterweisung	
					Wiederkehrende Unterweisung	
		Name: Vorname: Geburtsdatum:			Erstunterweisung	
					Wiederkehrende Unterweisung	
		Name: Vorname: Geburtsdatum:			Erstunterweisung	
					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: Pestal / Berger, 07.01.2004

Bauvorhaben / Baustellenadresse	Baustellen-Telefon:

NOTRUF

FEUERWEHR	122
POLIZEI	133
RETTUNG	144
NOTARZT	
KRANKENHAUS	

TELEFON	
STROM	
KANAL	
WASSER	
GAS	

BAULEITUNG

BAULEITER	Name: Tel.:
TECHNIKER	Name: Tel.:
POLIER	Name: Tel.:
VORARBEITER	Name: Tel.:

FIRMA	STRABAG AG DIREKTION
	Tel.:
BRL / GRL	Name:
	Tel.:
	Name:
	Tel.:

ARBEITSSICHERHEIT

BAUSTELLEN-KOORDINATOR	Name: Tel.:
SICHERHEITS-FACHKRAFT	Name: Tel.:
SICHERHEITS-VERTRAUENSPERSONEN	Name: Tel.:
	Name: Tel.:
ARBEITSINSPEKTORAT	Name: Tel.:

ERSTHELFER	
Name:	Tel.:
Name:	Tel.:
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!**

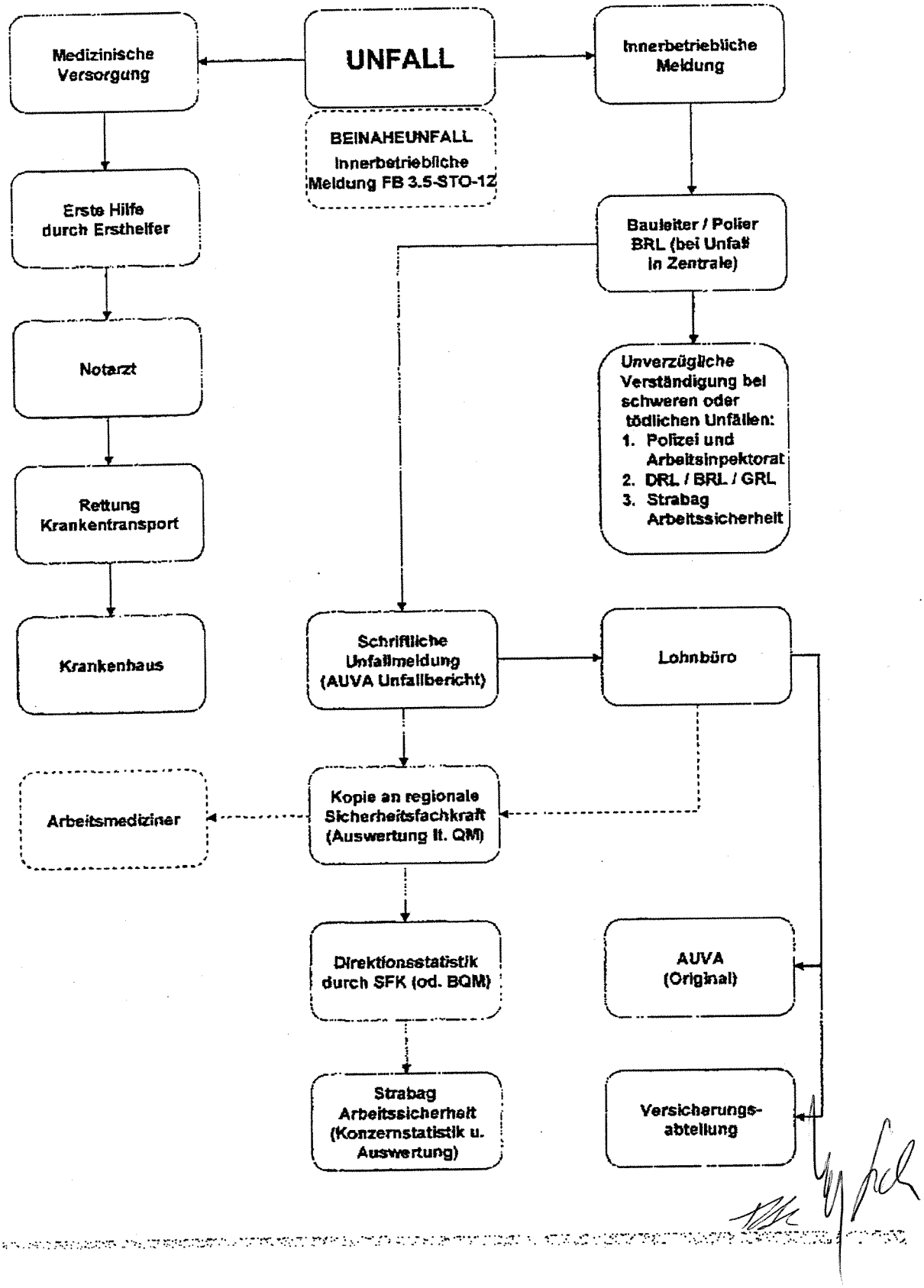
3. WEITERE MASSNAHMEN

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	Schlüssel Nr. 20 – 42	ART DER TÄTIGKEIT
	A		B
Schlüssel Nr. 50 – 59	BETEILIGTES ARBEITSMITTEL	Schlüssel Nr. 60 – 68	VERLETZTER KÖRPERTEIL
	C		D
Schlüssel Nr. 70 – 75	SCHWERE DES UNFALLES	Schlüssel Nr. 80 – 87	ART DES UNFALLES
	E		F

Baustellenangaben:	Vorgesetzte:
Baustelle:	Bereichsleiter:
KSt.:	Gruppenleiter:
Bereich:	Bauleiter:
Gruppe:	Polier/VA:
Verletzter:	Ausgewertet von:
Funktion:	Funktion:
Ausfalldauer (in Kalendertagen): ..... KT	Datum:
Sonstiges:	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 - 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	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	SICHERHEITSTECHNISCHE CHECKLISTE SFK	CR 3.5-STO-01 Ausgabe: 01

Erstellt/geandert: 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 Werkzeuge Kleingeräte		4.8	Wartung, Zustand, Prüfplakette ÖVE
			4.9	Zustand, Eignung (Leitern)
			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	Warmkleidung 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 - Gefahrguttbeförderung		13.1	ADR bzw. Ausnahme „Baustellenbeförderung" eingehalten?

NR.	BEMERKUNGEN	VERWEIS AUF

Verteiler *): ☐ BL ☐ SVP ☐ GRL ☐ 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
- ☐ Bauherr
- ☐ 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 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
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	☐	☐	
1.4 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

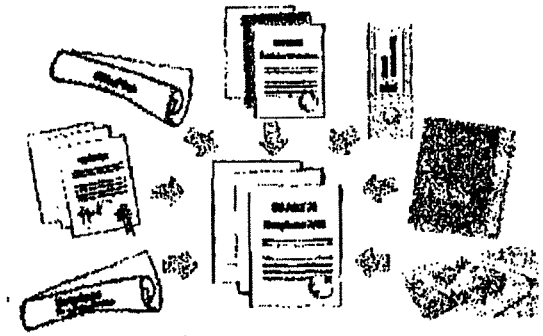
.....
Für das Unternehmen

STRABAG

Baustellenordner

„Arbeitssicherheit“





STRABAG

Baustellenordner

„Arbeitssicherheit"





STRABAG

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"

STRABAG

Baustellenordner Arbeitssicherheit:

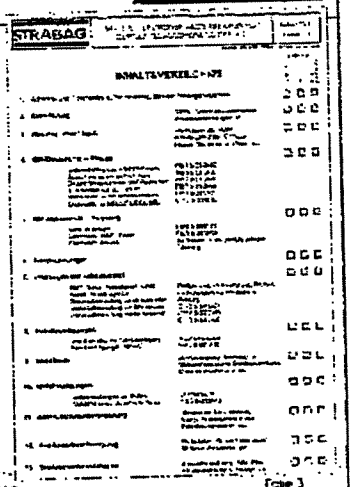
(FB 3.5-STO-01)

→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.



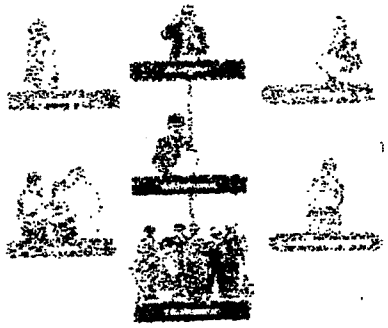
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„Baustellenordner Arbeitssicherheit"

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→ **1. Adress- und Telefonliste, Firmenliste, Baustellenorganigramm:**





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Baustellenordner Arbeitssicherheit

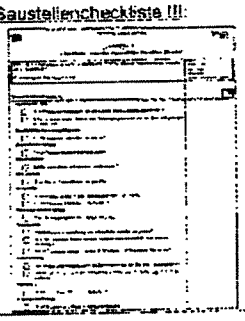
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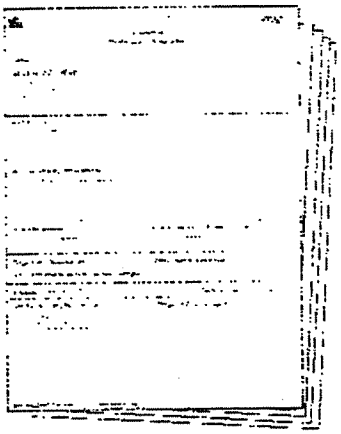
➔ 2. Evaluierung:

Evaluierung mit ÖBEV:



+ Baustellencheckliste !!!:



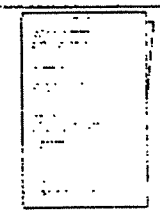


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Baustellenordner Arbeitssicherheit

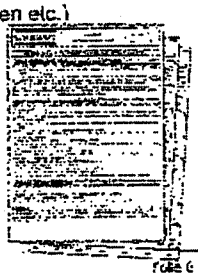
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➔ 2.1. Beilagen zur Evaluierung:



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.

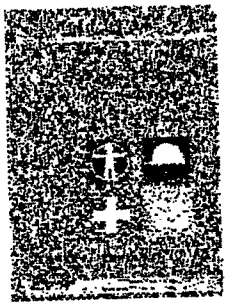


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Baustellenordner "Arbeitssicherheit"

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➔ 3. Gesetze und Untertagen:





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Baustellenordner "Arbeitssicherheit"

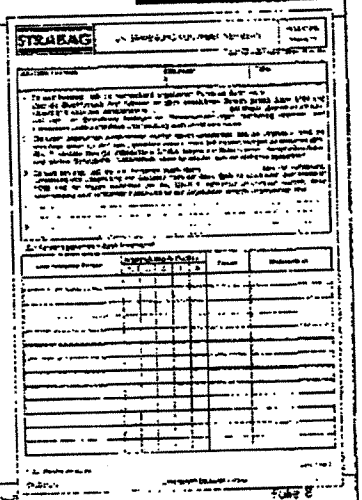
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➔ 4. QM-Dokumente - Ablage:

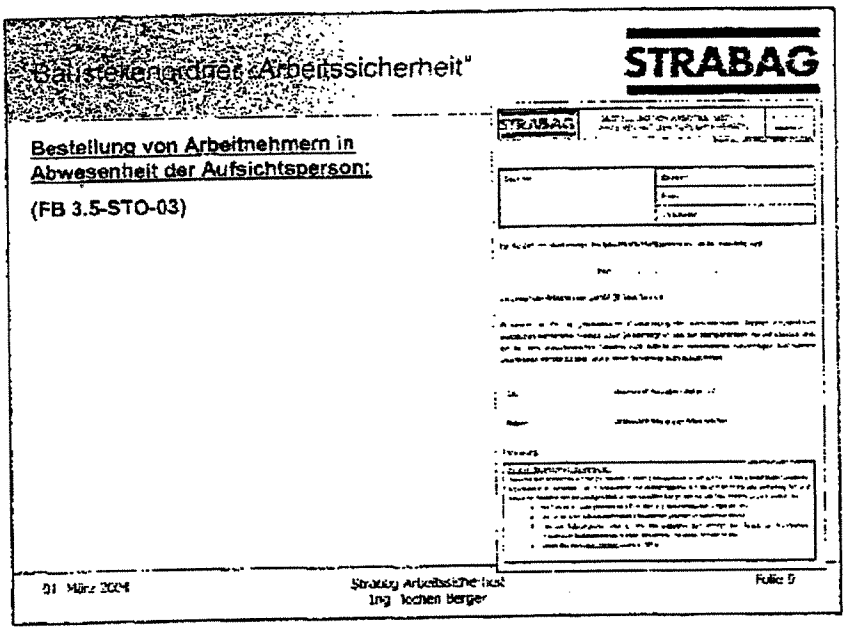
Unterweisung von Arbeitnehmern:

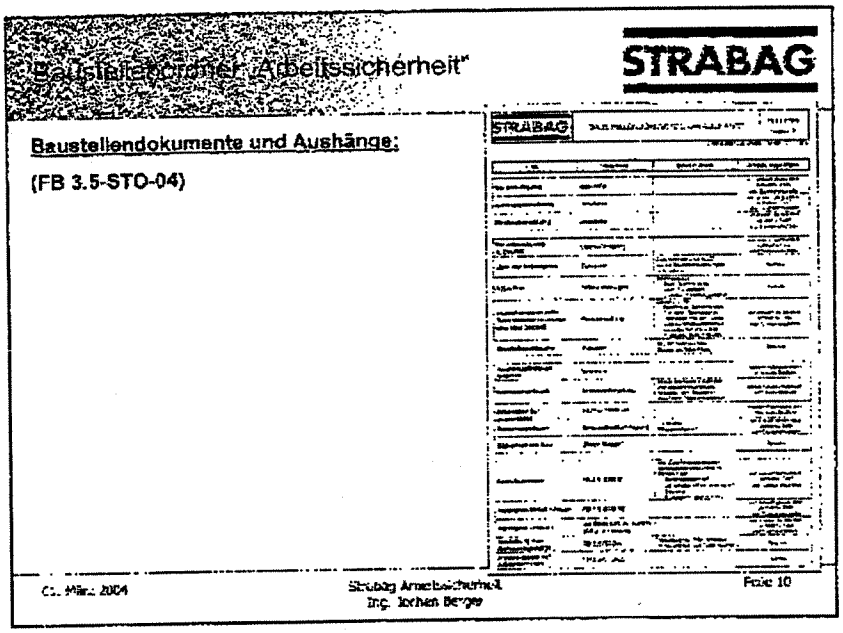
(FB 3.5-STO-02)

- Pkt. 1 – Allgemeine Unterweisung
- Pkt. 2 – Unterweisung PSA
- Pkt. 3 – Unterweisung Gerüste
- Pkt. 4+5 – baustellenspez. Unterweisung



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"Baustellenordner Arbeitssicherheit"
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Bestellung von Arbeitnehmern in Abwesenheit der Aufsichtsperson:
(FB 3.5-STO-03)
STRABAG
01. März 2004
Strabag Arbeitssicherheit
Ing. Jochen Berger
Folie 9

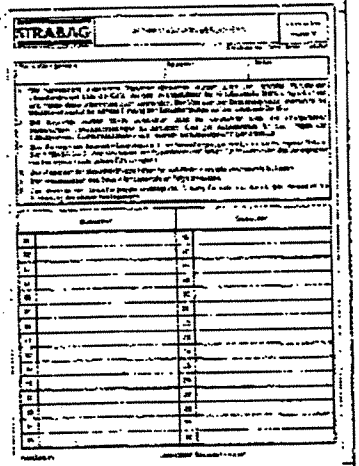

"Baustellenordner Arbeitssicherheit"
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Baustellendokumente und Aushänge:
(FB 3.5-STO-04)
STRABAG
01. März 2004
Strabag Arbeitssicherheit
Ing. Jochen Berger
Folie 10

„Baustellenbroschüre Arbeitssicherheit"

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Information von Besuchern:

(FB 3.5-STO-06)



01. März 2004

Strabag Arbeitssicherheit
Ing. Jochen Berger

Folie 11

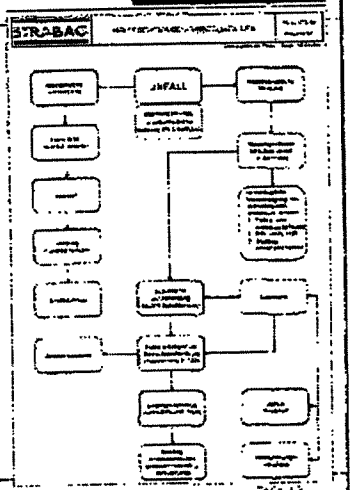
„Baustellenbroschüre Arbeitssicherheit"

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Meldeschema bei Arbeitsunfällen:

(FB 3.5-STO-09)

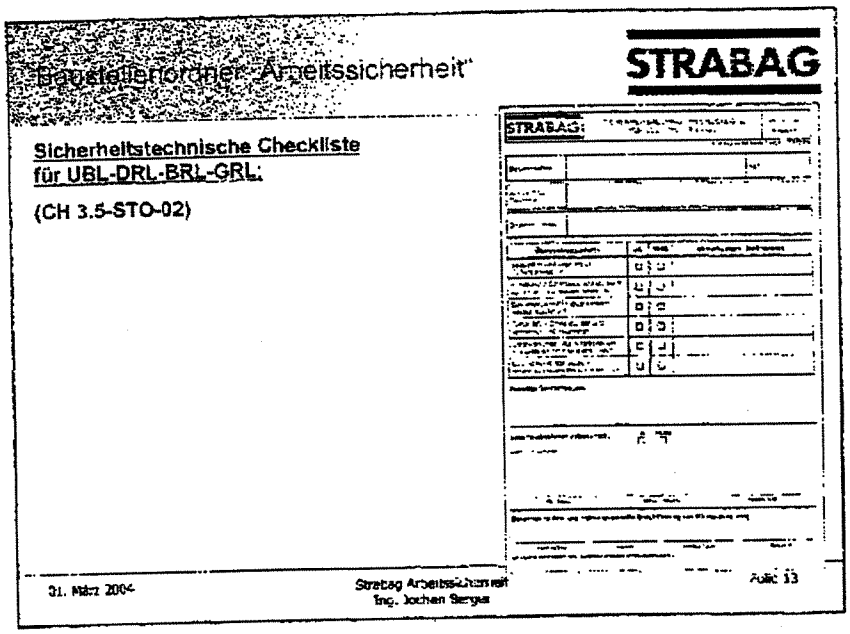
NEU: Meldung eines Beinahe-Unfalles !!!

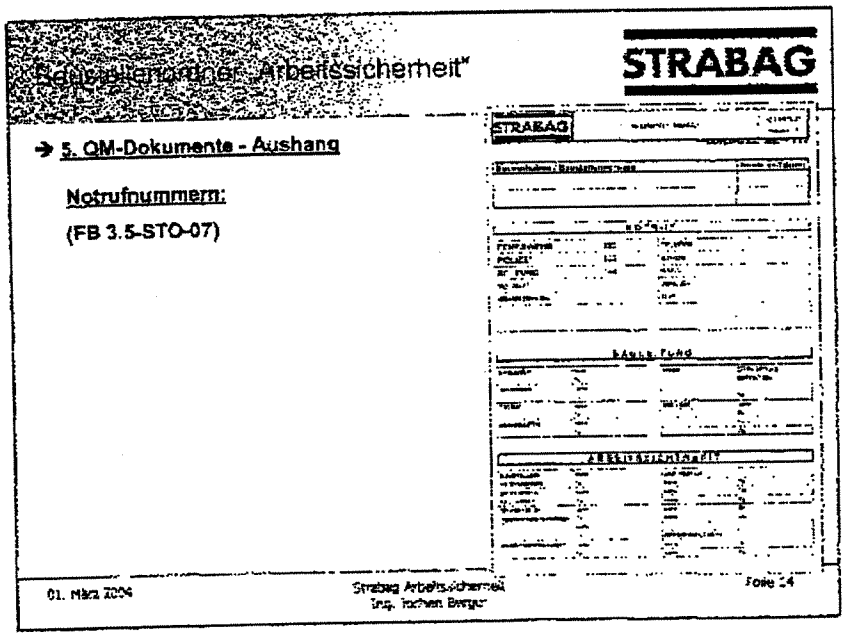


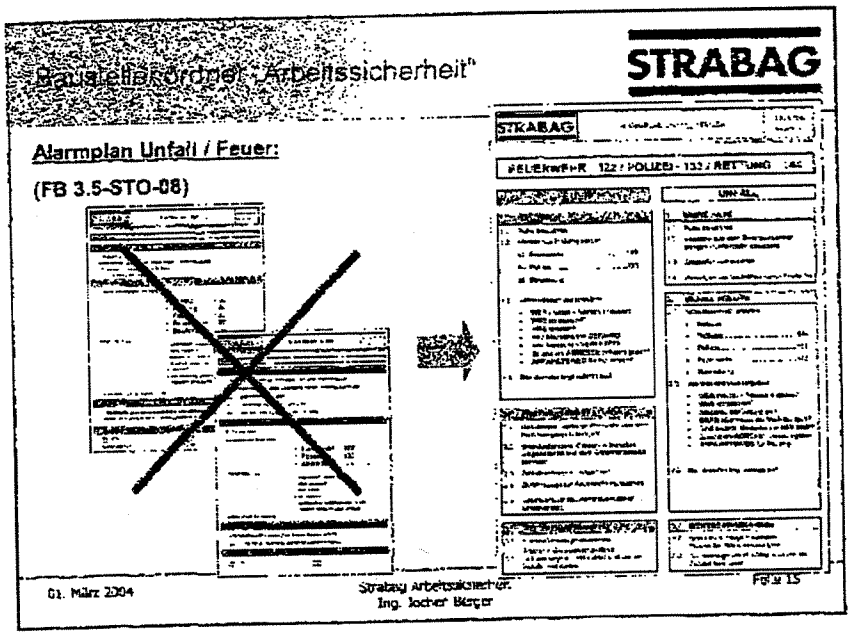
01. März 2004

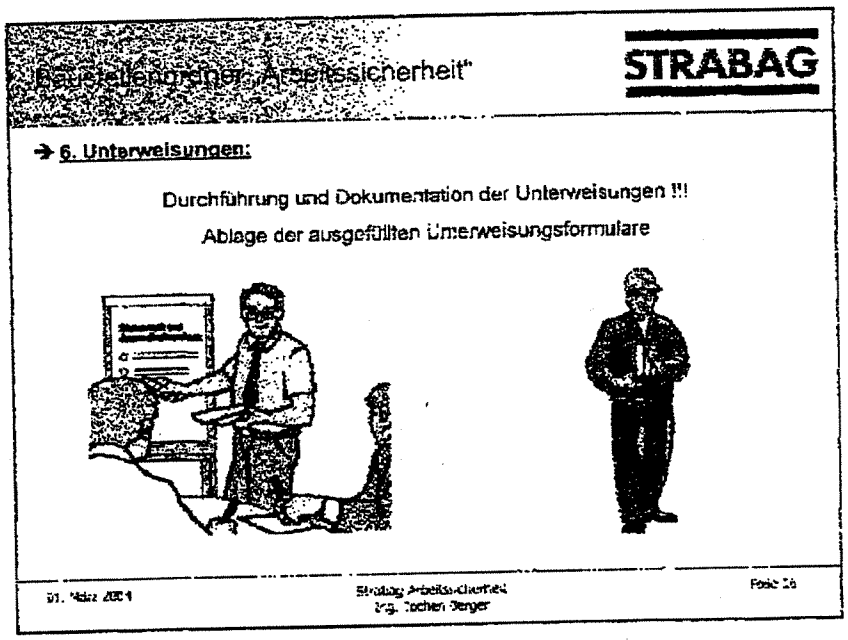
Strabag Arbeitssicherheit
Ing. Jochen Berger

Folie 12


Baustellenordner Arbeitssicherheit"
STRABAG
Sicherheitstechnische Checkliste
für UBL-DRL-BRL-GRL:
(CH 3.5-STO-02)
STRABAG
31. März 2004
Strabag Arbeitssicherheit
Ing. Jochen Berger
Folie 13


Baustellenordner Arbeitssicherheit"
STRABAG
➔ 5. QM-Dokumente - Aushang
Notrufnummern:
(FB 3.5-STO-07)
STRABAG
01. März 2004
Strabag Arbeitssicherheit
Ing. Jochen Berger
Folie 14


Baustellenordner "Arbeitssicherheit"
STRABAG
Alarmplan Unfall / Feuer:
(FB 3.5-STO-08)
01. März 2004
Strabag Arbeitssicherheit
Ing. Jochen Berger
Folie 15


Baustellenordner "Arbeitssicherheit"
STRABAG
→ 6. Unterweisungen:
Durchführung und Dokumentation der Unterweisungen !!!
Ablage der ausgefüllten Unterweisungsformulare
01. März 2004
Strabag Arbeitssicherheit
Ing. Jochen Berger
Folie 16

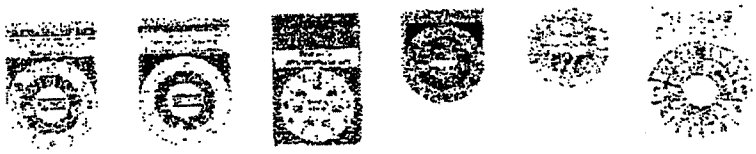
Baustellenordner „Arbeitssicherheit"

STRABAG

→ **7. Prüfungen der Arbeitsmittel:**

BMTI Gerät, Fremdgerät GWS, Kranz, Anschlagmittel

Prüfplan, Abnahmeprüfung, Prüfung nach Aufstellung, wiederkehr Prüfung



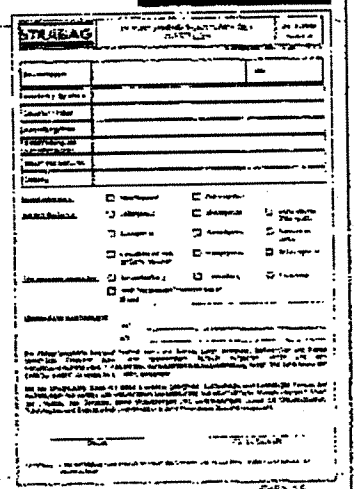
Gerüstüberprüfung durch Aufsteller	CH 3.5-STO-04
Gerüstüberprüfung vor Ersteinsatz	CH 3.5-STO-05
Gerüstüberprüfung wiederkehrend	CH 3.5-STO-06

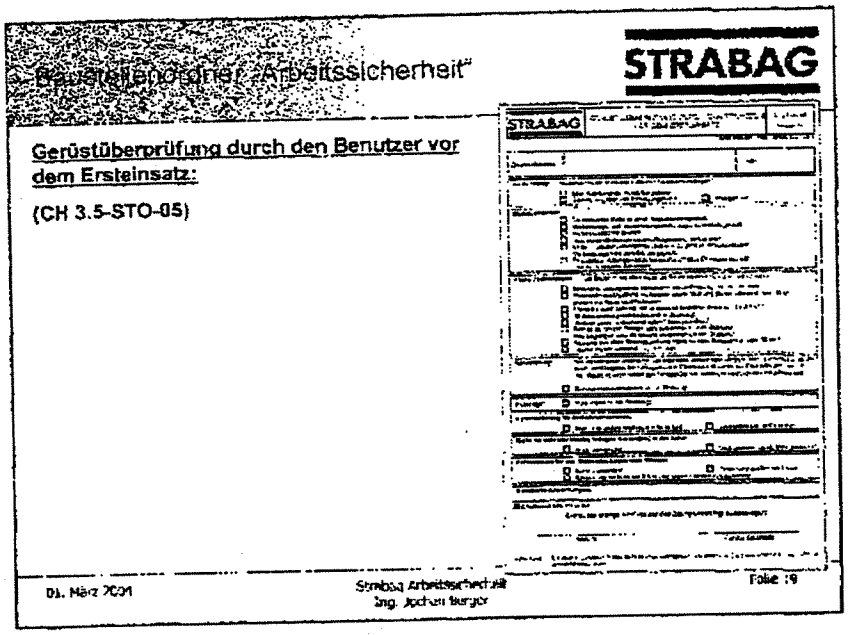
Baustellenordner „Arbeitssicherheit"

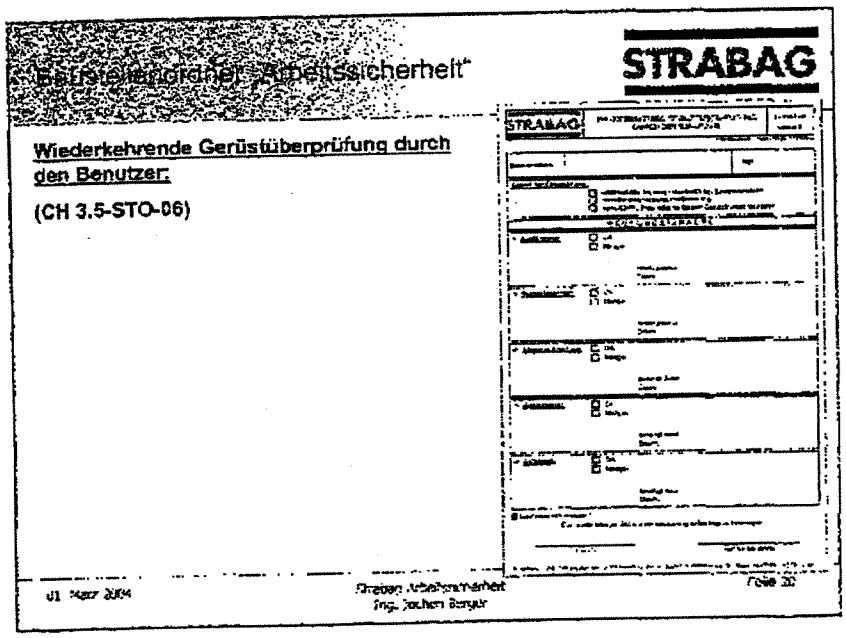
STRABAG

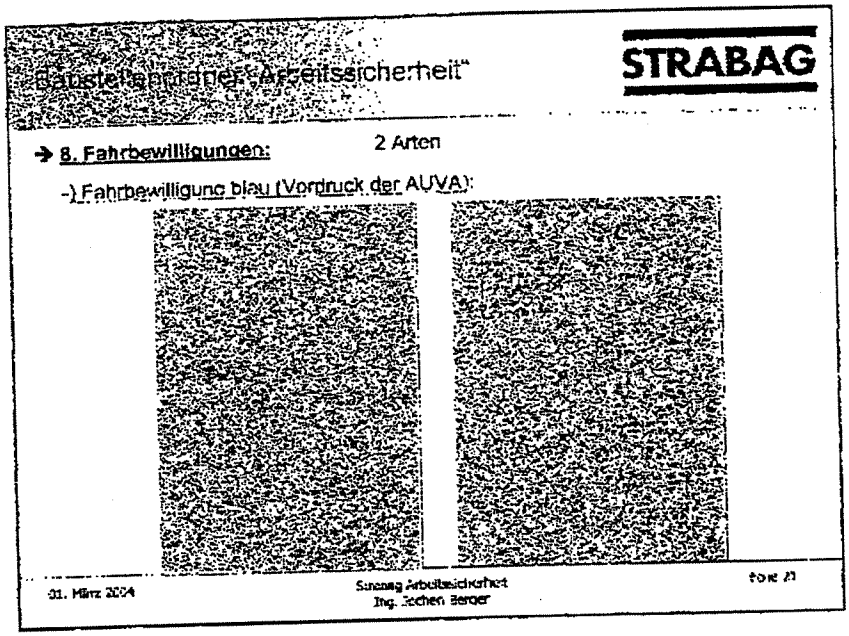
Gerüstüberprüfung durch den Aufsteller:

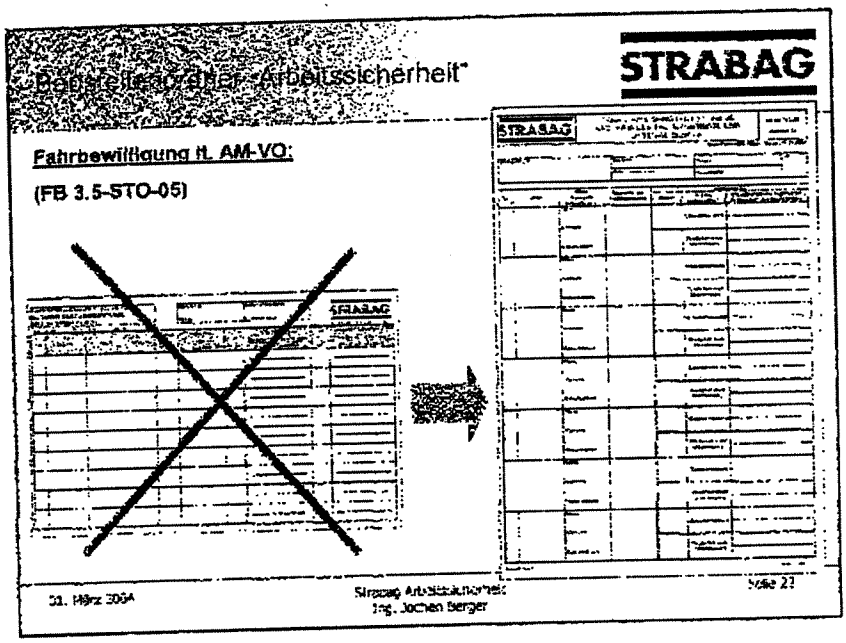
(CH 3.5-STO-04)




„Baustellenordner Arbeitssicherheit"
STRABAG
Gerüstüberprüfung durch den Benutzer vor dem Ersteinsatz:
(CH 3.5-STO-05)
STRABAG
01. März 2004
Strabag Arbeitssicherheit
Ing. Jochen Berger
Folie :9


„Baustellenordner Arbeitssicherheit"
STRABAG
Wiederkehrende Gerüstüberprüfung durch den Benutzer:
(CH 3.5-STO-06)
STRABAG
01. März 2004
Strabag Arbeitssicherheit
Ing. Jochen Berger
Folie 10


Baustellenordner "Arbeitssicherheit"
STRABAG
8. Fahrbewilligungen:
2 Arten
-) Fahrbewilligung blau (Vordruck der AUVA):
31. März 2004
Strabag Arbeitssicherheit
Ing. Jochen Berger

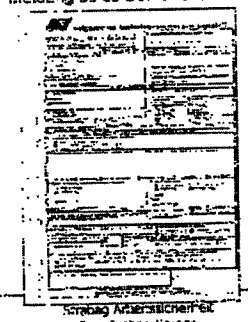

Baustellenordner "Arbeitssicherheit"
STRABAG
Fahrbewilligung lt. AM-VO:
(FB 3.5-STO-05)
31. März 2004
Strabag Arbeitssicherheit
Ing. Jochen Berger

„Baustellenordner Arbeitssicherheit"

STRABAG

➔ **9. Bescheide etc.:** Baubewilligung, Genehmigung Straßenbenutzung, Sonderarbeitszeit, Baustellensicherung, etc.

➔ **10. Unfallmeldungen:** Unfallmeldungen der AUVA, Meldung eines Beinahe-Unfalles — Lawinenmuster FB 3.5-STO-12



01. März 2004 — Strabag Arbeitssicherheit Ing. Jochen Berger — Folie 23

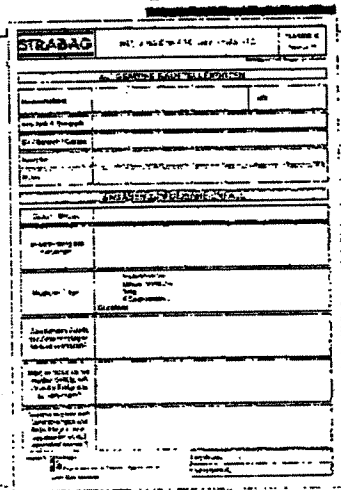
„Baustellenordner Arbeitssicherheit"

STRABAG

Meldung eines Beinahe-Unfalles:

(FB 3.5-STO-12)

NEUES DOKUMENT !!!



01. März 2004 — Strabag Arbeitssicherheit Ing. Jochen Berger — Folie 24

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:** Baustelleneinrichtung, SiGe-Plan
Vorankündigung, Unterlage etc

STRABAG

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

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

	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 Künetterwänden 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 Gerät 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 druckles 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.

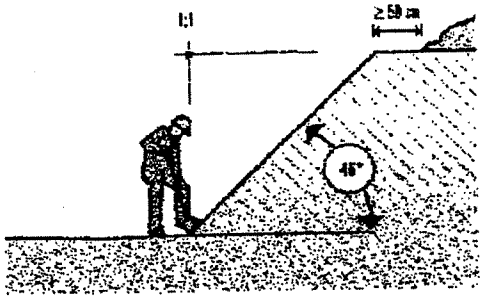
Böschungen

Böschungsneigung

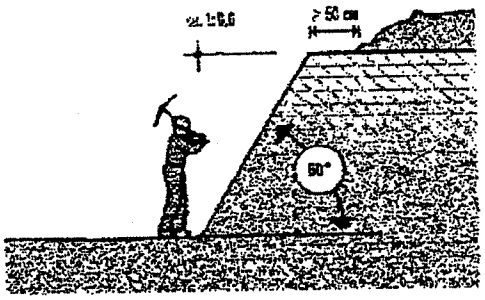
- Die Böschungsneigung richtet sich unter anderem nach
  - der Bodenart,
  - den vorhandenen Auflasten (z. B. Verkehr, Geräte, Aushub, angrenzende Bauwerke),
  - den möglichen Erschütterungen,
  - den Grundwasserverhältnissen,
  - den Witterungsverhältnissen,
  - den geologischen Verhältnissen.

- Ohne rechnerischen Nachweis dürfen die untenstehenden Böschungswinkel nicht überschritten werden.

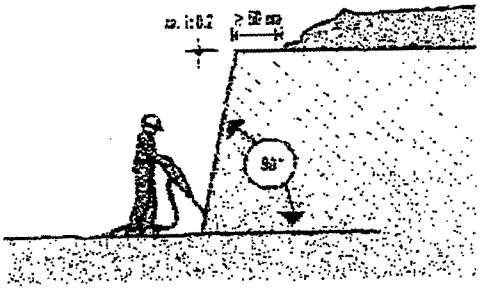
- **Nicht bindiger oder weicher bindiger Boden**
  z. B. Sande, Kiese, Mutterboden



- **Steifer oder halbfester bindiger Boden**
  z. B. Lehm, Mergel, fester Ton, Böden mit festem Zusammenhalt



- **Leichter Fels**
  nicht gebräch und nicht verwittert, keine zur Baugrube einfallenden Schichten, ohne Klüfte



- Schwerer Fels
  nur durch Sprengen lösbar

Böschungswinkel 80° erlaubt.

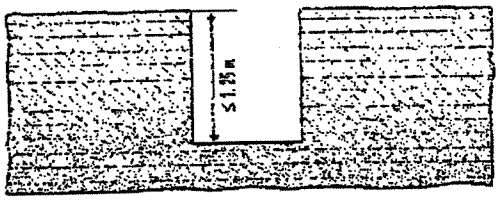
Böschungen

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

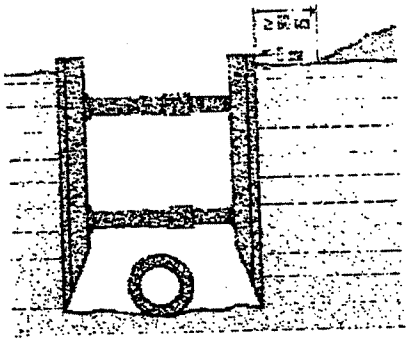
- Bei Baugruben und Gräben bis 1,25 m Tiefe können die Wände senkrecht angelegt werden, wenn der Boden ausreichend standfest ist und keine besonderen Einflüsse vorliegen.



Vorschriften und Regeln

- BetrV 8. Abschnitt
- M 225 Gruben, Gräben, Künetten

Künettenverbau



Allgemeine Forderungen

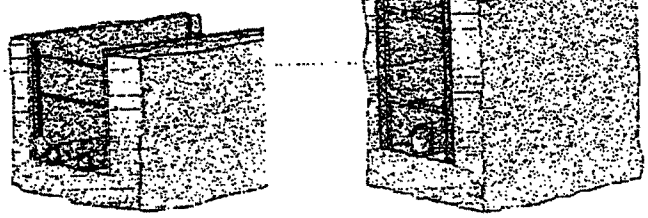
- Senkrechte Künettenwände.
- Beidseitig lastfreier Schutzstreifen mindestens 60 cm.
- Ungesicherte Künettenwände nicht durch Baugeräte und Fahrzeuge belasten.
- Künetten mit ungesicherten Wänden nicht betreten.
- Zufluss von Oberflächenwasser verhindern.
- Sich nicht an ungesicherten Künettenwänden 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)



Rundgeschlossene 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

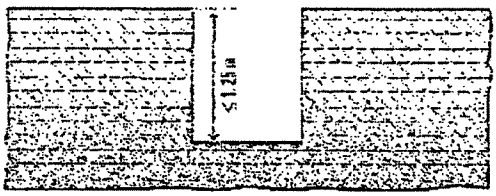
D

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

- DIN 4124 Abschnitt
- M 228 Gruben, Gräben, Kanäle

Maßgebend sind die neuesten Ausgaben

Annex F
Example Accident Investigation Programm Manapouri

Accident/Incident & Near Miss Reporting, Recording and Investigation

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- ACCIDENT INVESTIGATION 3
- IMMEDIATE ACTIONS AFTER AN ACCIDENT 3

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- VICTIM (INJURED PERSON) 6
- WITNESS 6
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7.3 INCIDENT DAMAGE REPORT 11
7.4 OSH NOTICE OR RECORD OF ACCIDENT / SERIOUS HARM 12

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

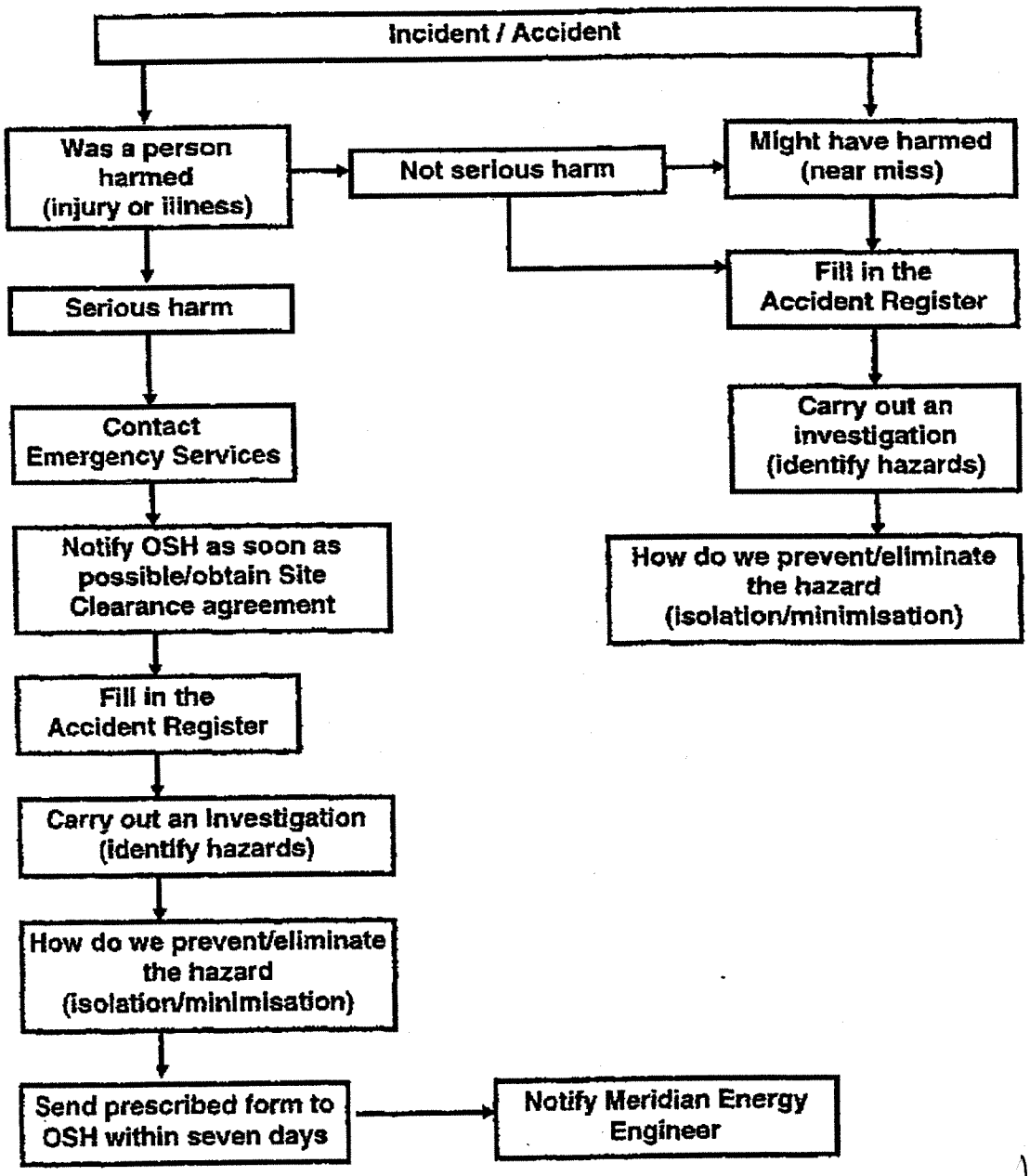
Accident Report, Record of Incident/Near Miss

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.

Project: _____

Location: _____

- ☐ Superintendent
- ☐ Foreman/Shift Boss
- ☐ Health & Safety Officer
- ☐ Project Manager

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

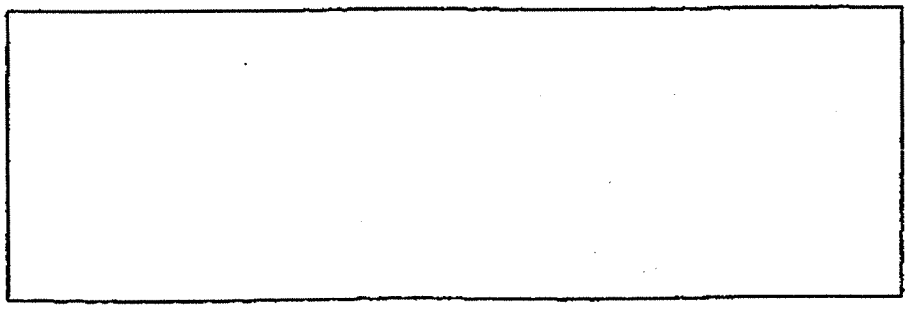
Supervisor's Name .....

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

Notice of Accident / Serious Harm

Complete this form and forward it to your nearest OSH office within 7 days of incident.
Keep a copy for your own records.

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

chanism 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

STRABAG

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 Imprese 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/Ko		
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

Coordinates roundabout 690 530 / 194 480

Area tubbing factory Aschoren

Map scale: 1:5'000

☐	yellow
X	red
O	green

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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STRABAG

Annex H
Safety Personnel

Sicherheitsfachkräfte Österreich 2004

STRABAG

Nachname	*Vorname*	*aktiv*	*Div.*	*Adresse 1*	*Adresse 2*	*Telefon*	*Fax*	*Handy*	*E-Mail*
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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
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KERN	Daniel	☐	AE	Enzersberg 123	A - 5303 Thalgau	06235 / 6471 - 161	06235 / 6471 - 199	0664 / 1315856	daniel.kern@bauholding.at
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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? _____

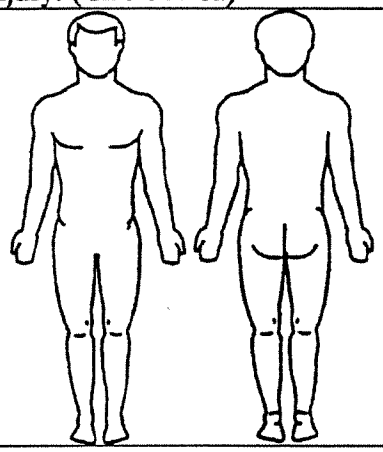
What happened? (Use back of page if more space is needed) _____

_____

_____

_____

_____

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 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

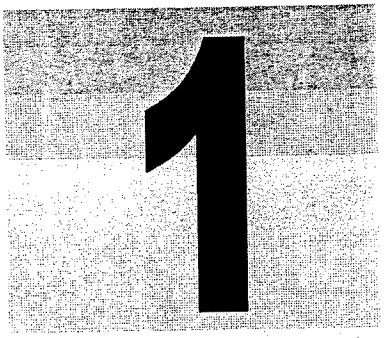
C. Third citation
- _____ Within 6 month period or history of repeat violations - Termination

Employee's Signature _____ **Foreman's or Witness's Signature** _____

Date: _____

Table 20: Work Injury Poster

If you are injured at work...

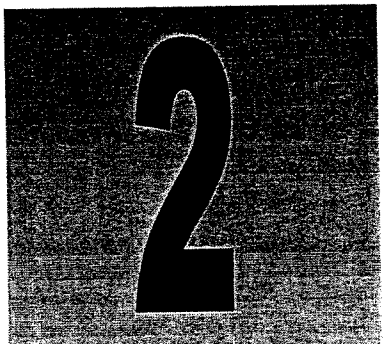


Tell Your Supervisor

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

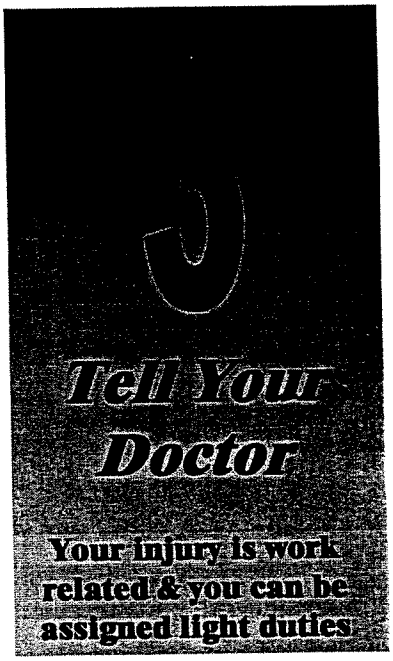


Tell Your Employer

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



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. lcNally 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.

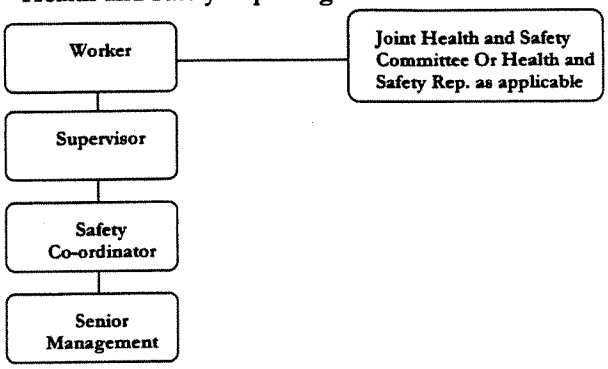
Management's desire is to provide a safe work atmosphere, safe equipment, proper materials, and safe methods and practice at all times. Each person who conducts company business no matter their position needs to accept this responsibility as well. The information contained herein, is for all McNally 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

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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

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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

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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.

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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.

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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.

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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.

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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).

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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 th e 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.

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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

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- Hearing protection - where noise levels exceed 85 db

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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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.

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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.

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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.

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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.

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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.

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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.

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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.

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5.31 Hot Work

Employees shall obtain authorization from supervisor before performing welding, cutting or grinding in a shaft, tunnel or confined space.

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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 p ower lines.
- For Procedures on what to do should equipment make contact with Overhead wires see Emergency Procedures section in this Policy and Program.

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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 platfor m 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.

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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.

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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.

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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.**

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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 sup ervisor 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.

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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.

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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

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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:
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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 all 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:
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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

10.2 Back to Work/Light Duty Policy

10.2.1 Program Principles

10.2.2 Functional Abilities Forms

10.2.3 McNally Injured at Work Poster

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.

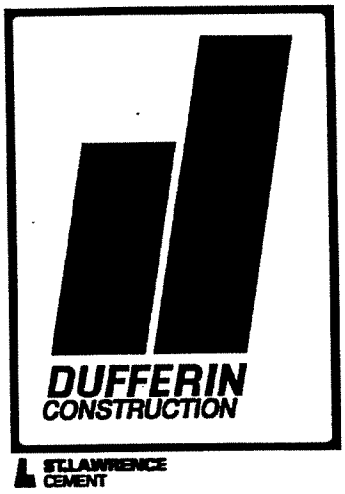
15.0 TABLES PACKAGE

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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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1

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.

HEALTH & SAFETY RESPONSIBILITIES

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

June 23, 2005

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.

June 23, 2005

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.

June 23, 2005

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**.

June 23, 2005

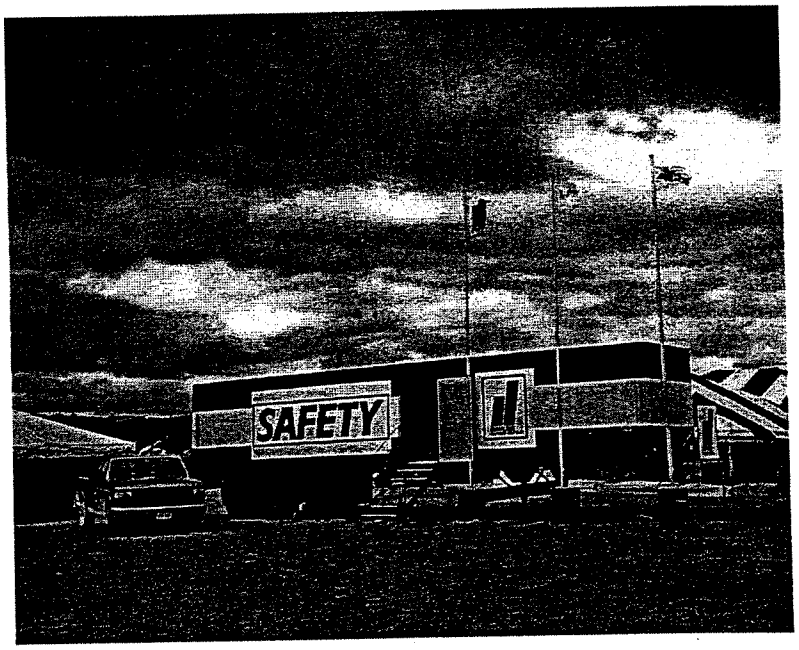
Training Programs

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.

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

590 Taylor Crescent
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lbuhler@stlawrencecement.com

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

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**
  - **Environmental Concerns**
  - **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.

PROJECT & WORKPLACE HAZARD ANALYSIS

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.

PROJECT & WORKPLACE HAZARD ANALYSIS

⇒ **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	In Compliance? No	Project Activity Elements
☐	☐	- 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 & Tunnelling 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

Comments

☐☐ _____ (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		Comments
☐	☐	Electrical (< 750v.)	
☐	☐	Electrical (> 750v.)	
☐	☐	Natural Gas	
☐	☐	Telephone	
☐	☐	T.V.	

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
☐	☐	- 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")	

☐☐ _____ (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	Comments
☐	☐	- 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	

☐☐ _____ (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	In Compliance? 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 (aids 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	In Compliance? 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	In Compliance? No	Project Activity Elements
☐	☐	- 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.

Comments

☐☐ _____ (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	In Compliance? No	Project Activity Elements
☐	☐	- 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

Comments

☐☐ _____ (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
☐	☐	- 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

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: 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
☐	☐	- 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

Comments

☐☐ _____ (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	In Compliance? 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 ...

Continuation of previous 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

Form 2 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	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	In Compliance? 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	In Compliance? No	Project Activity Elements
		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

Comments

[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	In Compliance? No	Project Activity Elements
		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

Comments

☐☐ _____ (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	☐ EMERGENCY
☐ SHORT INTERVAL PLANS	☐ TRAFFIC CONTROL PLAN
☐ FIRST AID REGS/SUPPLIES	☐ FALL RESCUE PLAN
☐ OHSA & REGULATIONS	☐ 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	Comply 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						

Appendix G

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						

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

Approved by: H S Dept.

8B - Revision Number - 1, June 6, 2005

Please forward a copy of this form to the H S Department following completion of the inspection

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.

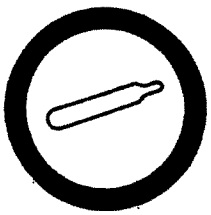
When working on sewer and watermain installation, keep fingers and hands clear when joining pipes, fitting manholes, etc. Use care in connecting lifting cables and avoid trapping fingers. Watch out for 'pinch' points. Never permit any portion of your body to get into a position where 'jamming' could 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.



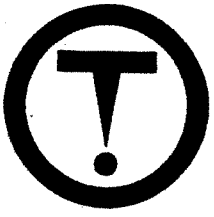
Class A
Compressed Gas



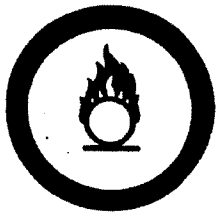
Class B
Combustible
andflammable
material



Class D
Division 1
Poisonous and
infectious material:
immediate &
serious toxic effects



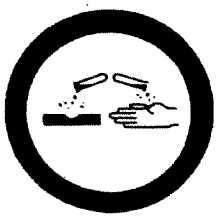
Class D
Division 2
Poisonous and
infectious material:
other toxic effects



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

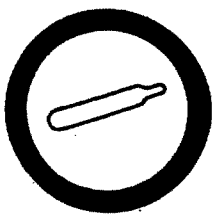
position où un coincement serait possible. Veiller toujours à éviter une position de déséquilibre en exerçant une poussée ou un effet de levier.
Veiller à maintenir les lieux de travail exempts de débris et matériaux dispersés (particulièrement les morceaux de bois comportant de clous). Veiller à toujours 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.



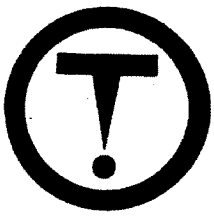
Classe A
Gaz comprimé



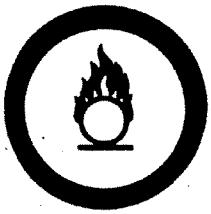
Classe D
division 1 Matière toxique et infectieuse, effets toxiques immédiats et graves



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.

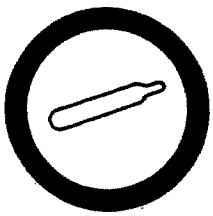
PROTEZIONE ANTINCENDIO

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



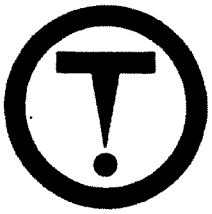
Classe C
Materiali ossidanti



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

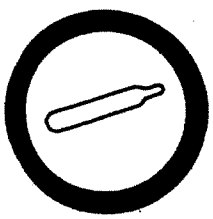
numa posição em que se arrisque a ficar em obstrução. Quando trabalhar com a alavanca ou empurrar, evite ficar numa posição de desiquilibrio.
Mantenha as áreas de trabalho livres de materiais soltos ou de lixo, especialmente bocados de madeira e pregos. Veja onde põe os pés para evitar escorregar e cair. 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.



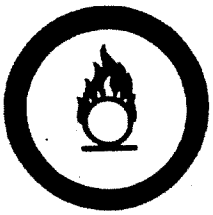
Classe A
Gás comprimido



Classe D, Divisão 1
Material venenoso e infeccioso: causa efeitos toxicos sérios e imediatos



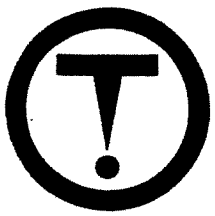
Classe B
Material
combustivel e
inflamável



Classe C Material
oxidante



Classe E
Material corrosivo



Classe D
Divisão 2 Material
venenoso e
infeccioso que
causam outros
efeitos toxicos



Classe D
Divisão 3 Material
venenoso e
infeccioso:
Materiais de perigos
bio-infecciosos



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/Funcionário

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 equipment must 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 the original 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 contact with 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 oulined 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 prejob 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 invdved 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 traffic protection 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 chemicd 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 must 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.

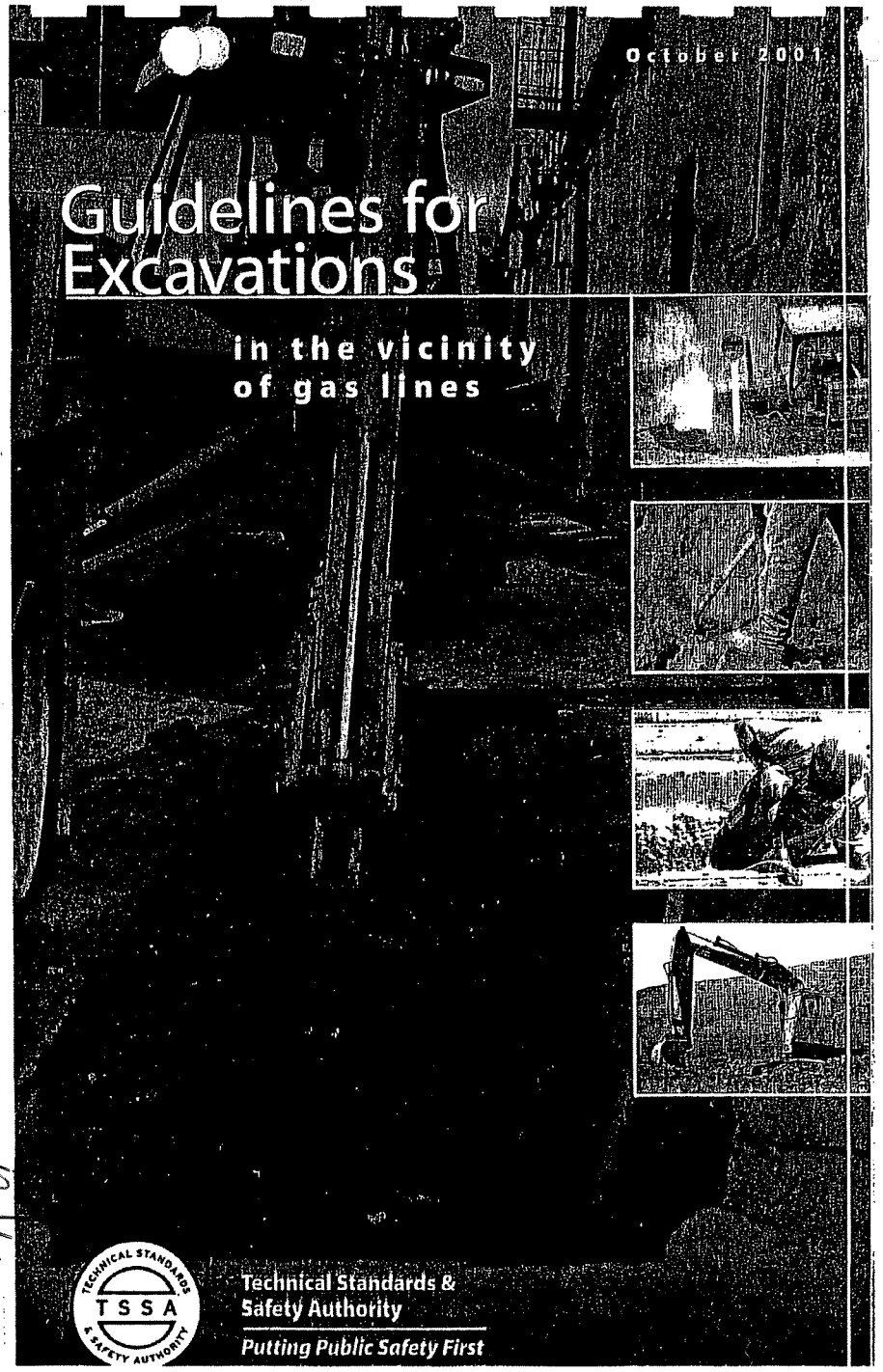
_____ _____

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

[illegible]

(Aylmer area, south of London)

[illegible]

(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

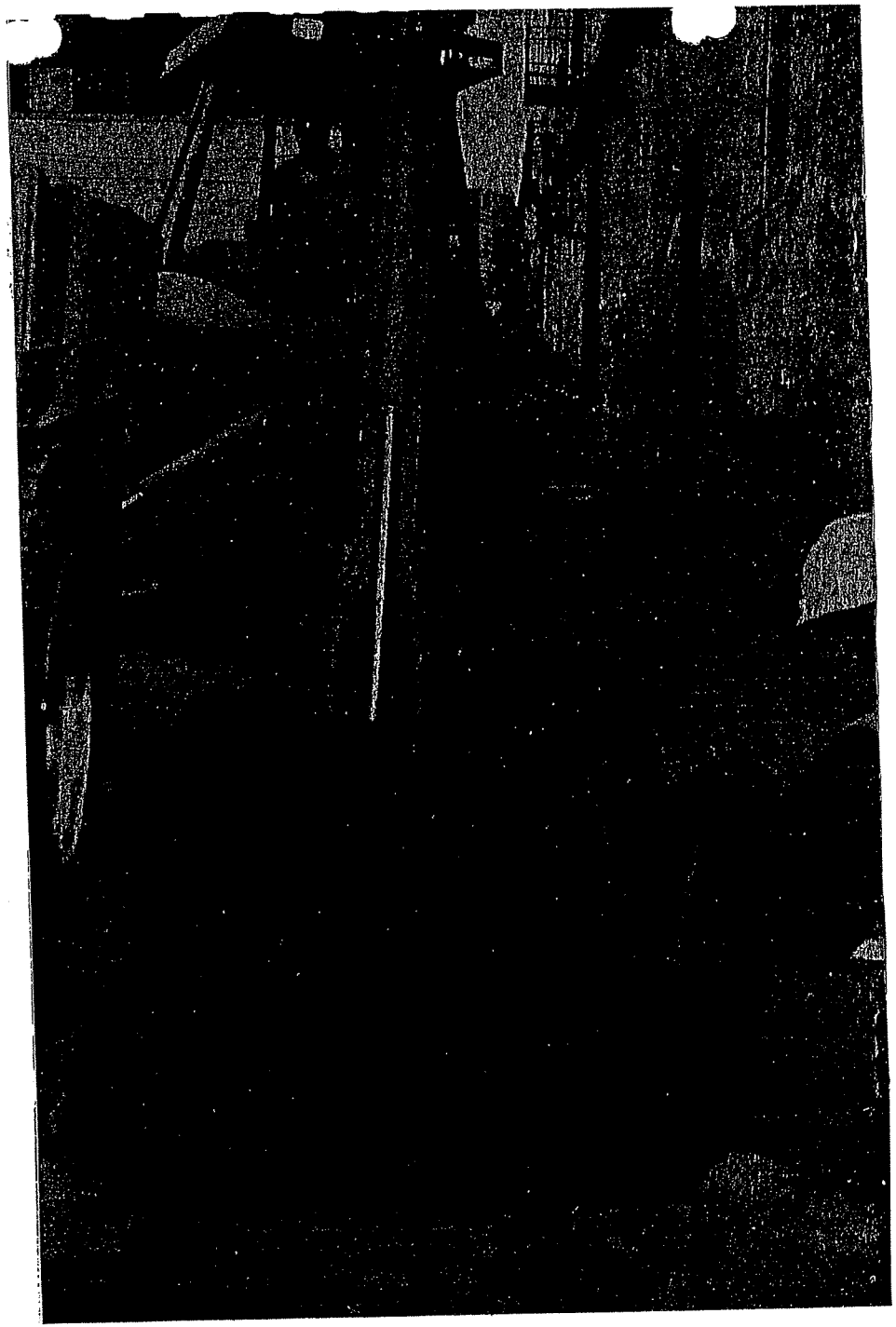
10. No person shall interfere with or damage any pipeline without authority to do so.

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.



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.



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 *relevat 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

ST.LAWRENCE CEMENT

DUFFERIN CONSTRUCTION

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 – Workplace Hazardous Material Information System	12
16	Snow Removal at LBPIA	6
17	Scaffolds	6
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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

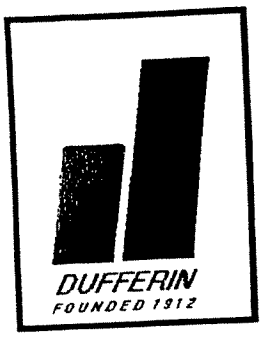
Topic#	Topic Name
21.1	Confined Space Defined
21.2	"Low Hazard" Confined Space Procedures
21.3	Confined Space Emergency Planning "Low Hazard"

22. Utility Locates

Topic#	Topic Name
22.1	Proper use of Locates

23. Asphalt Paving

Topic #	Topic Name
23.1	Asphalt – PPE
23.2	Asphalt – Health Effects of Asphalt Fumes
23.3	Asphalt – Accident Review



DUFFERIN
CONSTRUCTION
COMPANY

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.

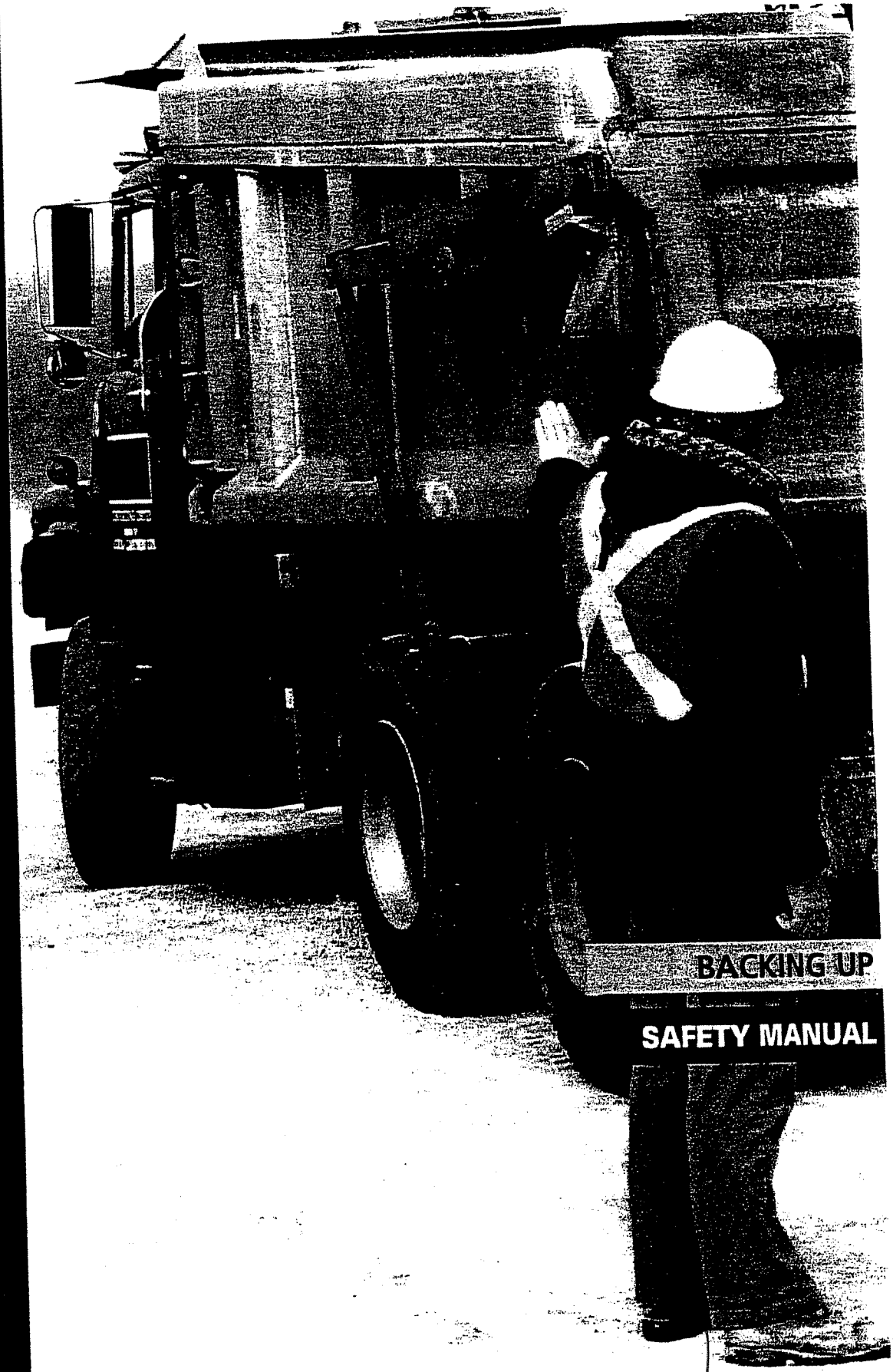
5 *Backup Signal Person or Spotter.* - This section describes where a signal person is required and the responsibilities of the signal person and operator under the Occupational Health & Safety Act & Regulation. Also described are: requirements for backing trucks a through long distances, Personal Protective 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.

INSTRUCTION
SAFETY



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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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.

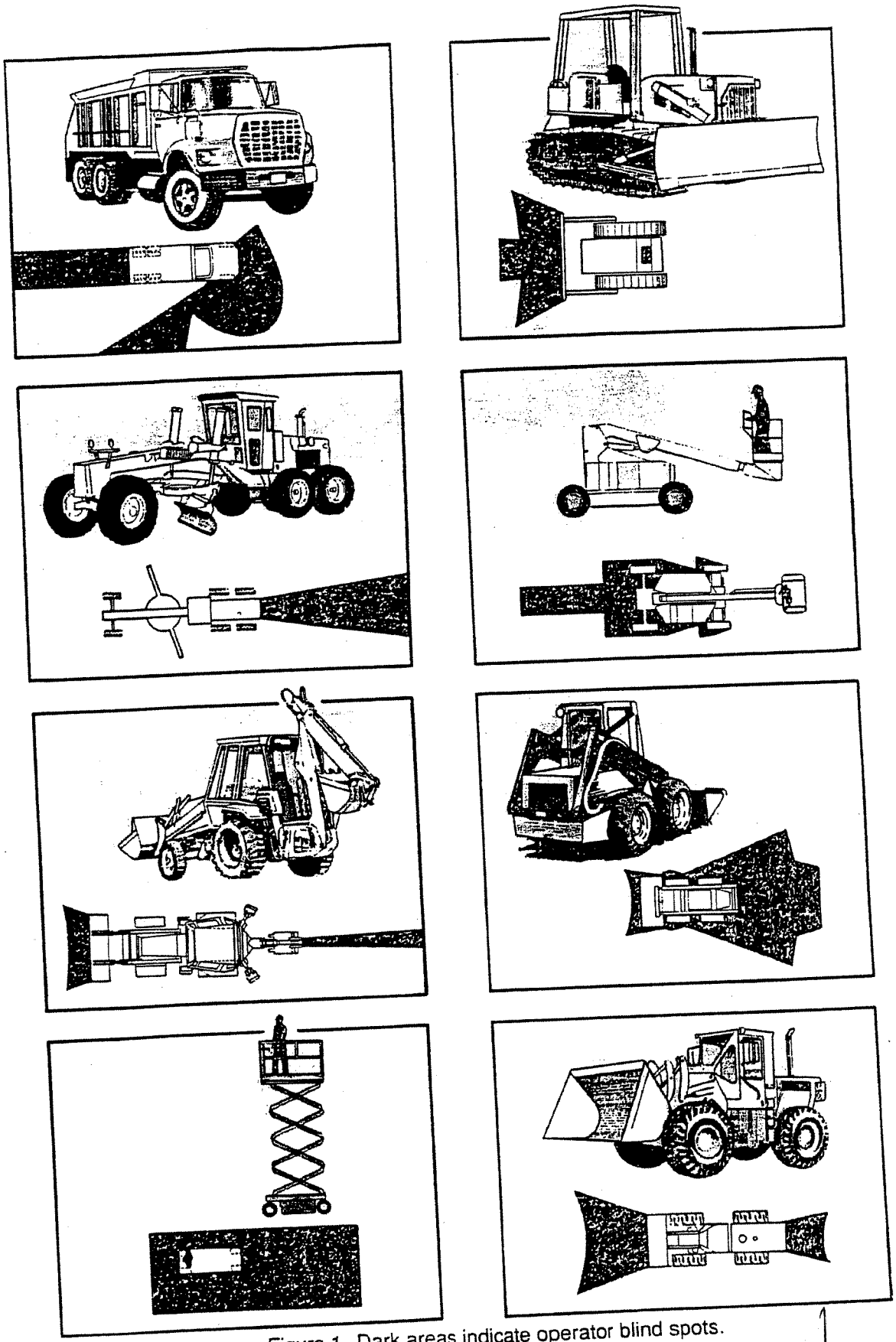


Figure 1. Dark areas indicate operator blind spots.

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).

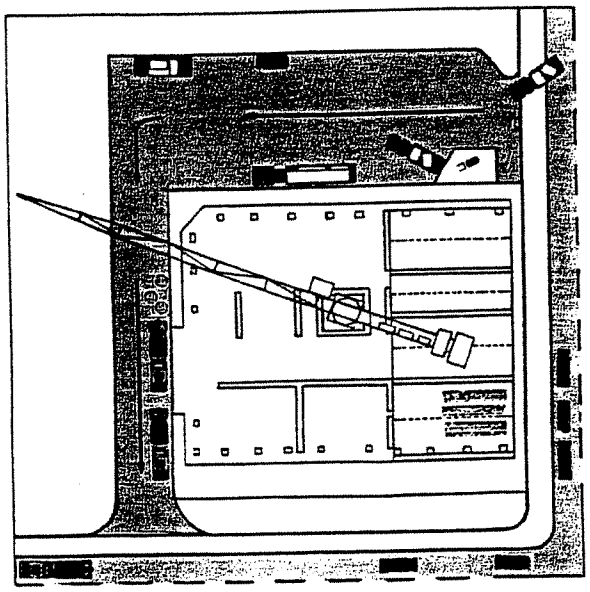


Figure 2

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).

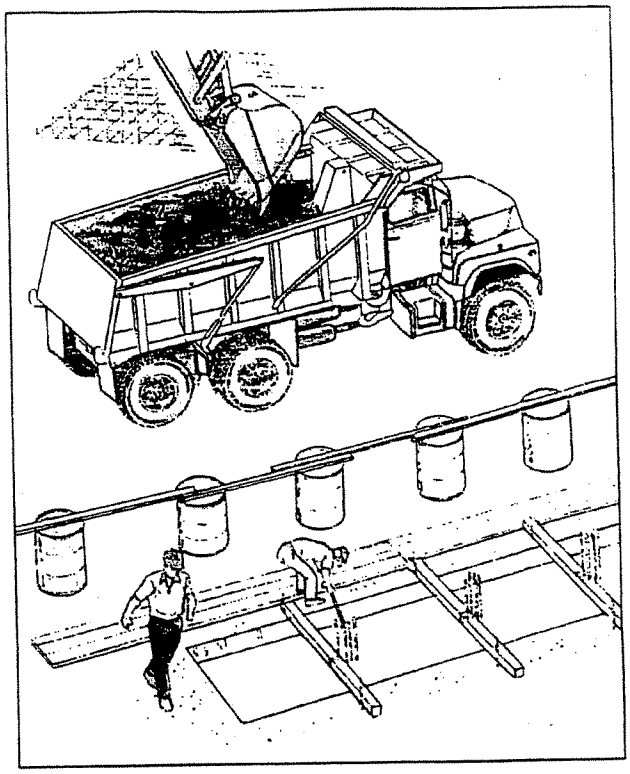


Figure 3

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.

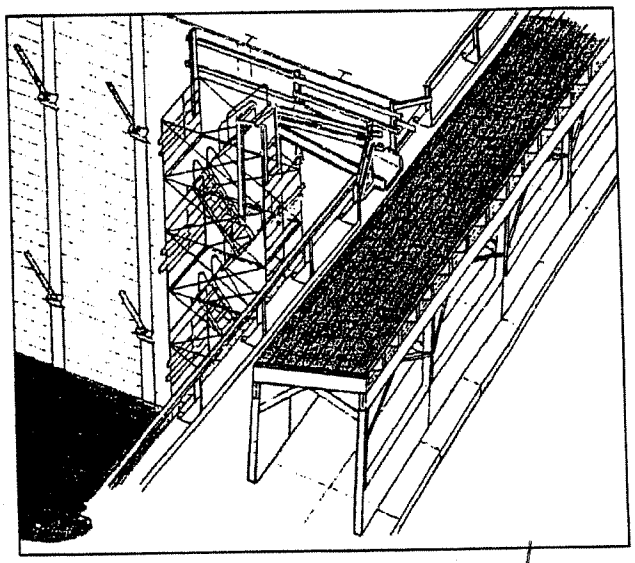


Figure 4

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.

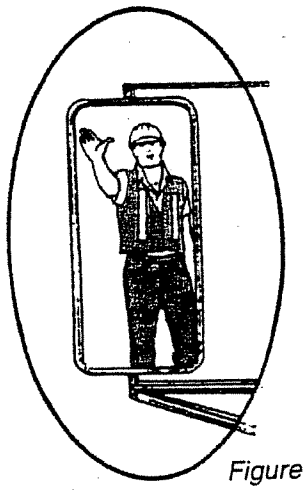
A signaller must be a competent worker and must not have any other duties to fulfill while acting as a signaller.

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.



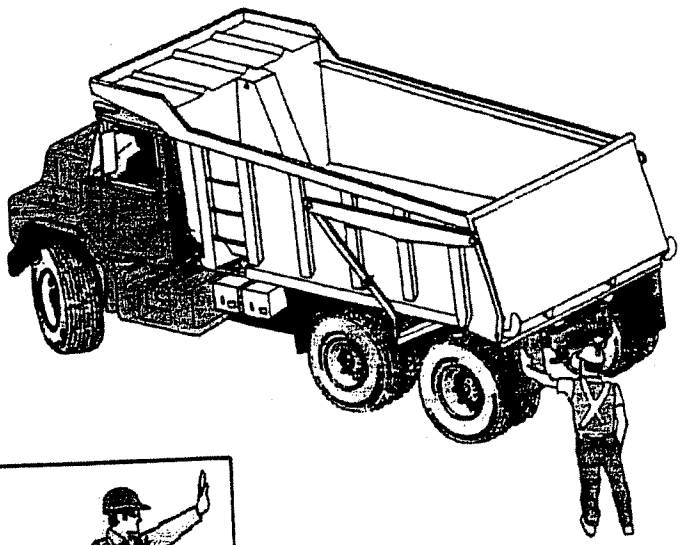




Figure 5

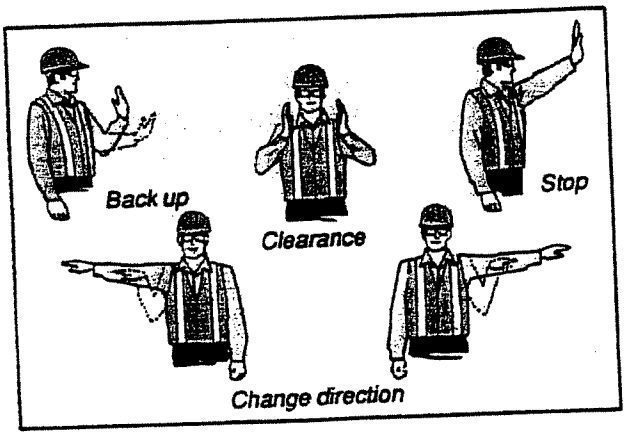


Figure 6

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.

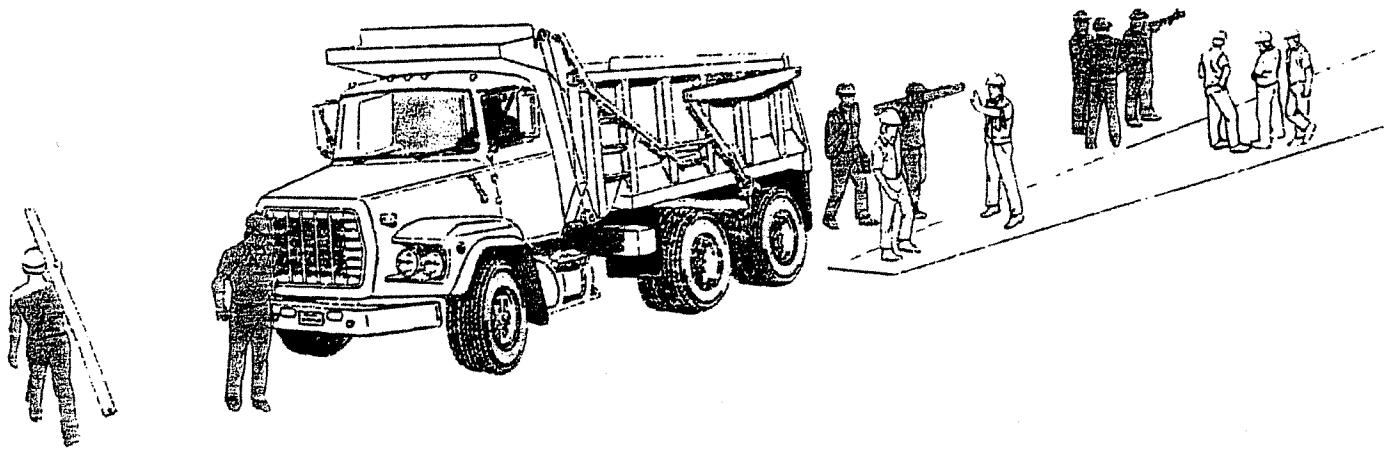


Figure 7. This illustration shows how some personnel on foot are visible to the driver while others are not. The driver cannot see the dark figures because they are passing through blind spots at the front and rear of the truck. The other figures are visible to the driver.

- 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).

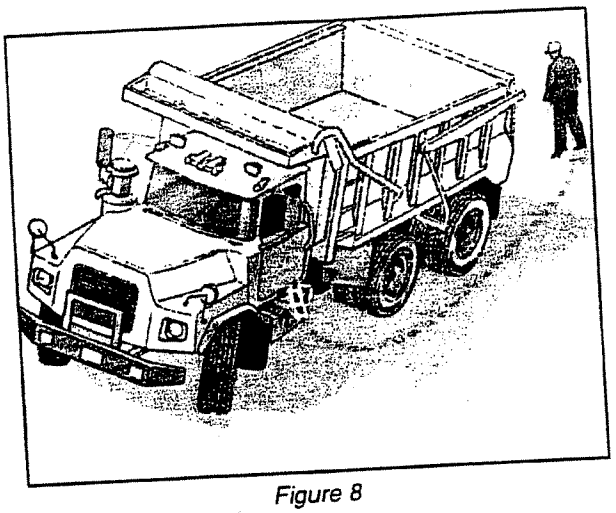


Figure 8

- 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



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.

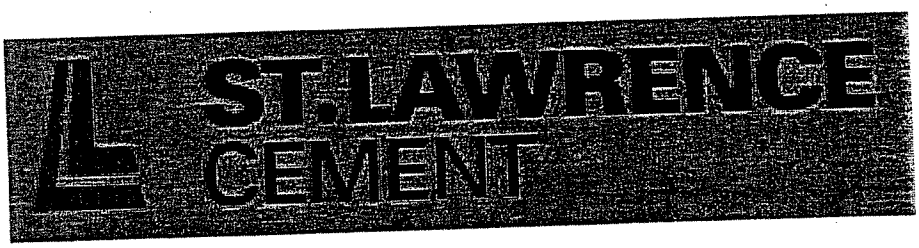
III **Inspection and Maintenance of Fall Arrest Equipment** - This section instructs the participants on the procedures of inspecting and maintaining the various pieces of equipment. Additionally, it emphasizes the fact that each worker is responsible for inspecting and maintaining their own equipment 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



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

ONSTRUCTION
SAFETY



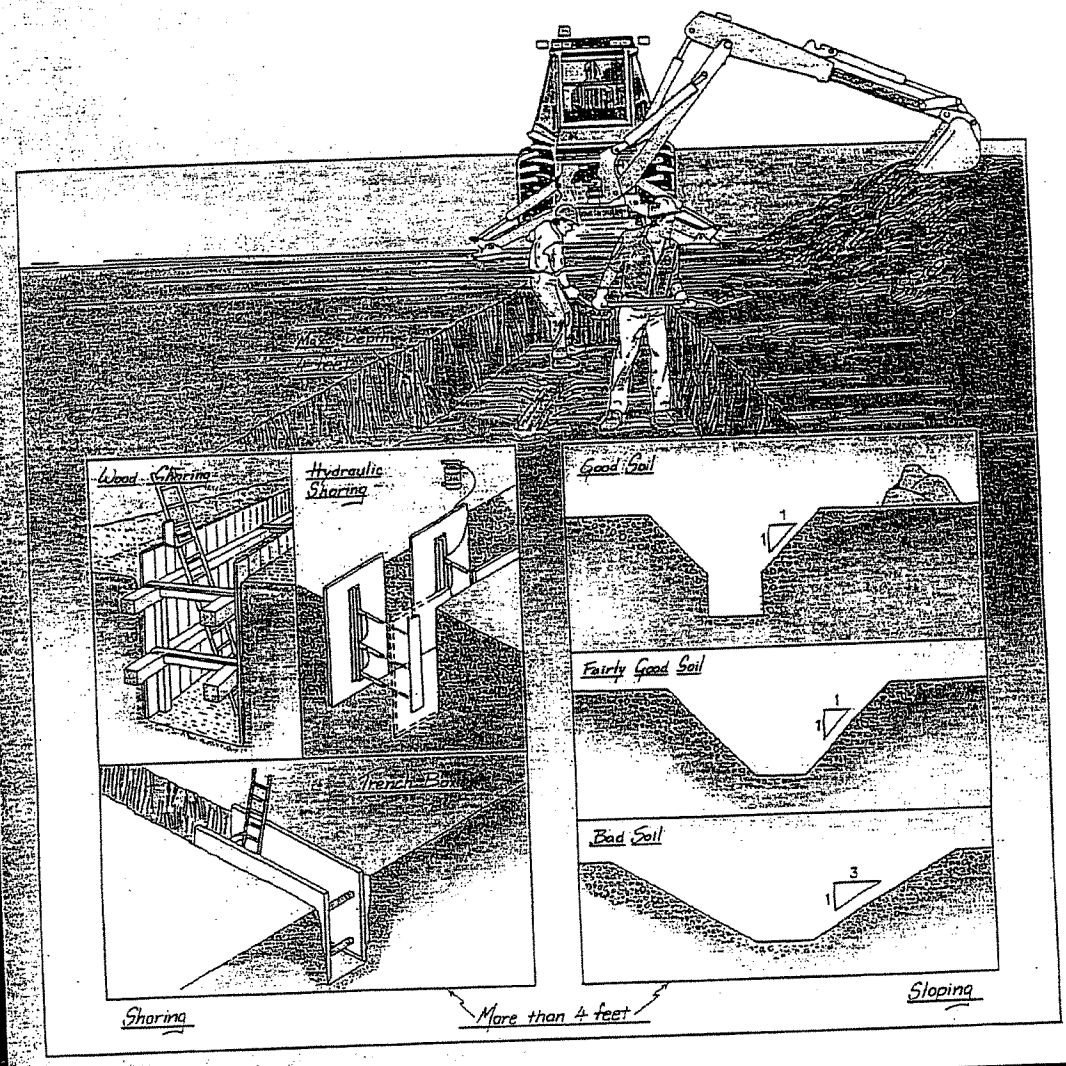
GUIDELINES FOR TRAINING TRAFFIC CONTROL PERSONS

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

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.

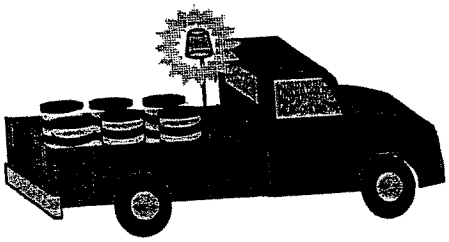
2.1.5 Company Issued Cell Phones and MIKE Units

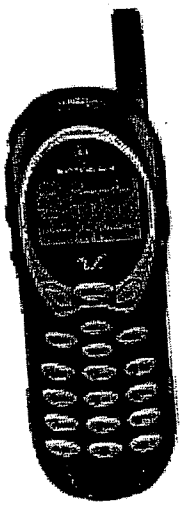
Supervisors and Lead Hands who have been assigned a Company issued cell phone or MIKE unit are excluded from this policy. Supervisors and Lead Hands using a cell phone at the project must be aware of their surroundings and only utilize the phone when it is safe to do so. The Company has made every effort 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.

WORK REFUSAL POLICY

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

WORKING IN CONFINED SPACES - *"Special Conditions"*
Low Hazard Confined Spaces

- 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

WORKING IN CONFINED SPACES - *"Special Conditions"*
Low Hazard Confined Spaces

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.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

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

PERSONAL PROTECTIVE EQUIPMENT (PPE)

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.

MATERIAL HANDLING

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

ACCIDENT/INCIDENT - NOTIFICATION, ANALYSIS & REPORTING

CONTENTS

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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.

ACCIDENT/INCIDENT - NOTIFICATION, ANALYSIS & REPORTING

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.

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

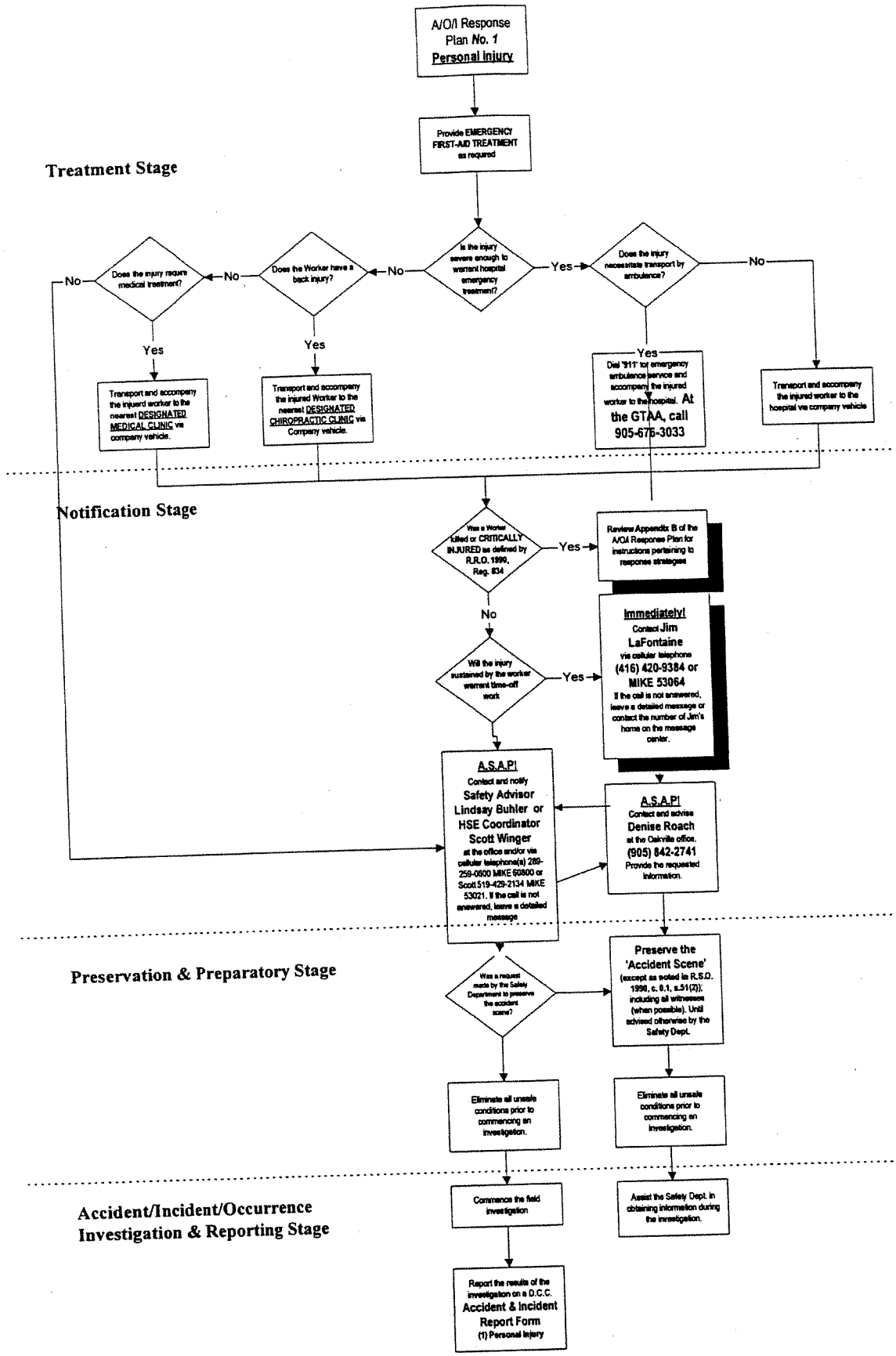
The Safety Advisor is responsible for:
* Reviewing the incident analysis report, giving careful attention to the judgments-of-needs

*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?
No
Yes
Does the injury necessitate transport by ambulance?
No
Yes
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
Does the Worker have a back injury?
No
Yes
Transport and accompany the injured Worker to the nearest DESIGNATED CHIROPRACTIC CLINIC via Company vehicle.
Does the injury require medical treatment?
No
Yes
Transport and accompany the injuerd worker to the nearest DESIGNATED MEDICAL CLINIC 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 warrent 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) 289-259-0500 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

Equipment #:	Year & Make:
Serial #:	Lic #:
Operators name:	
Operator's Lic #/Cert #:	Estimate to Repair ($):

Describe Damage(s) to Vehicle(s):

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)

Vehicle Make & Model year:	Estimate to Repair ($):
Serial #:	Vehicle Lic #:
Operator's/Owner's Name:	Address of Owner:
Name of Insurance Company:	Insurance policy #:

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:

Analysis of Cause

Do you have reason to dispute in whole or in part DCC's liability in respect to this accident?

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:

☐ H&S Manager ☐ H&S Coordinator ☐ H&S Advisor

Appendix 2.4(g)
Elements of the Project Specific Site Security, Public Safety and Emergency Response Plan

Appendix 2.4(g) - 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)
Designated Substances Present at Site

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)
Outline Environmental Management Plan

MH-10001-01, Outline of the Environmental Management Plan

Appendix 2.5(a)(3) - 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.

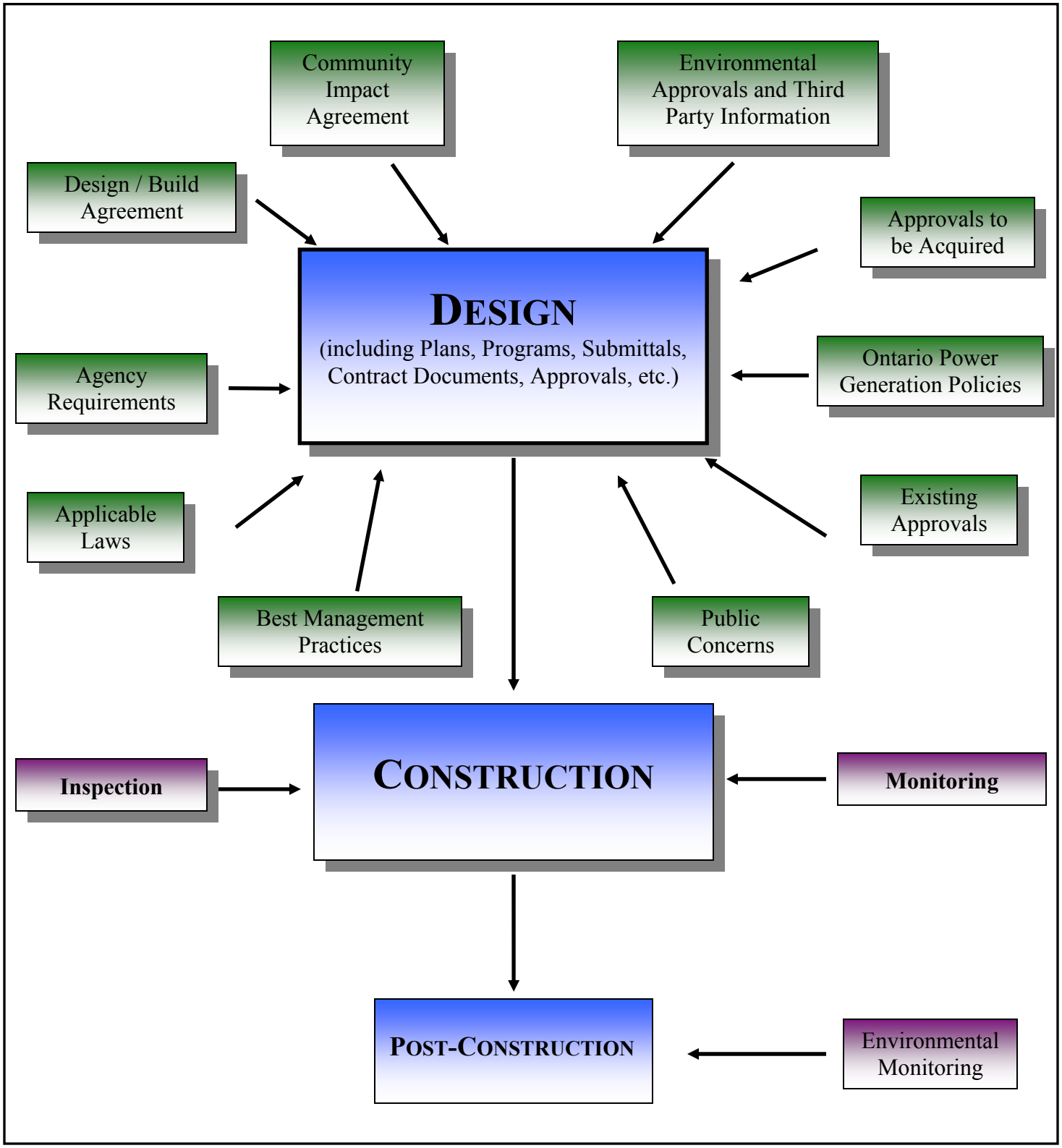


Figure 1: Environmental Project Requirements Process

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.

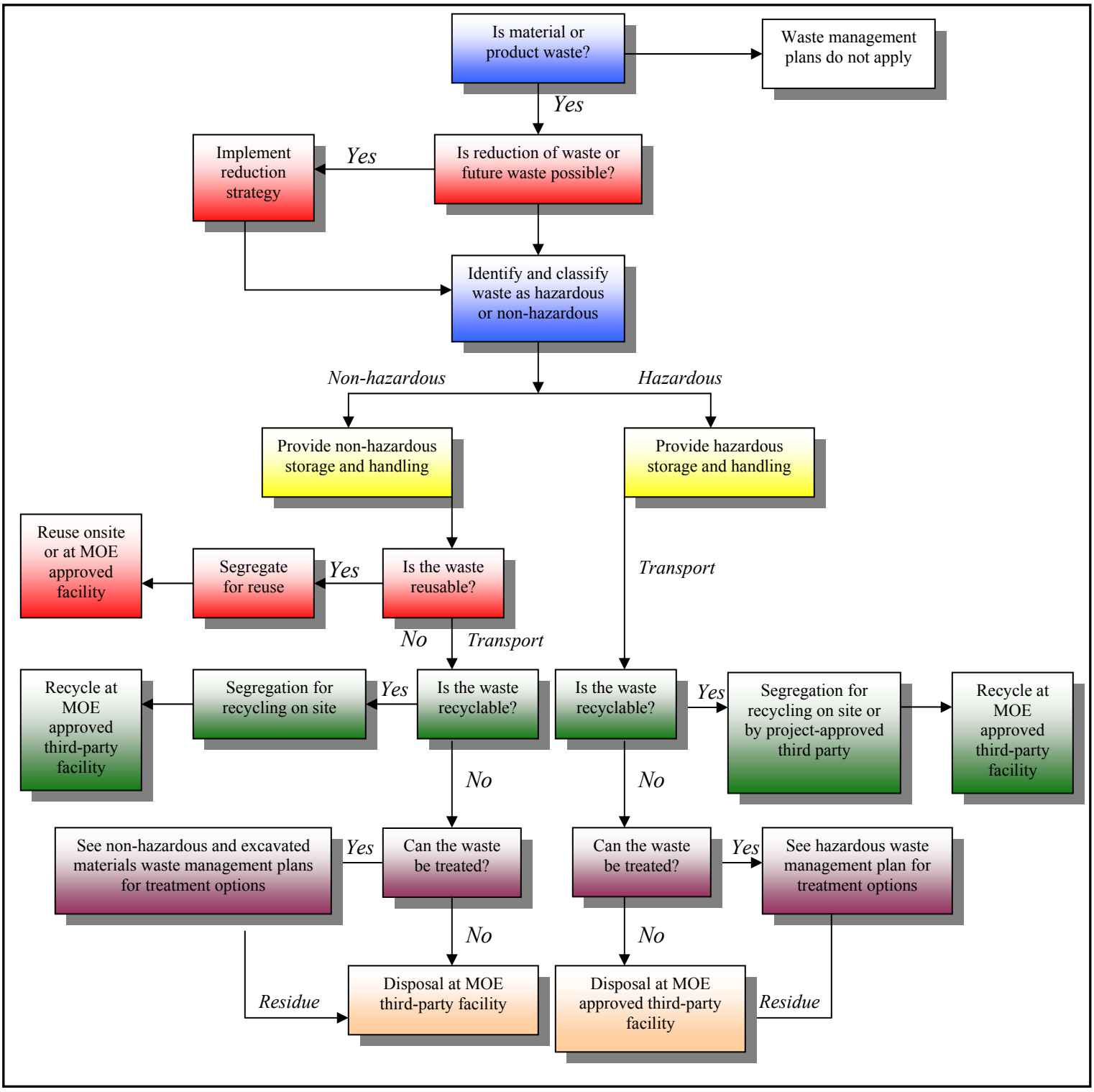


Figure 2: Waste Management Plan Decision-Making Process

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.

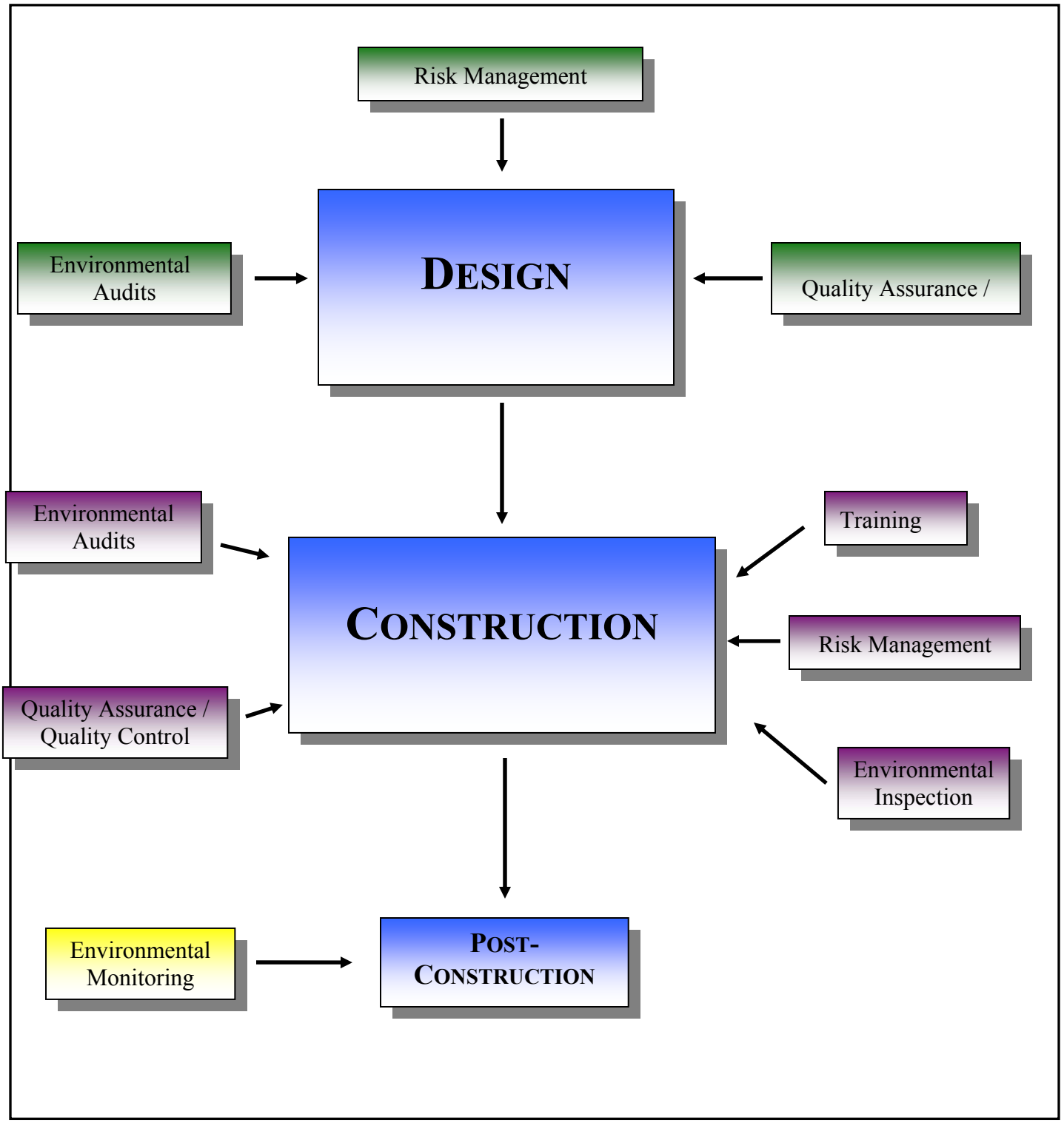


Figure 3: Project Environmental Compliance Process

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.

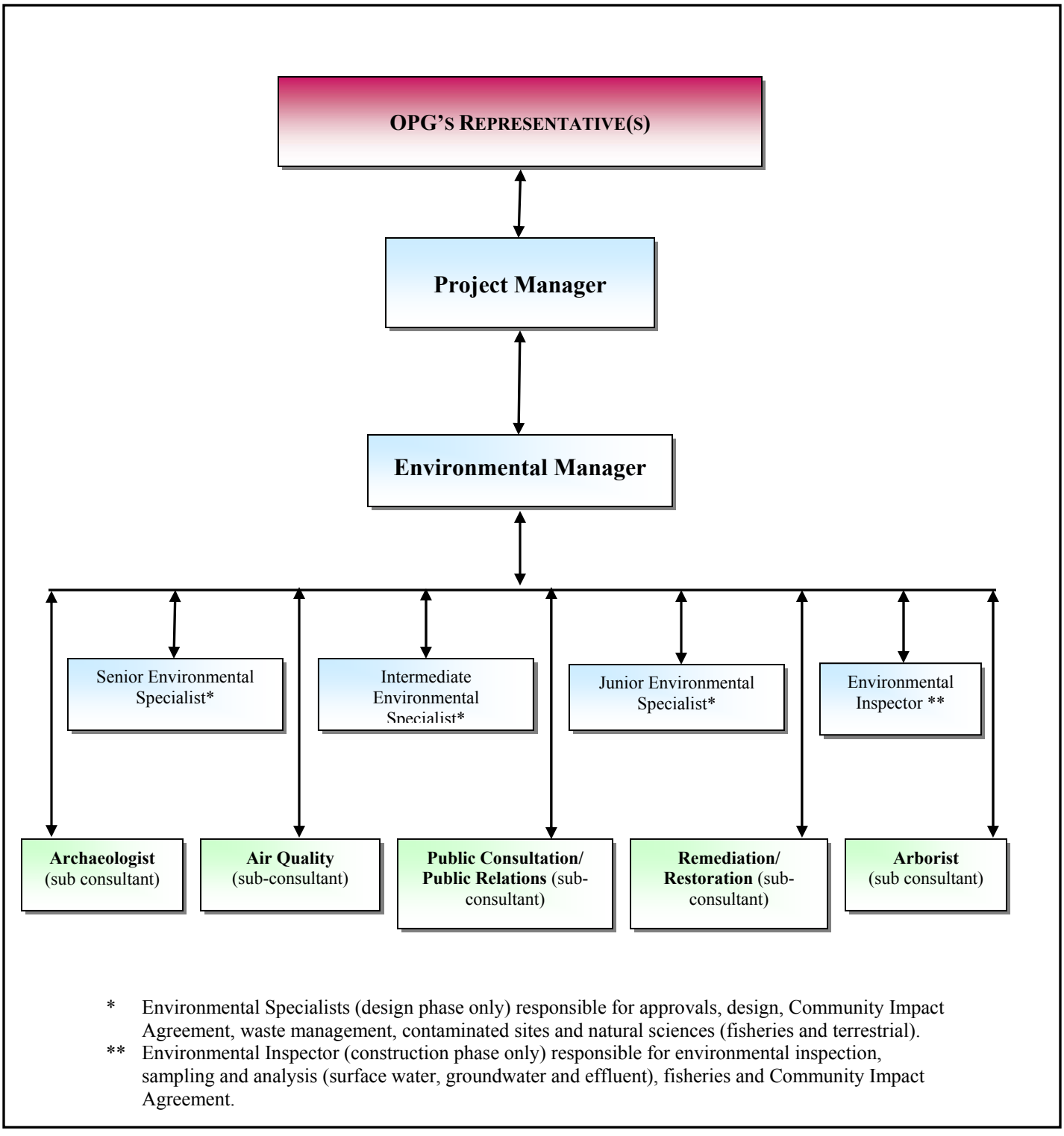
Figure 4 provides the Environmental Team Organization Chart.

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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Government of Ontario. 1994. Ontario Regulation 347/90: *General – Waste Management.*

Government of Ontario. 1990. *Ontario Water Resources Act.*

Government of Ontario. 1990. *Public Lands Act*.

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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.	

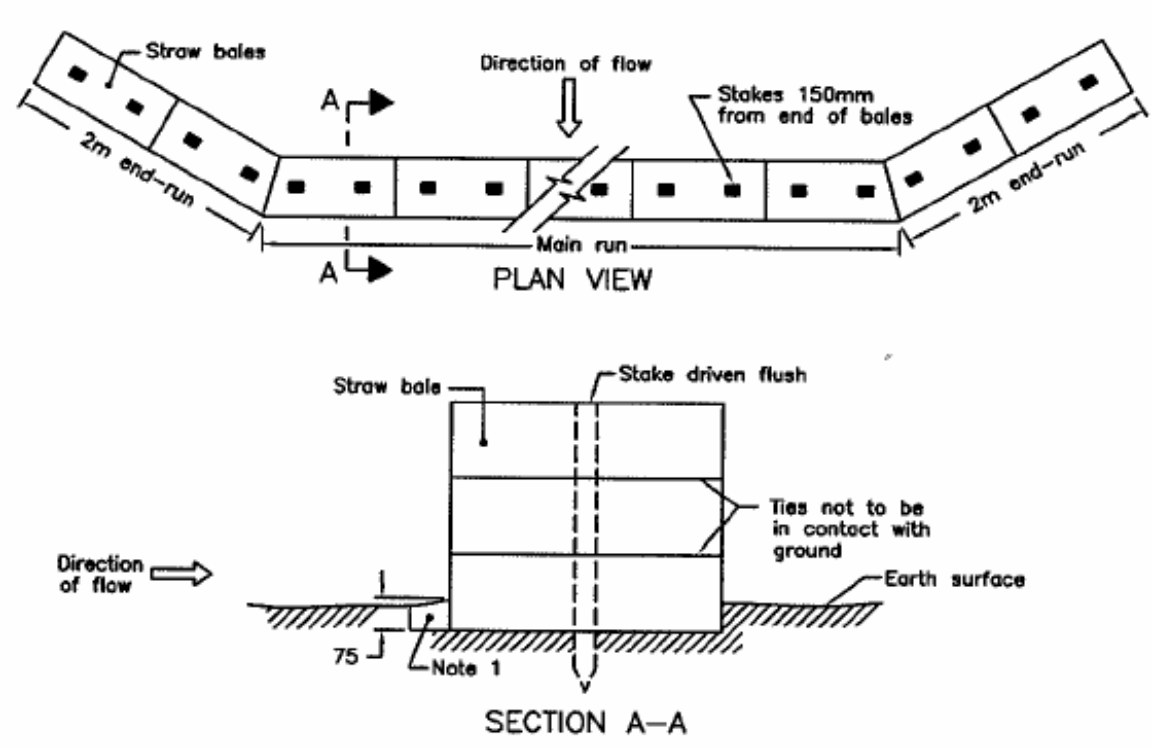
Public Lands Act – 1990	Yes	• Section 14. (1) of the Public Lands Act states that the Lieutenant Governor in Council may make regulations, (a) prohibiting an activity specified by the regulations on public lands or shore lands unless the activity is carried on in accordance with a work permit. • Application 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.	

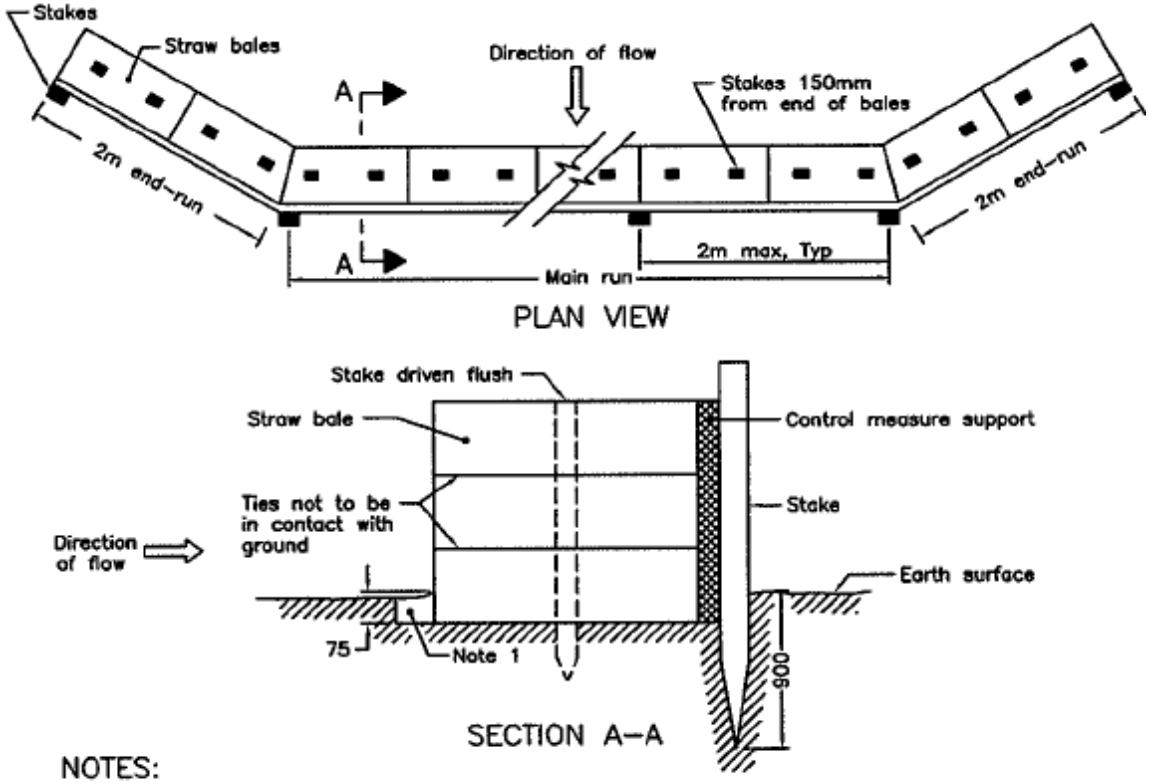
The Power Corporation Act – 1990	No	• Act was mostly repealed in 1998. The remaining portions govern pension plans for employees of power corporations and the appointment of a commission for the control and management of the construction, operation and maintenance of all works undertaken by the corporation 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.	

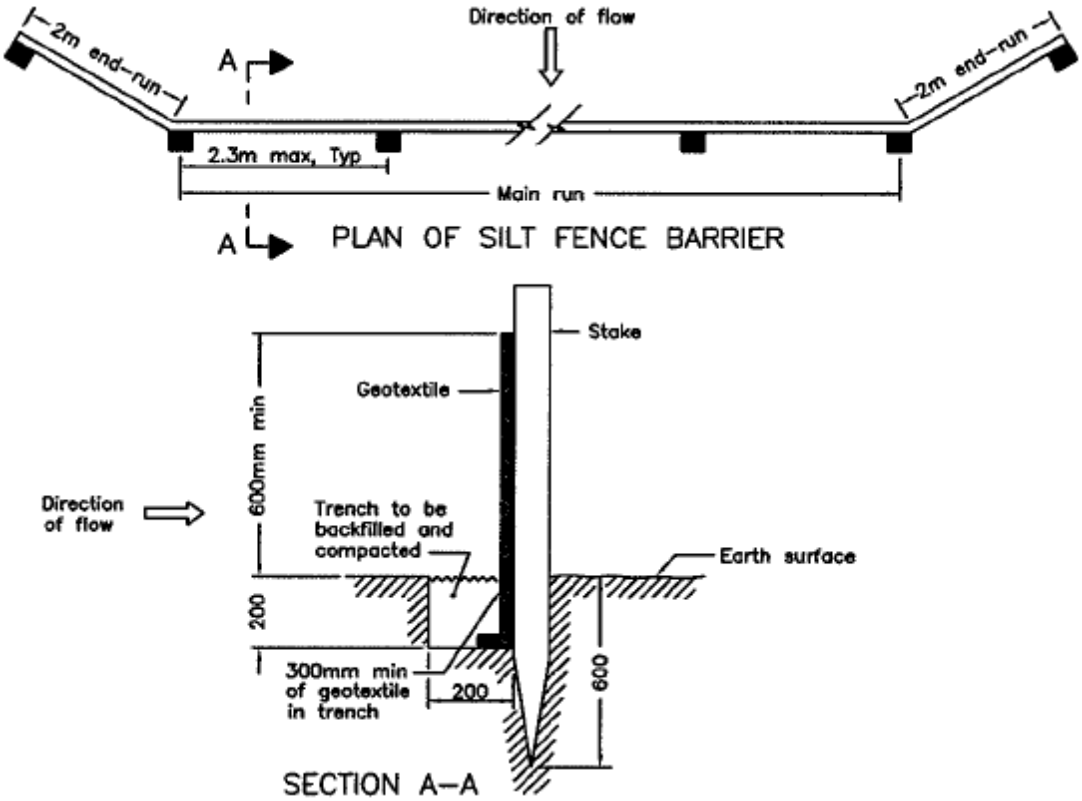
APPENDIX C - Schematics of Erosion and Sedimentation Control Measures (From Ontario Provincial Standards)



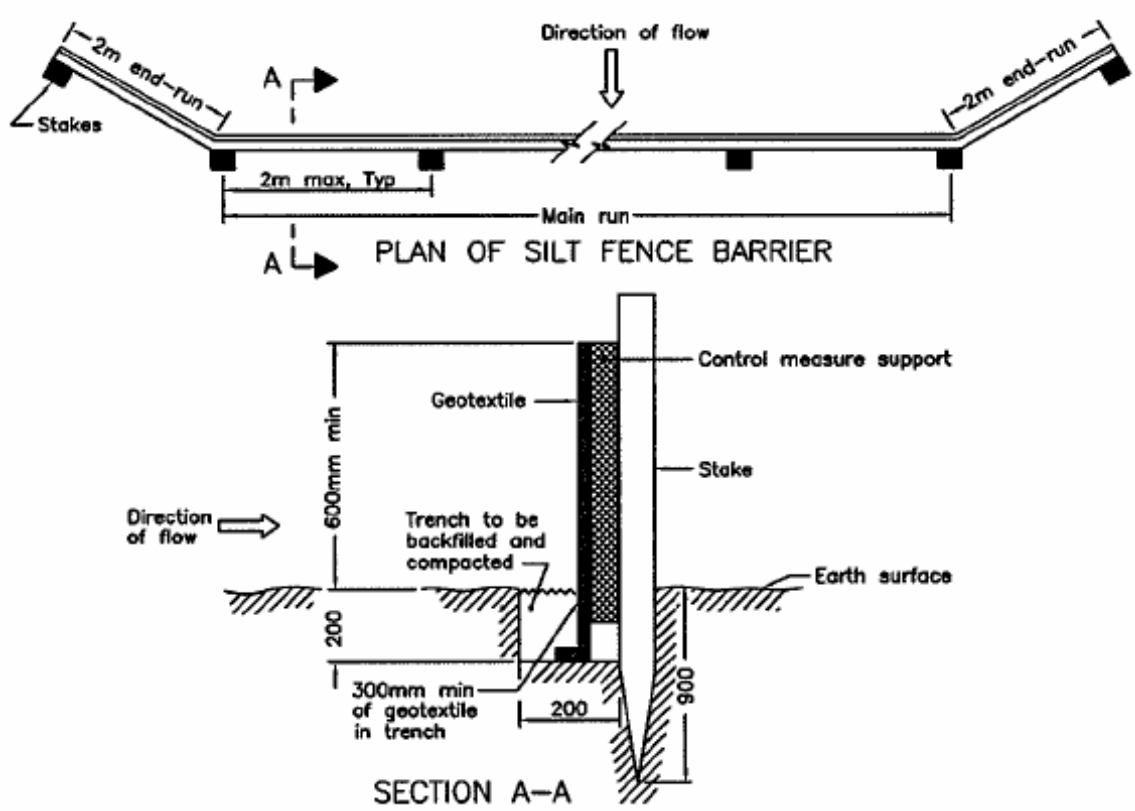
Light Duty Straw Bale Barrier



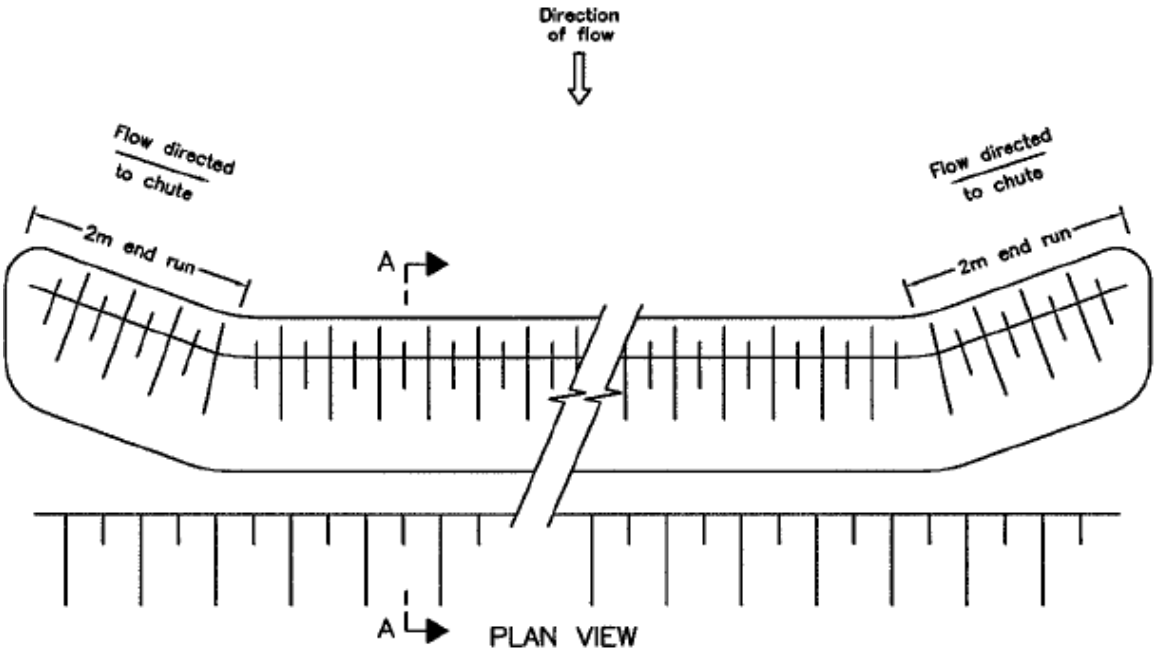
Heavy Duty Straw Bale Barrier

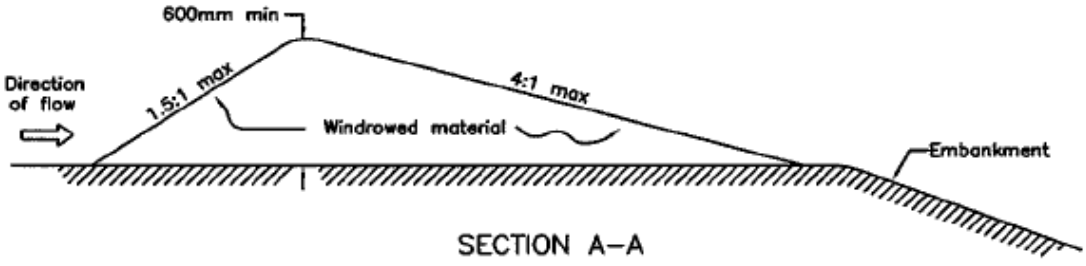


Light Duty Silt Fence Barrier

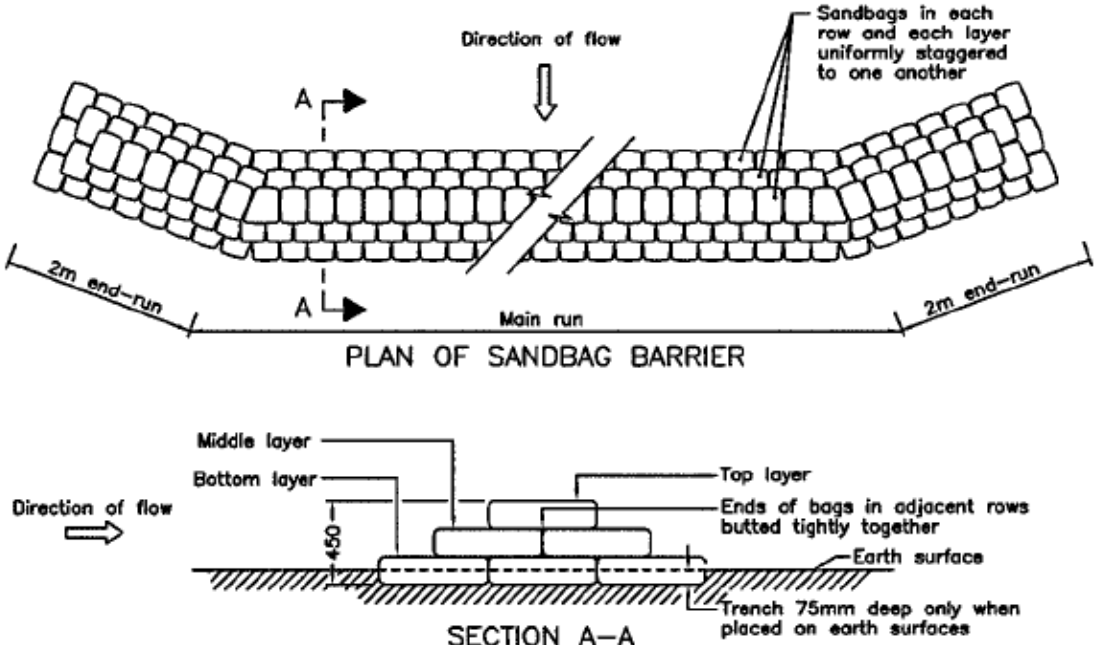


Heavy Duty Silt Fence Barrier

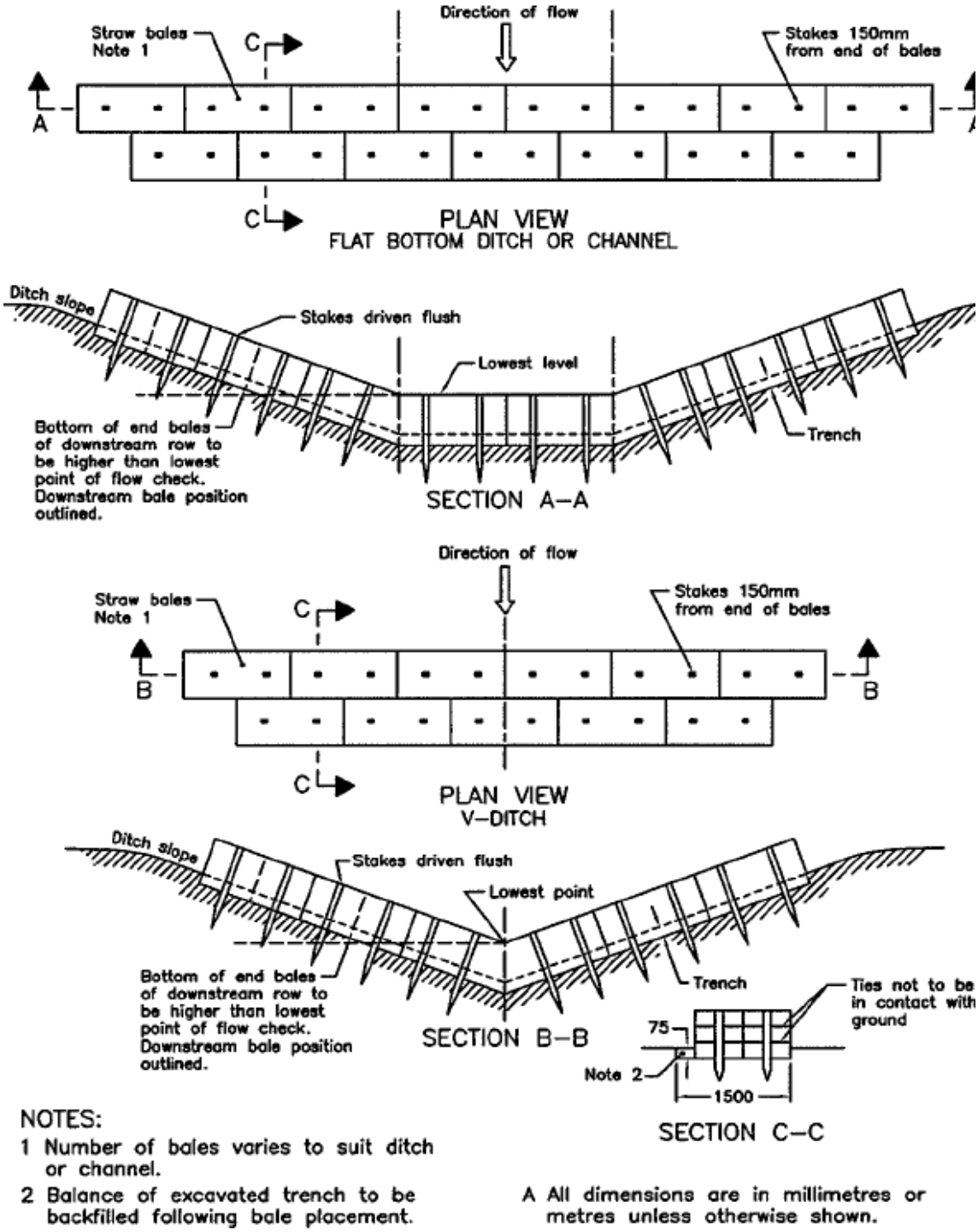




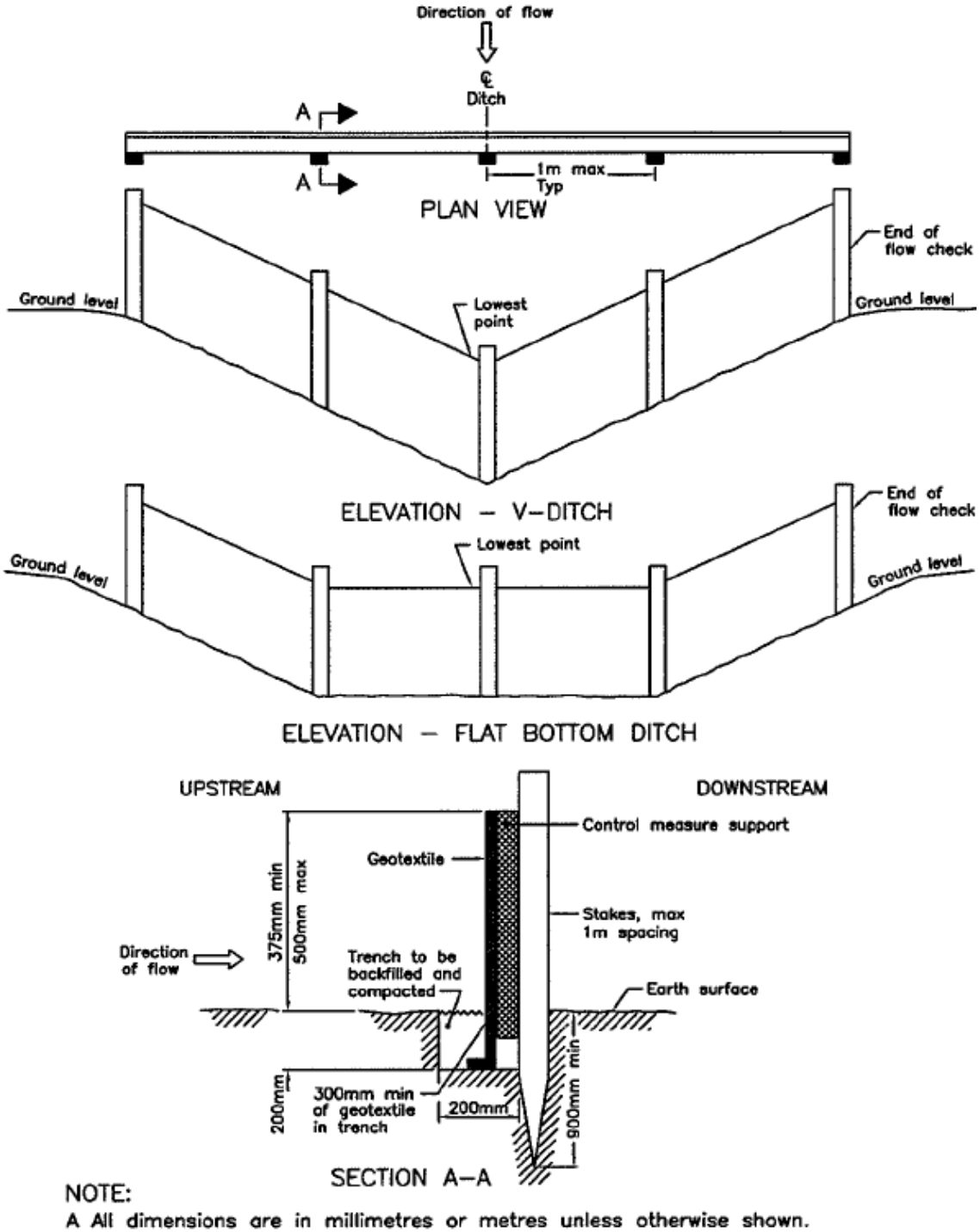
Berm Barrier



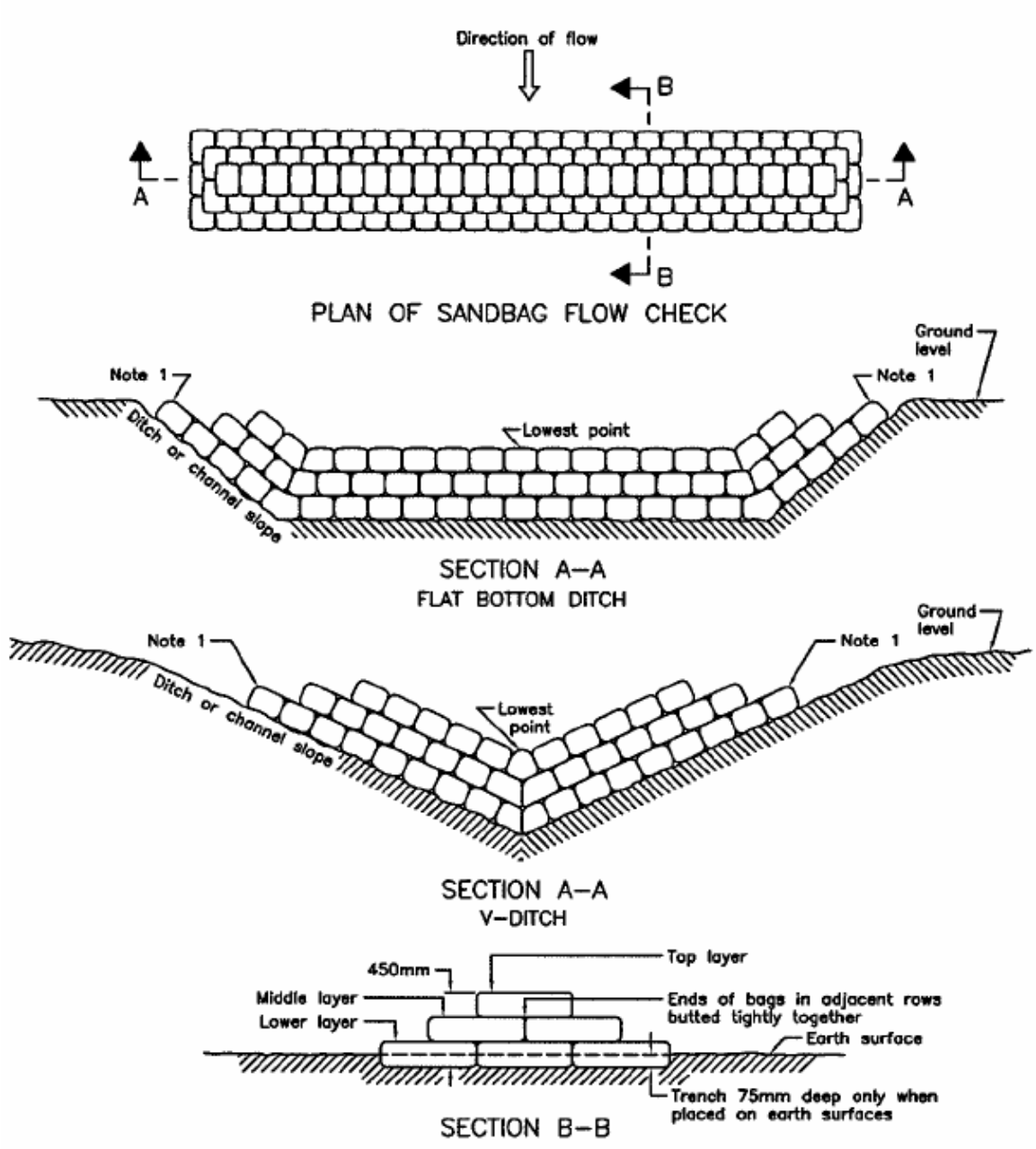
Sandbag Barrier



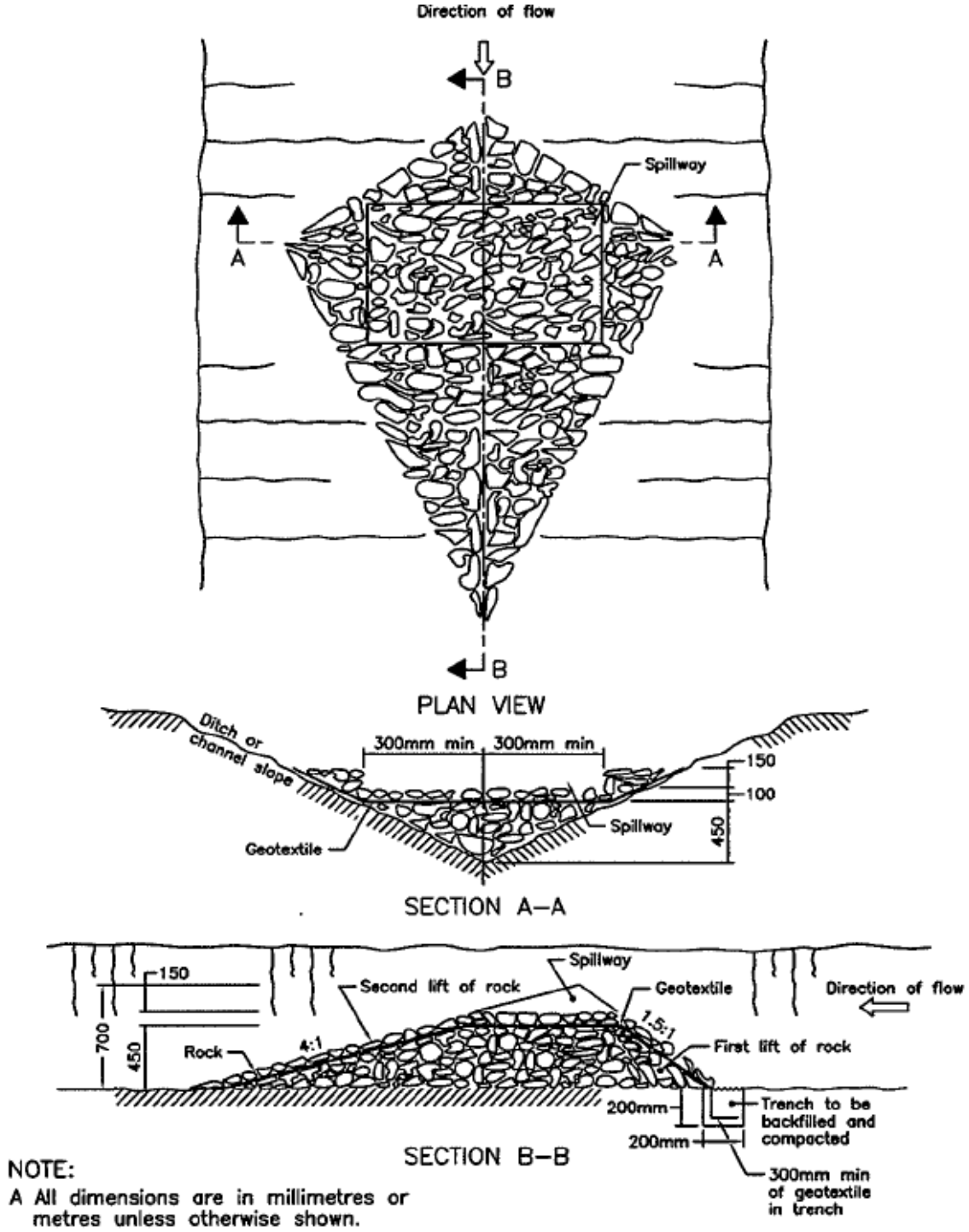
Straw Bale Flow Check



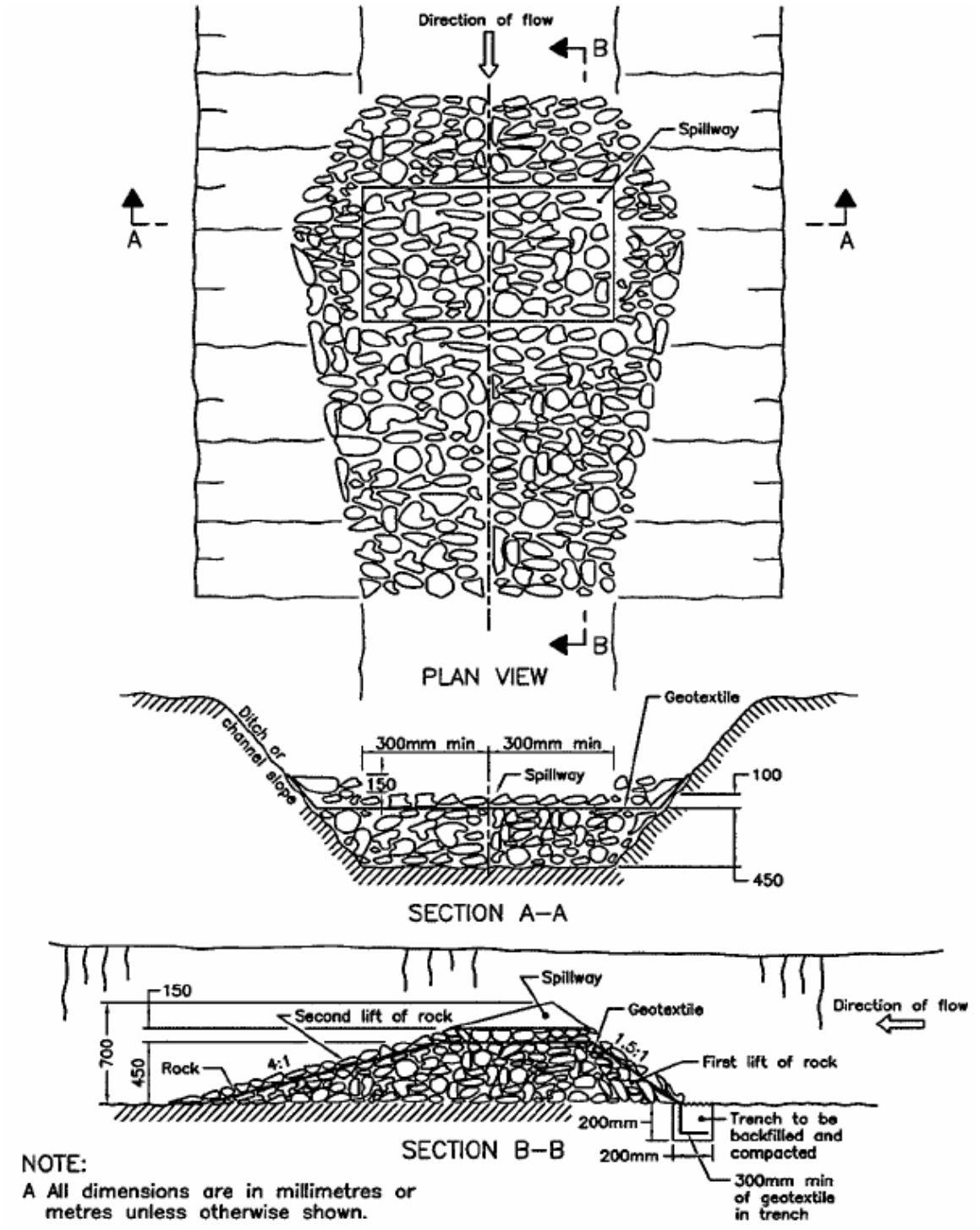
Silt Fence Flow Check



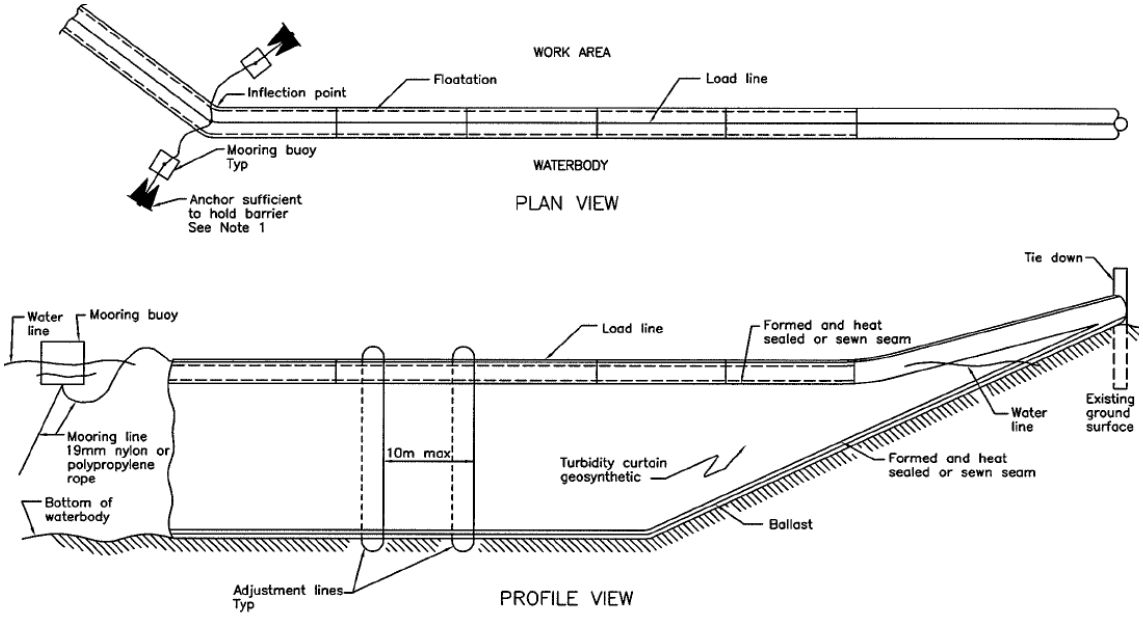
Sand Bag Flow Check



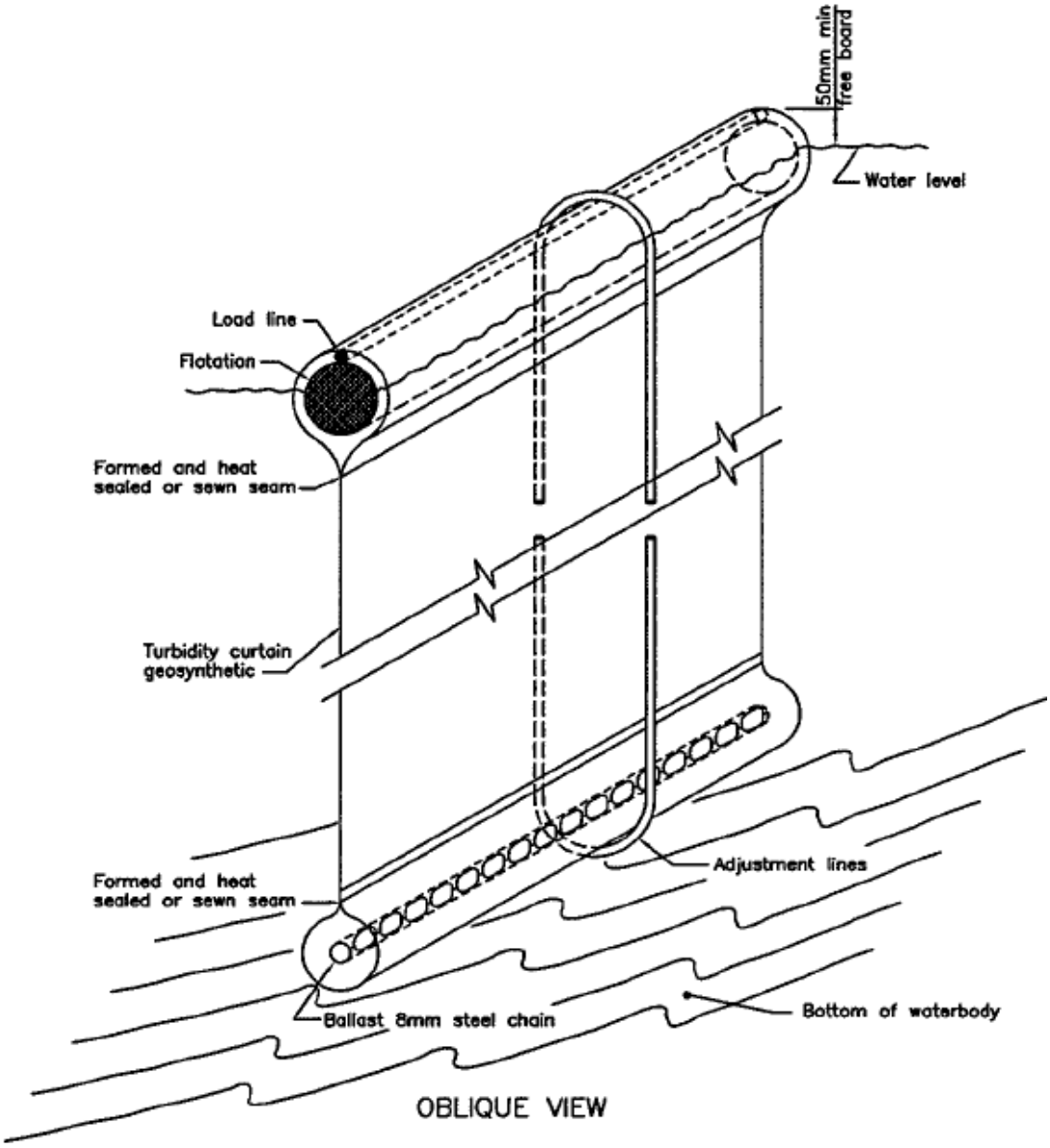
Temporary Rock Flow Check – V-Ditch



Temporary Rock Flow Check – Flat Bottom Ditch or Channel



Turbidity Curtain



Turbidity Curtain – Seam Detail

Appendix 2.5(b)
Environmental Notice

Appendix 2.5(b) - Environmental Notice

ENVIRONMENTAL NOTICE

To: Ontario Power Generation Inc. ("OPG")	Contract: Amended Design/Build Agreement (the "**Agreement**") dated as of December 1, 2008 between Strabag Inc. (the "**Contractor**") and OPG 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 INC.

By: _____

Name:
Title

Appendix 2.7(a)(3)
INTENTIONALLY DELETED

Appendix 2.7(a)(3) - INTENTIONALLY DELETED

Appendix 2.8(a)
Submittal Requirements

Appendix 2.8(a) - Submittal Requirements

5. 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.

5.1 Submittal Categories

1. **Environmental and Quality Assurance Documents**-submit in accordance with Agreement Sections 2.5(a)(4); 2.5(a)(5); and 2.12(c)(1).

2. **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.

3. **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.

4. **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.

5. **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.

6. **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.

5.2 Format of Submittals

1. Submit written documentation on 8-1/2 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 or later

   (b) word process documents are to be in MS Word 2000 or later

   (c) spreadsheets are to be MS Excel 2000 or later

   (d) schedules are to be in Primavera Project Management (Release 5.0)

   (e) any other proposed software requires prior approval by the Owner.

6. SUMMARY TABLE OF SUBMITTALS

Statement of Work Element	DesignBasis Document	100% Construction Documents	Construction Methodologies	As-Built Design and Drawings	Additional Submittals
Schedules					• Contract Schedule per Agreement Section 2.7(c) • WSIB account number per Agreement Section 2.14
Health and Safety					• Project Specific Site Safety, Security, Public Safety and Emergency Response Plan for Agreement Section 2.4(d) • INCW Part Project Specific Site Safety, Security, Public Safety and Emergency Response Plan per Agreement Section 2.20(d) • Contractor's safety program per Agreement Section 2.4(c)(3)

Statement of Work Element	DesignBasis Document	100% Construction Documents	Construction Methodologies	As-Built Design and Drawings	Additional Submittals
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.
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

Statement of Work Element	DesignBasis Document	100% Construction Documents	Construction Methodologies	As-Built Design and Drawings	Additional Submittals
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
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

Statement of Work Element	DesignBasis Document	100% Construction Documents	Construction Methodologies	As-Built Design and Drawings	Additional Submittals
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 • 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

Statement of Work Element	DesignBasis Document	100% Construction Documents	Construction Methodologies	As-Built Design and Drawings	Additional Submittals
Accelerating Wall, Intake & Intake Approach Wall	✓	✓	✓	✓	
Diversion Outlet Canal	✓	✓	✓	✓	
Tunnel Piezometers	✓	✓	✓	✓	
Dewatering System Shafts	✓	✓	✓	✓	
Intake Structure	✓	✓	✓	✓	
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	✓	✓	✓	✓	

Statement of Work Element	DesignBasis Document	100% Construction Documents	Construction Methodologies	As-Built Design and Drawings	Additional Submittals
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.
Disallowed Costs					• The Contractor's policies concerning accommodation, travel and relocation costs of Contractor's staff, in accordance with Subsection 1.1(O)(10) and (11).
ILF Documents in "Searchable PDF" Format					• PR-00-4003, Slope Stability Analysis for Excavations, as contained in Appendix 1.1(r), as amended by Amendment Agreement 2 to the original DBA

Appendix 2.9(c)
Notice of Error in the Contractor's Proposal Documents or the Final Submittals

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: Amended Design/Build Agreement (the **"Agreement**") dated as of December 1, 2008 between Strabag Inc. (the "**Contractor**") and OPG 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 INC

By: _____

Name:
Title

Appendix 2.12(c)(2)
Outline Quality Assurance/Quality Control Program

R-NAW130-01900--0001 R10
Quality System Manual, Version 4.0

Appendix 2.12(c)(2) - Outline Quality Assurance/Quality Control Program

[See attached]

Doc N°: R-NAW130–01900–0001 Rev 10

ONTARIO POWER GENERATION

NIAGARA TUNNEL FACILITY PROJECT

Quality System Manual
Version 4.0

27/9/2008

STRABAG

JEGEL

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STRABAG INC.
NIAGARA TUNNEL FACILITY PROJECT

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QUALITY SYSTEM MANUAL
VERSION 4.0

October 27, 2008

NOTICE:

The following material contains trade secrets, commercial and technical information that are the property of Ontario Power Generation (OPG) and Strabag Inc. and their associated companies.

This material is confidential to registered users and is limited to them insofar as their need for the material exists. The disclosure of the material could be expected to be injurious to the corporation. The advisory found at the bottom of each page in this book is intended to have the same force as the foregoing statement.

DISTRIBUTION LIST

Holder Title	Holder Name	Location	No. Of Copies	Date
Owner's Representative		NTFP Main Office	5	October 27, 2008
Design Engineers:				
Design Engineer Outside Structures	Edward Li	MH Office	1	October 27, 2008
Tunnel Design Engineer	Paul Bonapace	ILF Office	1	October 27, 2008
Tunnel Design Collaborator	David Wood	NTFP Main Office	1	October 27, 2008
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Equipment Manager Robert	Robert Goliasch	NTFP Main Office	1	October 27, 2008
Tunnel Construction Manager	Alexander Herz	NTFP Main Office	1	October 27, 2008
Quality Manager	Keith Foster	JEGEL Office Toronto	1	October 27, 2008
Geotechnical Engineer	Ediz Vural	NTFP Main Office	1	October 27, 2008
Design/Schedule Engineer	Mary Jane Ferraro	NTFP Main Office	1	October 27, 2008
Office Administrator	Kim Krkljus	NTFP Main Office	Original + 1 copy	October 27, 2008
Surveying Engineer	Ahmet Unlutepe	NTFP Outlet Office	1	October 27, 2008
Site Engineer/Technician	Terry McNulty	NTFP Outlet Office	1	October 27, 2008
	Scott Campbell			
Site Engineer/Intake	Neil Blake	NTFP Intake Office	1	October 27, 2008
Lab Technicians	Fredy Martinez	NTFP Laboratory	1	October 27, 2008
	Shahab Khan			

	Eric Crosby Deepak Bajracharya			
Dufferin Concrete	Peter Moylan	Dufferin Concrete Office	1	October 27, 2008
Dufferin Construction	Larry Lorusso	Dufferin Construction Office	1	October 27, 2008
Lone Star Drilling	Jim Moore	Lone Star Drilling Office	1	October 27, 2008
COH	Louis Philippe Bertrand	COH Office	1	October 27, 2008

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1 ISSUE

1.1 APPROVAL

This Quality Manual is approved for use by STRABAG INC. (SBG):

Signed copy retained by Office Administrator. Distributed copies may not bear signatures.

Signature: _____ Date: _____

Ernst Gschnitzer, Project Manager (PM)

Signature: _____ Date: _____

Lloyd Ferguson, Director of STRABAG INC. (SBG Director)

Signature: _____ Date: _____

Erich Kapeller, Senior Construction Manager (SCM)

Signature: _____ Date: _____

Keith Foster, Quality Assurance/Quality Control Manager (QA/QCM)

Signature: _____ Date: _____

Alex Herz, Tunnel Construction Manager (TCM)

Signature: _____ Date: _____

Robert Goliasch, Equipment Manager (EM)

Signature: _____ Date: _____

Paul Bonapace, Tunnel design Engineer

Signature: _____ Date: _____

Edward Li, Design Engineer - Outside

Please note: Comments shall be received within two weeks from distribution date otherwise will be considered as acceptance.

VERSION CONTROL

This section is to be updated for each issued revision of the Quality Manual for SBG.

Version No.	Reason for Revision	Effective Date
0.0	First Draft	July 12, 2006
1.0	OR comments – August 28, 2006 (Submittal DS-0056-R05)	August 31, 2006
2.0	Add the Procedure: Lines of Communication. OR Comments – November 17, 2006 (Submittal DS-0056-R06) Update Appendix E – Construction Quality Plan due to changes in materials and procedures	January 29, 2007
3.0	OR Comments – March 22, 2007 (Submittal DS-0056-R08) Update Procedure SBQ011: Management Review Update Procedure SBQ041: Design Review Update Procedure SBQ042: Design Variance Update Procedure SBQ043: Design Evaluation and Optimization Update Procedure SBQ052: Document Naming/ Numbering Update Procedure SBQ061: Purchasing Update Procedure SBQ091: Process Control Update Procedure SBQ141: Corrective and Preventative Action Update Procedure SBQ171: Quality Audits Update the Quality System Manual Main Document Update Appendix A – Corporate Organization, Relationships and Responsibilities Update Appendix C – SBG Quality Responsibility Matrix Update Appendix E – Construction Quality Plan due to changes in materials and procedures Add Form 11 for Dewatering Shafts inspection	Mar. 24, 2008
4.0	OR Comments – May 2, 2008 (Submittal DS-0056-	October 27, 2008

Version No.	Reason for Revision	Effective Date
	R09) Update the Quality System Manual Main Document Update Procedure SBQ041: Design Review Update Procedure SBQ042: Design Variance Update Procedure SBQ043: Design Evaluation and Optimization Update Appendix E – Construction Quality Plan due to changes in materials and procedures	

1.2 OWNERSHIP AND DISTRIBUTION

The owner of this Quality Manual is SBG. The contents of this manual are copyrighted by Ontario Power Generation (OPG). All copies must be returned to the SBG Quality Assurance / Quality Control Manager (QA/QCM) upon demand.

The QA/QCM maintains this manual and ensures distribution of changes to holders of controlled copies.

Holders of controlled copies are responsible for updating their copy by inserting distributed changes and removing or deleting obsolete material.

Holders of uncontrolled copies are solely responsible for ensuring the currency and completeness of their copy.

1.3 GLOSSARY

Terminology used with special meanings is listed in Appendix D.

1.4 REFERENCES TO PROCEDURES:

Procedures associated with a Section of this manual (and the corresponding section of ISO 9001) are numbered as follows:

ISO/Manual Section	Procedure number
4.nn	SBGQnnm, m is 1,2,3, ...

For example: SBGQ022 is the second procedure associated with the requirements of Section 4.2, Quality System; SBGQ181 is the first procedure associated with Section 4.18, Training.

Appendix I lists the current set of procedures.

2 INTRODUCTION

2.1 Project Description

The Niagara Tunnel Facility Project (NTFP or the "Project") involves the construction of a diversion facility to convey an additional 500 m^3/s of water from the headwaters of the Niagara River above the Niagara Falls to the headwaters of the Sir Adam Beck Power Generation Plant. The water will permit maximizing utilization of available generating capacity at the complex thereby increasing average annual energy output of the plant.

The project involves the construction of a 10.4 km long, 14.4 m diameter, concrete-lined tunnel, running from the existing International Niagara Control Works (INCW) structure, under the City of Niagara Falls, to the Sir Adam Beck plant canal system in Queenston, Ontario. The tunnel will go below the St. Davids Gorge, and, at its lowest point, will be buried some 140 m below the ground surface. Apart from the tunnel, the project will also involve the construction of reinforced concrete intake and outlet structures, modification of the INCW structure to accommodate the new works, approximately 350 m long approach wall along the bank of the Niagara River, and the removal and reconstruction of the 600 m long Accelerating Wall in the Niagara River. Other works include intake channel, outlet canal, control gates and associated works, demolition of the existing control structure at the Pump Generation Canal, access road and services and utility works, site clearing and subsequent reinstatement, site fencing and security system, stockpiling of materials, environmental installations such as desalting ponds, and temporary works such as cofferdams, conveyor system, concrete batching plant, and other related facilities.

2.2 Application

This Quality System Manual applies to the construction of the NTFP by Strabag Inc. of Austria (SBG).

SBG is committed to design and construct the Project; to exercise due diligence in the Quality Control and Quality Assurance of the work and functions including compliance with the terms of the Design-Build Agreement (DB or the "Agreement") and the schedules attached thereto.

2.3 Quality and Environmental Standards

SBG and all incorporated associated companies will operate in compliance with ISO 9001:2000 and follow the guidelines of ISO 14000:2004 International Standards, as applicable to their work.

Any reference to "ISO 9001" or "ISO 9000" shall be construed as the appropriate one of ISO 9001:2000, ISO 9002:2000 or ISO 9003:2000, as prescribed in ISO 9000-1:2000.

Partners, subcontractors and subconsultants with current ISO 9000 registered Quality Systems are listed in Appendix B.

2.4 Requirements for Subcontractors, Subconsultants and Suppliers

Subcontractors, Subconsultants and Suppliers are required to fulfill all requirements for quality specified in their contracts with SBG. Applicable quality requirements included in this manual and associated procedures are referenced in or attached to these contracts as required.

Assistance will be offered to SBG subcontractors, subconsultants and suppliers in order that the quality requirements of the Project will be met. Subcontractors, subconsultants and suppliers will be required to commit to carrying out training plans. It will be a condition of their contracts with SBG that their quality representatives attend quality information sessions to review technical, management, quality and environmental requirements for compliance. Those companies that are interested will be encouraged to pursue ISO registration.

3 BUSINESS ORGANIZATION

The project is a “Design-Build” contract awarded to the team led by Strabag Inc. of Austria (SBG), with the engineering team of ILF Consulting Engineers of Innsbruck, Austria (ILF), and Morrison Hershfield Limited of Toronto, Canada (MH). The Quality System Manual has been prepared to set out the Quality Assurance / Quality Control Process that will be implemented by SBG, Subcontractors and Subconsultants when conducting the design and construction activities for the Project.

The organization of SBG is described in Appendix A.

4 Quality System Description

4.1 Management responsibility

4.1.1 Quality policy

The Quality Assurance / Quality Control processes manage the quality of materials to be incorporated in the project and the workmanship during construction.

The Objectives are:

- **Meet or exceed quality needs, expectations and satisfaction as expressed in the Agreement.**
- **Avoid delays in completing the work due to poor workmanship and planning**
- **Provide a safe and productive work environment**
- **Ensure early detection of deficiencies and non-conformances**

The QA/QCM ensures that SBG Quality Policy and applicable quality requirements are communicated to employees, subcontractors, subconsultants and suppliers on commencement of their employment or contract.

All managers and supervisors are expected to set performance standards and objectives for quality within the scope of their operations to support and contribute to the achievement of a 100 percent Quality Management Performance Score and to initiate prompt and effective corrective actions for any shortfall that is fairly attributed to their operations.

Processes and procedures for the normal administration of the project are considered outside the scope of this manual.

4.1.2 Organization

4.1.2.1 Quality Assurance Process

The Quality Assurance Process consists of a controlled review of the Quality Control Process and associated records on a daily basis. It also includes random reviews/inspections of workmanship to ensure QC tasks have been completed.

The review/inspections of workmanship will be performed at random times and will be performed by staff, familiar with the specific manufacturing/construction component.

The reviews/inspections will be documented in a report and filed in the Quality Assurance system files. The findings may result in a Nonconformance Notice, which

will be submitted to the Manager of the component of work reviewed for his/her action in accordance with the QA/QC Plan nonconformance process.

The QA/QCM will conduct audits of each Subconsultant and Subcontractor to ensure that the QC process is carried out as stated in the respective QC Plans. This will include checking the following:

- Process controls are implemented and QC documentation is maintained.
- Prompt response/resolution to QC Reports indicating a Nonconformance.
- Dates of deliverables/schedules are met.

The QA/QCM will be responsible to review and file all Quality Assurance / Control records. He will also develop the QA/QC plans for each element of work.

The QA/QCM or his assistant (who is also the designated Quality Laboratory Manager or QLM) will be on site full time and ensure that all QA/QC activities have been performed in a timely and proper manner.

The QA/QCM reports to the PM and will ensure that the required elements of the QA/QC Plan have been completed in a timely manner.

The QA/QCM will also compile the part of the Weekly Construction Activity Report (WCAR) as per Appendix 2.8 (a) “Submittals Requirements” of the DB. He will compile the report for the parts related to the QA/QC process with all relevant reports and test results attached.

The QA/QCM will also receive, monitor and file the following information:

- QC test results from material suppliers
- QC test results from manufacturers of pre-cast elements
- QC data from subcontractors and subconsultants where applicable
- Inspection reports and other monitoring reports
- Test results from the testing laboratory
- QC check list from the designer

The QA/QCM will keep the PM informed in general terms through the WCAR, but will notify the PM immediately of any serious quality problems or deviations from the QA/QC Plan. The QA/QCM will forward a copy of the non-conformance notice and the associated corrective action.

The QA/QCM will develop a tracking system to ensure that the QC activities have been performed as detailed in the various QC plans. The tracking sheets will be included in each specific QA/QC plan.

The QLM is responsible for the timely sampling and testing of materials in the field and in the laboratory. He will be reporting to the QA/QCM.

The testing requirements are detailed in the applicable QC plans and the QLM in conjunction with the shift technicians will be responsible to ensure that all testing requirements have been met and the results submitted to the QA/QCM. He will also carry out testing in the field and in the laboratory. The QLM will be CSA certified to carry out the required tests in a CSA certified laboratory.

The Laboratory Quality Technicians (LQT) will be responsible for carrying out the field and laboratory testing. The LQT will be certified to carry out the required tests in a CSA certified laboratory.

All Managers and supervisors of work contributing to the project have the above authority within the scope of their own management responsibilities.

4.1.2.2 Quality Control Process

Extensive liaison work between team members will be carried out to ensure that all requirements resulting from engineering, construction, economy, scheduling issues will be addressed in a timely manner. Formal Design and Construction Meetings will be held every two weeks and one week respectively with participants from all team members as well as from the Owner's Representative (OR), with other meetings held at a much higher frequency and on an "as requested" basis to discuss more imminent issues.

The PM and his/her delegates will be responsible for the control project schedule and cost; liaise with SBG, attending meetings, external agencies and utilities on behalf of SBG where required; present various components of the project, coordinate multi-disciplinary engineering functions, and take overall responsibility for Quality Control. The PM will act as the primary liaison and contact with the Director of SBG, as well as a conduit for any required corporate support that may be needed and are available to address and resolve issues that may arise on the project. The PM will be responsible for ensuring adequate staffing on the project.

The PM and his/her delegates will also be responsible for meeting the terms and conditions of the Engineering Agreement and responsible for the submission, implementation and documentation of QC Plan requirements. The PM shall ensure personnel are properly trained and provided the proper resources necessary to deliver the level of quality expected.

The Quality Control Plans ensure that the project is completed in accordance with the quality requirements. The QC Plans will also help to ensure that the quality of the project is satisfactorily monitored and controlled.

Monitoring and control includes verifying compliance and the identification of deviations from Quality Control requirements. Remedial action includes both corrective and preventive action and is an essential component of the QC Plan.

The scope of the QC plan will include checking of drawings and specifications, testing of materials and installations, independent inspections, tracking of submittals to ensure timely delivery.

The Manager for each component is responsible to ensure that the QC Plan requirements are adhered to and performed. He is also responsible for the QC Plan for subcontractors/subconsultants performing part of his work.

The QC Plan will include position descriptions with responsibilities, check lists for inspections/reviews, submittal and review of submittals tracking sheets, work schedule submissions, work tolerances, non-conformance process, inspection/review frequencies, test results, reporting.

The Quality Control Technician will maintain the QC records and submit the non-conformance reports and weekly summaries to the QLM.

4.1.3 Management Review

The Project Managers review the status and effectiveness of the Quality System at intervals defined by them to ensure its continuing suitability and effectiveness in satisfying the requirements of ISO 9001 and SBG's stated quality policy and objectives. Immediately after approval of the Quality Control Plan by OPG, the PM will ensure that all standards, policies and practices are in place to complete the design. Subsequent Quality reviews will take place, to ensure that the Quality Controls are still in place, that technical reviews are being conducted and documented as required and that records and documentation are as per the Quality Control Plan. Additional Quality Reviews may be considered, if deviations from the Quality Control Plan are perceived. Records of these reviews are maintained in the form of minutes or reports as appropriate and are submitted to the Director of SBG for review and ratification.

4.2 Quality System

4.2.1 General

SBG has prepared this Quality Manual to describe its Quality Management System in accordance with the requirements of ISO 9001.

SBG plans and provides the resources necessary to implement the system in a timely manner to ensure that the project conforms to all contractual requirements.

The QA/QCM and staff are responsible for the preparation, release and maintenance of this Quality Manual and associated Quality System Procedures to support the activities of the project.

4.2.2 Quality System Procedures

SBG prepares and maintains documented procedures consistent with the requirements of ISO 9001 and SBG's stated quality policy and ensures that the quality system and its documented procedures are effectively implemented.

Detailed Quality System Procedures are referenced where necessary to provide additional direction in the execution of the required quality related tasks. The range and detail of these Procedures is appropriate to the complexity of the work, the methods used, and the skills and training of the personnel performing it. Where necessary, supporting work instructions are provided to direct how an activity is performed. Where the responsible parties are deemed to have the training and experience to implement the described activities without further detailed instructions, no further Procedures or Instructions are issued.

4.2.3 Quality Planning

SBG defines and documents how the requirements for quality are controlled and assured by preparing and issuing Quality Plans for the construction of the Project. In developing the Quality Plans, SBG reviews the requirements of the DB Agreement. All relevant requirements are incorporated and addressed in the individual Quality Plans of SBG and of related organizations.

In executing their individual responsibilities, each person indicated develops their portion of the Quality Plan.

The following describes SBG’s Quality Planning process:

a) Preparation of Quality Plans

Quality plans consist of tabulations of Contract Activities, the corresponding Quality Requirements, the responsibility and activity for Quality Control and the corresponding responsibility and verification activity or record for Quality Assurance.

(Early versions of the Quality Plans may contain columns for sign-off of verification and date. These need not be used; instead, inspection reports or other records are used as evidence of the completion of the activity as required.)

The Quality Plans required for all components of the Project are organized as follows:

Design:

Morrison Hershfield Limited of Toronto (MH) develops and implements quality plans for its consulting participation in the project, which covers:

1. Providing Project Management of all engineering services to be furnished by MH, including all related liaison for this work with SBG, its Subcontractors, other design engineers, OPG and its representatives, agencies and the public.

2. Providing detailed structural engineering services for the approach walls, acceleration walls and intake channel, as well as modifications to the International Niagara Control Works (INCW) structure. Reviewing temporary structures and supports designed by SBG, or Subcontractors for facilitation of the construction of these permanent works.

3. Providing detailed civil engineering design services for the formation of SBG's and/or Subcontractors' work areas, access roads and stockpiling areas, including subsequent reinstatement works.

4. Providing electrical design services for the temporary and permanent power supply to the site.

5. Providing assistance to SBG to acquire supplier(s) for the intake and outlet gates and associated works and accessories; and

6. Coordinating design work with other consultants.

ILF Consulting Engineers of Innsbruck (ILF) develops and implements Quality Plans for its consulting participation in the project, which covers:

1. Providing Project Management of all engineering services to be furnished by ILF, including all related liaison for this work with SBG, its Subcontractors, other design engineers, OPG and its representatives.

2. Providing detailed structural engineering services for the Diversion Tunnel, the Intake and Outlet Structures, the Outlet Canal and the Dewatering System.

3. Coordinating design work with other consultants.

The Quality Plans regarding consulting works developed by MH and ILF are appended to this Quality System Manual (See Appendix E).

Environmental:

Morrison Hershfield Limited of Toronto (MH) has developed the Environmental Management Plan (EMP). The EMP 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 Design/Build Agreement and the Community Impact Agreement.

Construction:

Quality Plans are developed and implemented by SBG according to requirements of the designer's NTFP drawings and specifications regarding: Steel Ribs, Reinforcement, Rock Dowels, Shotcrete, Monitoring, Underground Injections, Interface Grouting, Concrete Works Final Lining, Concrete Works Intake and Outlet Structures, Waterproofing System, Drainage Measures, Tunnel Excavation and Support, Dewatering System Excavation and Support, Intake Channel Excavation, Approach Wall and Accelerating Wall, Cofferdam and Other Concrete Works. These Quality Plans are appended to this Quality System Manual (See Appendix E).

Subcontractors, subconsultants and suppliers engaged by SBG are required to submit Quality Plans or Manuals, consistent with their scope of work, for review and approval by the QA/QCM.

b) Identification and acquisition of resources for quality

Each responsible manager, subcontractor, subconsultant or supplier is required to identify the human and physical resources necessary for the completion of assigned tasks, including communication and liaison with other functions, purchased and subcontracted products and services, and selection and training of employees.

SBG Managers are responsible for identifying and acquiring the controls, processes, equipment, fixtures, resources and skills required for quality subject to the coordination and approval of the PM.

c) Compatibility of processes, procedures and documentation

All Managers and Supervisors are required to follow performance objectives for quality within the scope of their operations, to support and contribute to the achievement of a quality product; and to initiate prompt and effective corrective actions for any shortfall that is fairly attributed to their operations.

A controlled document is information in any media that is required for the performance of activities that affect quality. A controlled document must be accessible in its current and correct version to all personnel who perform the work in question.

Any employee, subcontractor, subconsultant or supplier must immediately identify non-conforming work or product to the responsible manager to initiate appropriate action.

Records are established and maintained to provide evidence of conformity to contract requirements as well as quality management system requirements. Records will remain legible, readily identifiable and retrievable at all times.

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.

d) Quality control, inspection and testing techniques and new instrumentation

The QA/QCM and staff are responsible for updating, as necessary, of quality control, inspection and testing techniques, or for approving such updates when proposed or developed by SBG staff, subcontractors, subconsultants or suppliers.

e) Measurement capability exceeding the known state-of-the-art

SBG foresees no need to exceed the known state-of-the-art in measurement capability.

f) Verification during realization of the project

The QA/QCM, the SCM and the TCM are responsible for identification of suitable verification at appropriate stages in the realization of the project through the development and maintenance of quality inspections. The Environmental and Safety Managers have corresponding duties with respect to their disciplines.

g) Standards of acceptability

The QA/QCM, ILF/MH Design Engineer – Tunnel/Outside and SBG Construction Managers are responsible for the provision of necessary information, procedures and forms to the Construction Organization to clarify standards of acceptability for all features and requirements, including those which contain a subjective element, and for liaison with the governing authorities to clarify those standards in case of dispute.

h) Quality Records

SBG Managers, subcontractors, subconsultants and suppliers are responsible, in consultation with the QA/QCM, for the identification, preparation and retention of quality records required to demonstrate conformance of the project and the quality system.

4.3 Review of Contracts

4.3.1 Contract with OPG

The contract governing SBG's work on the Project is the Design / Build Agreement (DB), which covers all technical and administrative issues regarding the Project (See Design–Build Agreement dated August 18, 2005, Volume 1, "Main Document".

4.3.2 Amendments to Contracts

Changes to the DB agreement are approved and implemented by means of Change Orders (CO), Change Requests (CR) or renegotiation of requirements as prescribed in that agreement. The Administrative Project Manager maintains an up-to-date copy of the agreement and all approved changes and communicates them to the affected disciplines for implementation.

4.3.3 Records

The records of contract review for the DB are:

a) the Request for Proposal (RFP);

b) SBG's Proposal;

c) Subsequent COs and CRs; and

d) communications and clarifications between SBG and OPG during negotiations.

4.4 Design Control

4.4.1 General

Responsibility for execution and control of all aspects of the design for the Project is vested in the Design Manager of ILF and MH who are responsible to ensure that the design meets the requirements and specifications included or referenced in the DB Agreement, schedules and other applicable standards.

A Design Package shall be performed for each activity of the Project, which includes: Drawing and Specifications.

ILF and MH designate a Design Engineer – Tunnel/Outside and a Design Collaborator – Tunnel/Outside with the responsibilities described in Section 4.4.3.

SBG designates a Design/Schedule Engineer (D/SE) along with the QA/QC Manager who are responsible of ensuring the performance of QC, identify and coordinate opportunities for optimization of designs for constructability, schedule and cost.

The responsibilities of each participant in the design process are described in Section 4.4.3.

4.4.2 Development and Design Planning

ILF and MH maintain a Design Quality Plans, and coordinate the design activities, reviews and approvals required. Refer to the Design Quality Plan.

4.4.3 Responsibilities

The responsibility of the development, implementation, monitoring and documentation within the Project and the Design Quality Plan are the following:

SBG Design/Schedule Engineer (D/SE):

- Ensures receipt of interim and final Design Packages from the subconsultants, transmits design requirements and the results of design reviews to the subconsultants and ensures completion of required changes or corrections.
- Conducts regular meetings with Subconsultants, to optimize the design and construction in terms of quality, constructability and environmental issues, etc., relevant to the project.
- Reviews Subconsultants' work by ensuring that all drawings and reports have been sealed by a Professional Engineer licensed in Ontario and signed by the Specialized Collaborator if required.
- Ensures that proposed plans are submitted to the Owner's Representative (OR) for review per the DB agreement.
- Submits Change Requests that are required to support design decisions, to the OR.
- Facilitates appropriate organizational and technical interfaces between ILF/MH and OPG, SBG, Subcontractors and other stakeholders in the design process.
- Ensures that all applicable design information is available prior to start of construction activity.

ILF/MH Design Engineer – Tunnel/Outside:

- Communicates the scope of the contract and distributes copies of all relevant project plans with bid packages and contracts.
- Performs checks on all critical project tasks that may require engineering judgment and experience.
- Reviews tender documents, co-stamps and signs contract drawings and reports where required.
- Maintains complete, current copies of all Project Plans.
- Performs Project file keeping, background reviews, data collection, analysis/evaluation, preparation of technical reports, detailed design, clearance and approvals, stamping and signing contract drawings, and construction liaison with PM, TCM and DSE.

- QA's ILF/MH QC process.

ILF/MH Design Checker – Tunnel/Outside (internal to Consultant):

- Performs checks on all critical project tasks that may require engineering judgment and experience. The Design Checker will review tender documents, drawings and reports where required.

ILF Collaborator:

- Responsible for the duties of the Design Collaborator - reviews design drawings and reports and ensure that documents are produced in accordance with legal requirements in Ontario. The Collaborator will co-stamp and sign tunnel drawings and tunnel reports.

Design Quality Control Auditor (internal to Consultant):

- Responsible for Independent Design Quality Audits of the implementation and documentation of Design Quality Plan, procedures and documentation. The Quality Control Auditor will conduct Quality Audits at identified Milestones.

4.4.4 Design input

The SBG D/SE ensures that the design inputs are identified, documented and their selection reviewed for adequacy. Incomplete, ambiguous or conflicting requirements are resolved with the governing authorities wherever possible.

The design inputs are the Technical Specifications and Standards and Design Criteria Documents (defined in the DB Agreement); applicable Laws, Regulations and standards; and the results of any studies and tests related to the Work.

The principal design input documents are:

- DB agreement
- Surveys, studies and reports
- Plans and as-built information for Crown Completed works
- Safety Audits (safety by design)
- Standards and regulations
- Communications and agreements with third parties. (e.g., government agencies, municipalities, affected landowners.)
- OR reviewed submittals.

4.4.5 Design Output

The design outputs for the NTFP are the Project Plans. The Project Plans (design basis documents, 100 percent construction documents such as drawings and specifications) contain or reference the acceptance criteria for the work in the form of dimensions, notes, specifications, standards and methods. The Project Plans are verified against design input requirements by the SBG D/SE, the ILF/MH Design Engineer Tunnel/Outside and by the design review process.

Those characteristics of the design that are crucial to the safe and proper operation of the facility are derived from the governing standards and regulations and are reviewed in Safety Audit reports.

The form and content of project plans output is standardized to ensure consistency of the product delivered to follow-on designers and contractors.

Before release for construction, Project Plans are reviewed and stamped by a Professional Engineer licensed in the Province of Ontario.

Project Plans are submitted in adequate time to be reviewed by the Owner's Representative to allow work to proceed, as required by the DB Agreement.

4.4.6 Design Review (internal to Consultant)

All Design Packages and their corresponding QC Plan will be subjected to internal interim technical reviews carried out by ILF/MH Design Checker. A final technical review is carried out by additional technical staff where required. Other informal reviews and project discussions will be conducted throughout the Project as established in Design Review procedure (See Procedure SBGQ041).

A final check is made, internally by the consultant, at the completion of the design. This is done in a Technical Review Meeting.

Upon completion, all design drawings and reports (as required) will be stamped and signed by the Professional Engineers responsible for the design. Design documents are then forwarded to Strabag D/SE for additional review of constructability and conformance with the contract requirements.

4.4.7 Design Verification (D/SE and Strabag's Engineering Department)

In addition to scheduled design reviews, design verification may include performing alternative calculations, comparison with similar proven designs, tests or demonstrations of design elements and independent reviews of the design and its documentation prior to release.

4.4.8 Design Validation (Strabag/Designers)

Design validation is a demonstration that the project, or a part of it, conforms to defined user needs and requirements.

Design validation is achieved by:

- compliance with applicable design standards included in the DB Agreement, and
- demonstrating the performance of the facility or portions of it under operating conditions.

Design Validation is an ongoing process that evaluates the performance of the works as the application of the design is repeated over the course of the project. Where possible, problems encountered in validation are resolved early enough to prevent the duplication of shortcomings elsewhere in the project.

4.4.9 Design Changes

All design changes and modifications are identified, documented, reviewed and approved by SBG D/SE before their implementation. Where required by the agreement, changes are submitted to the OR for review.

Designs may, at the discretion of SBG, be reviewed to identify opportunities for improvement. The D/SE is engaged by SBG to manage the Design Evaluation and Optimization process and is responsible for ensuring that all revised designs are reviewed for compliance with the requirements of the DB Variance Process(See procedure SBGQ043).

4.4.10 Quality Audits

Quality Audits are carried out by MH and ILF staff generally not having direct responsibility in the areas being audited. Quality Reviews are conducted:

- To ensure that Quality Control policies / procedures as outlined in the Design Quality Plan are being adhered to; and
- To ensure that all aspects of Design Quality Plan are being appropriately documented.

The Quality Audits will be documented in Quality Review Reports by the QA/QCM. The Quality Review Report will consist of a memorandum from the QA/QCM to the PM outlining the scope of the review and the basic findings (Technical Audit Finding Report), any Quality Review Nonconformance Notice and the completed Audit Checklist. A copy of each Quality Review Report will be submitted to the Owner within 7 days after the completion of each milestone review.

The Quality Review Nonconformance Notice will document any required corrective action to address Nonconformances. Nonconformances will be tracked to ensure that all outstanding issues are addressed and corrected.

4.5 Document and Data Control

4.5.1 General

All personnel whose work affects quality have timely, ready access to complete, current information necessary to perform their work correctly. Revisions to that information are positively communicated to all holders.

The Document Control Staff log and file all documented communications to or from SBG. Documents are distributed or circulated by the document controllers according to the instructions of the originator or addressee.

Documents of external origin, (e.g. standards, customer drawings, applicable legislation) that are cited as requirements are identified by the individual recording the citation (e.g. design engineering, quality assurance) who is then responsible for ensuring that SBG possesses or has appropriate access to controlled copies of these documents.

4.5.2 Document and Data Approval and Issue

Approval authorities for policies, procedures, forms and other information that is subject to revision or updating are established by the originating manager at the initial issue of the document in accordance with legal and contractual restrictions, professional competence and financial authority.

The authoring discipline for each controlled document maintains a record of users who need current copies and ensures that revisions are positively distributed to all locations where operations affecting quality are performed.

Upon notice of a revision, the holder of a controlled document replaces or updates the document and removes any invalid or obsolete copies from use or otherwise assures against unintended use.

4.5.3 Document and Data Changes

Changes to documents and data are reviewed and approved by the same functions, organizations and levels of authority that performed the original review and approval, unless specifically designated otherwise. Any such designated function or organization must have access to pertinent background information upon which to base their review and approval.

The nature of the change is identified in the document or the appropriate attachments; e.g., in the revision block of a drawing, in the revision history page of a procedure, or on a CO or document transmittal form.

4.6 Purchasing

4.6.1 General

SBG may purchase or cause to be purchased, services, products and materials for the design, development and construction of the NTFP. These resources are provided by "Subcontractors or Subconsultants", in the sense of ISO 9001:2000, which includes the following three categories:

- Subconsultants, who provide professional services;
- Subcontractors, who perform work on the project; and
- Suppliers, who manufacture, fabricate or supply materials and components.

The Financial/Administration Manager is responsible for establishing contracts for supply of materials and components and for the construction of works on the Project and for such aspects of design or redesign as are contracted directly by SBG. The QA/QCM is responsible for planning and conducting quality audits and maintaining quality records on subcontractors, subconsultants and suppliers.

In order to ensure the success of SBG services, and guarantee OPG's satisfaction, the following activities are performed and recorded:

- Clear and complete description of services and products to be procured;
- Qualification and (initial) selection of subcontractors, subconsultants, service providers and suppliers;
- Agreement on acceptance criteria for the inspection of products and services; and
- Systematic evaluation of subcontractors, subconsultants, service providers and suppliers as a basis for decisions on placing future orders.

4.6.2 Evaluation of Subcontractors, Subconsultants and Suppliers

Prospective subcontractors, subconsultants or suppliers are requested to respond to a questionnaire on the nature and extent of their quality system. These responses, or any failure to respond, together with the respondents' quality plans and their actual performance, are used by Quality Assurance to determine the amount and kind of control to be applied to the contract to ensure that the products and services provided to SBG meet its quality objectives. The controls will be in accordance with the expected impact of the work on project quality.

Evidence of a quality system meeting the essential requirements of ISO 9001 or ISO 9002 is preferred but not mandatory.

SBG requires subcontractors, subconsultants or suppliers to submit a Quality Plan for their work before issuing their first payment. The Financial/Administration Manager maintains copies of the contracts and all changes, and conducts a review of completion to show acceptance of work before final payment.

4.6.3 Required Purchasing Data

SBG contracts clearly describe the product or service to be supplied by attached or referenced plans, specifications and standards. Where applicable, these include:

a) the type, class, grade or other precise identification of the product material or work;

b) the title or other positive identification, and applicable issues of specifications, drawings, process requirements, inspection instructions and other relevant technical data, including requirements for approval or qualification of product, procedures, process equipment and personnel; and

c) the title, number and issue of any quality system standard to be applied.

For most work, the information required is in the form of project plans, the applicable specifications from DB Volume 2 and any Specifications issued by OPG.

The Financial/Administration Manager is responsible for review of all contracts before approval by the Project Manager.

The content and interpretation of all contracts is reviewed with the contractors in bid clarification and preconstruction meetings.

4.6.4 Verification of Purchased Product

Manufactured product - Purchased product is accepted by the ordering subcontractor, but may be inspected or re-inspected and rejected by SBG construction or quality engineers at any time before delivery, on site or after installation.

Materials - Quality Laboratories, engaged by or on behalf of SBG, test the materials being used in the Project, as required by the Quality Plan.

Work - The Site Engineers/Technicians review and approve all construction work, but the work may be inspected or re-inspected and rejected by SBG SCM and TCM at any time.

4.6.4.1 SBG Verification at Subcontractors', Subconsultants' or Suppliers' Premises

SBG reserves the right to verify purchased materials, product and work at the subcontractors', subconsultants' or suppliers' premises or on the work site and to specify in the contract the verification arrangements and method of product release.

4.6.4.2 OPG Verification of Subcontracted Work and Product

DB Appendix 2.12 (c)(2) provides the right of the client to audit, review or inspect on the project, SBG's premises and at subcontractors', subconsultants' or suppliers' premises to ensure that subcontracted work and product, including services, conforms to specified requirements. SBG will not use such audit, review or inspection in lieu of evidence of effective control of quality by the subcontractor or subconsultant.

SBG acknowledges that such audit, review or inspection does not relieve SBG of the responsibility to provide acceptable product, nor does it preclude subsequent rejection by OPG.

4.7 Control of Customer/Client-Supplied Product

Customer-supplied product for the NTFP includes designs, specifications, surveys and geotechnical studies supplied to SBG.

The evaluation and retention of data, designs, specifications, surveys and geotechnical studies is the responsibility of SBG. In the course of design and construction, SBG continually assesses the suitability for use of all such information supplied by OPG and reports any shortcomings as appropriate.

Verification of customer/client-supplied product by SBG does not relieve OPG of the responsibility to provide acceptable product, material, information or services.

4.8 Product Identification and Traceability

SBG requires the subcontractors, subconsultants and suppliers performing work on the Project to follow the documented requirements for identifying all product for the project by suitable means from receipt and during all stages of production, delivery and installation.

Where and to the extent that traceability is a specified requirement, SBG requires subcontractors, subconsultants and suppliers to record and maintain unique identification of individual product or batches.

The requirements for identification and traceability of materials and products are contained in the DB and in the contracts.

4.9 Process Control

The construction processes that directly affect quality are identified in the Quality Plans that cite the specific quality requirements in each case. In general, the controlled conditions are those prescribed in the specifications of Volume 2 of the DB together with any Particular Specifications issued by SBG.

In addition, the conditions prescribed by the Environmental Plans and the Safety requirements for the project also apply to all work by subcontractors, subconsultants and suppliers to SBG.

SBG requires and, if necessary, assists its subcontractors, subconsultants and suppliers to carry out the following requirements for process control, which also apply to all work carry out by SBG:

a) prepare and apply documented procedures (Method Statements) defining the manner of construction/production and installation where the absence of such procedures could adversely affect quality;

b) use suitable production, installation and servicing equipment, and a suitable working environment;

c) comply with reference standards, codes, quality plans and other documented procedures;

d) monitor and control suitable process parameters and product or project characteristics;

e) evaluate and approve processes and demonstrate the effective operation of equipment, as appropriate;

f) stipulate and communicate clearly the criteria for workmanship by written standards, representative samples, illustrations or direct supervision; and

g) maintain equipment to ensure continuing process capability.

Where the quality cannot be fully verified by subsequent inspection and testing and where deficiencies may become apparent only after the product is in use, processes must be performed by qualified personnel or be continuously monitored and controlled to ensure that requirements are met.

Contracts specify any requirements to qualify processes, equipment and personnel, and specify the records to be maintained.

4.10 Inspection and Testing

4.10.1 General

SBG is responsible for establishing contracts for an independent laboratory services to provide inspection and testing of products and materials. In addition, the QA/QCM ensures that all submissions, suppliers' certificates, performance-based mix designs and test results are reviewed.

The QA/QCM may require independent testing as appropriate.

Mandatory inspections and tests are listed in Quality Plans with any relevant governing standards, specifications or practices (e.g., CSA, ASTM). On-site and subcontracted testing laboratories maintain documented procedures for the performance of prescribed tests to specified standards.

Subcontractors, subconsultants and suppliers are responsible for establishing and performing any testing required for effective quality control of their work unless specifically relieved of that obligation by contract.

4.10.2 Receiving Inspection and Testing

Except under positive recall (see below), SBG and its subcontractors, subconsultants and suppliers must ensure that incoming products and materials are not used or processed until they have been verified in accordance with the Quality Plan.

In determining the amount and nature of receiving inspection required, the QA/QCM considers the amount of control exercised at the supplier's or manufacturer's premises and the recorded evidence of conformance provided.

4.10.2.1 Positive Recall

Incoming or in-process product or material may be released for urgent production purposes prior to verification, with the advance approval of the QA/QCM it is positively identified and recorded by SBG and the subcontractor. The identification and records must permit the immediate location, recall and replacement of the material or product in the event of nonconformity. Release under positive-recall procedures does not preclude the requirement to complete and pass all test and inspection activities required by the Quality Plan. In granting approval, the QA/QCM must consider the risks to project quality and the feasibility and expense of executing the recall should this be required.

POSITIVE RECALL MAY BE USED ONLY WHEN THERE IS NO OTHER EFFECTIVE OPTION TO MAINTAIN PROJECT QUALITY AND SCHEDULE.

4.10.3 In-process Inspection and Testing

SBG requires inspection and testing of materials, products and work during fabrication, assembly and installation as prescribed by the Quality Plan.

4.10.4 Final Inspection and Testing

SBG prescribes any necessary final inspection and testing by on site and independent laboratories in accordance with the Quality Plan to complete the evidence of conformance of the finished project to the specified requirements.

Before final inspection is considered complete, all inspections and tests specified in the Quality Pan, including receiving, in-process and all tests deferred under positive recall, must be completed and passed, and all nonconformances must be satisfactorily resolved.

SBG does not issue final payment for any work until all the activities specified in the Quality Plan and applicable documented procedures have been satisfactorily completed, all nonconformances are satisfactorily resolved and the associated data and documentation are available and authorized.

The Financial/Administration Manager provides Contract Closeout Checklists to the Construction, Quality, Technical, Safety, Environmental, Administration and Equipment Managers. These managers (or delegates) review and sign off to verify that all contract requirements are fulfilled before final payment.

4.10.5 Inspection and Test Records

Subcontractors, subconsultants and suppliers are required to maintain records of inspection and testing in accordance with SBG requirements and to supply copies to, or permit access by SBG Quality personnel and for OR audit as required. Inspection and test records must show clearly whether the product passed or failed and include the identity of the person and organization approving the product or work.

Where a product or project element fails to pass any inspection or test, the procedures for control of nonconforming product apply (see 4.13).

4.11 Control of Inspection, Measuring and Test Equipment

4.11.1 General

Inspection, measuring and test equipment (inspection equipment) used to assess or control quality or to gather data for design work must be capable of the required precision and accuracy. Traceable records must be maintained to demonstrate that the equipment is properly calibrated for its intended function.

The use of uncalibrated or out of tolerance inspection equipment is prohibited.

Any product, material or work that has been inspected or tested using deficient inspection equipment must be identified and promptly evaluated by the Construction Managers to determine the consequences of possible error. The suspect product is clearly identified and held pending disposition. The Construction Managers may require appropriate further inspection and testing using proper equipment.

Where technical data is required to verify that inspection equipment is functionally adequate, it will be made available to OPG.

4.11.2 Control procedure

The measurements to be made, the accuracy required, and inspection, measuring and test equipment to be used will be as specified in the appropriate test standard or specification (e.g., CSA, ASTM, ACI, DIN).

4.12 Inspection and Test Status

SBG Site Engineer/Technician is responsible for recording the inspection and test status of product, materials and work on different Forms or verifying that product markings and subcontractors', subconsultants' or suppliers' records show the status.

The identification of inspection and test status is maintained as defined in the Quality Plan throughout the work to ensure that only products, material and work that have passed the required inspections and tests, or has been released under an authorized concession, is dispatched, used or installed.

4.13 Control of Nonconforming Product

4.13.1 General

Subcontractors, subconsultants and suppliers are responsible for identifying, controlling and correcting all nonconforming work within their control and for recording the disposition and correction of the nonconformity. SBG must approve all nonconforming work that is not fully rectified.

SBG Site Engineer/Technician are responsible for identifying nonconforming products, material and work promptly to the responsible subcontractors, subconsultants and suppliers and for documenting the nonconformance and corrective action according to procedure.

SBG ensures that nonconforming material, product and work are prevented from unintended use or installation by identifying, documenting, evaluating, segregating (when practical), and disposition of the nonconforming product, and notifying the functions concerned.

4.13.2 Review and Disposition of Nonconforming Product

Disposition of Nonconforming product may be as follows:

a) REWORKED to meet the specified requirements,

b) ACCEPTED AS IS or REPAIRED, ONLY WITH WRITTEN OPG APPROVAL;

c) REGRADED for alternative applications for which it conforms fully to requirements, or

d) REJECTED or SCRAPPED.

The description of the nonconformity that has been accepted, whether repaired or "as-is", must be recorded to denote the actual condition.

Repaired or reworked product is re-inspected in accordance with the original Quality Plan and its actual condition recorded.

4.14 Corrective and Preventive Action

4.14.1 General

SBG initiates corrective or preventive actions, appropriate to the magnitude of the problem and commensurate with the risks to project quality, to eliminate the causes of actual or potential nonconformities.

SBG implements and records any changes to documented procedures resulting from corrective and preventive action.

4.14.2 Corrective Action

The objectives of Corrective Action are:

a) Act on and respond to Nonconformance Notices.

b) Investigate the cause of product, process and system nonconformities and record the results of the investigation.

c) Determine the action needed to eliminate the cause of nonconformities.

d) Verify the completion and effectiveness of the action.

4.14.3 Preventive Action

The objectives of Preventive Action are:

a) Use appropriate sources of information to detect, analyze and eliminate potential causes of nonconformities. (e.g., processes and work operations which affect product quality, concessions, audit results, quality records, service reports, customer complaints).

b) Determine the steps needed to deal with problems requiring preventive action.

c) Initiate preventive action and apply controls to ensure that it is effective.

d) Submit relevant information on actions taken for management review.

4.15 Handling, Storage, Packaging, Preservation and Delivery

4.15.1 General

SBG requires subcontractors, subconsultants and suppliers to handle, store, package, preserve and deliver product in a manner that prevents damage and deterioration. Methods must be in accordance with all requirements of the DB agreement, and any requirements of the contract, the EMP, SBG Safety Standards and Policies and applicable laws and regulations.

4.15.2 Handling

SBG ensures that product safety, environmental and other handling provisions are communicated to affected employees through training and procedures.

4.15.3 Storage

SBG requires subcontractors, subconsultants and suppliers to use appropriate storage areas, yards and buildings to prevent damage, deterioration, contamination or loss of product, pending use or delivery and to control and authorize access, receipt to and dispatch from such areas.

In order to detect deterioration, the subcontractor, subconsultant or supplier is required to arrange for assessment of the condition of product in stock at appropriate intervals.

4.15.4 Packaging

SBG requires subcontractors, subconsultants and suppliers to comply with any packing, packaging and marking processes specified in Standards, contracts, laws and regulations.

4.15.5 Preservation

Any special requirements for preservation and segregation of products and materials are specified in contracts or in relevant standards.

4.15.6 Delivery

Contracts include or reference any requirements to protect quality after final inspection and test until delivery to destination.

Subcontractors, subconsultants and suppliers are required to abide by contractual requirements and applicable laws and permits in the transportation and delivery of all products and materials.

4.16 Control of Quality Records

SBG maintains procedures to identify, collect, index, access, file, store, maintain and disposition quality records to demonstrate conformance to specified requirements and the effective operation of the quality system.

The Document Controllers operate a record storage and retrieval system for ready retrieval and prevention of damage, deterioration or loss.

The QA/QCM, in consultation with other managers, establishes the retention times of all quality records taking into account the requirements of the contract, the needs of Quality System Auditing, SBG business requirements and legal and regulatory requirements.

Subcontractors, subconsultants and suppliers are responsible for retaining and delivering any records demonstrating the quality of their material, product or work.

4.17 Internal Quality Audits

The QA/QCM establishes and maintains a system of internal audits to determine whether Quality Plan activities are in compliance with ISO 9001:2000 and are effective in achieving specified SBG quality objectives.

Internal quality audits are performed by qualified personnel who are independent of those having direct responsibility for the activity being audited and are scheduled according to status and importance of the activity.

Where possible, reasonable notice is given to the manager responsible for the activity being audited.

All personnel are required to cooperate fully in the conduct of internal quality audits.

The QA/QCM records audit results and communicate them to the appropriate managers. Managers responsible for the activity being audited are required to ensure timely corrective action and response to resolve all identified deficiencies. Follow-up audits may be used to verify the completion and effectiveness of corrective action. Audits of a specific activity to be schedules every six months from the start of the activity.

Recurring problems will be brought to the attention of the responsible managers and, if necessary, the Project Manager.

Quality audit results are reported for management review.

4.18 Training

SBG identifies and ensures training of all personnel performing activities affecting quality. Training includes orientation to relevant aspects of the Quality, Safety and Environmental Systems and policies for all personnel who work on the project or require unescorted access to any work area.

Subconsultants: Firms and personnel performing professional activities are engaged based on evidence of valid licenses or permits (e.g. PEO), experience and evidence of credentials.

Subcontractors / Suppliers: Firms performing work or providing materials for the NTFP are engaged based on evidence of capability and competence. They are required to hire or train their personnel according to the needs of the subcontract. Where required by law or by applicable Standards, employees must have appropriate licences or certifications (e.g. equipment operators, welders, electricians).

SBG maintains records of the relevant training, education and experience, and of training needed and received during the project, for all NTFP personnel whose work affects project quality.

Discipline Managers are responsible for implementing training plans and for maintaining records of required and actual personnel education, training and experience.

4.19 Statistical Techniques

4.19.1 Identification of Need

The QA/QCM identifies the need for statistical techniques required to establish, control and verify process capability and project characteristics. Where the need is related to a subcontractor's, subconsultant's or supplier's capability, they ensure that the requirement is incorporated into their contract, or is compensated by appropriate inspection.

4.19.2 Procedures

When required for processes under SBG's direct control, the QA/QCM establishes and maintains documented procedures to implement and control the application of the statistical techniques identified in Section 4.19.1.

In keeping with the undertaking of Section 2.4 of the Quality System Manual, ISO Compliance, SBG may assist eligible subcontractors, subconsultants or suppliers to develop and implement the necessary procedures.

5 APPENDICES

5.1 Appendix A - Corporate Organization, Relationships and Responsibilities

5.2 Appendix B - ISO Registered Participants

5.3 Appendix C - Quality Responsibility Matrix

5.4 Appendix D - Glossary

5.5 Appendix E - SBG Quality Plans

5.6 Appendix F - Supplier Assessment Form

5.7 Appendix G - List of Quality System Procedures

5.8 Appendix H - Quality System Manual Structure

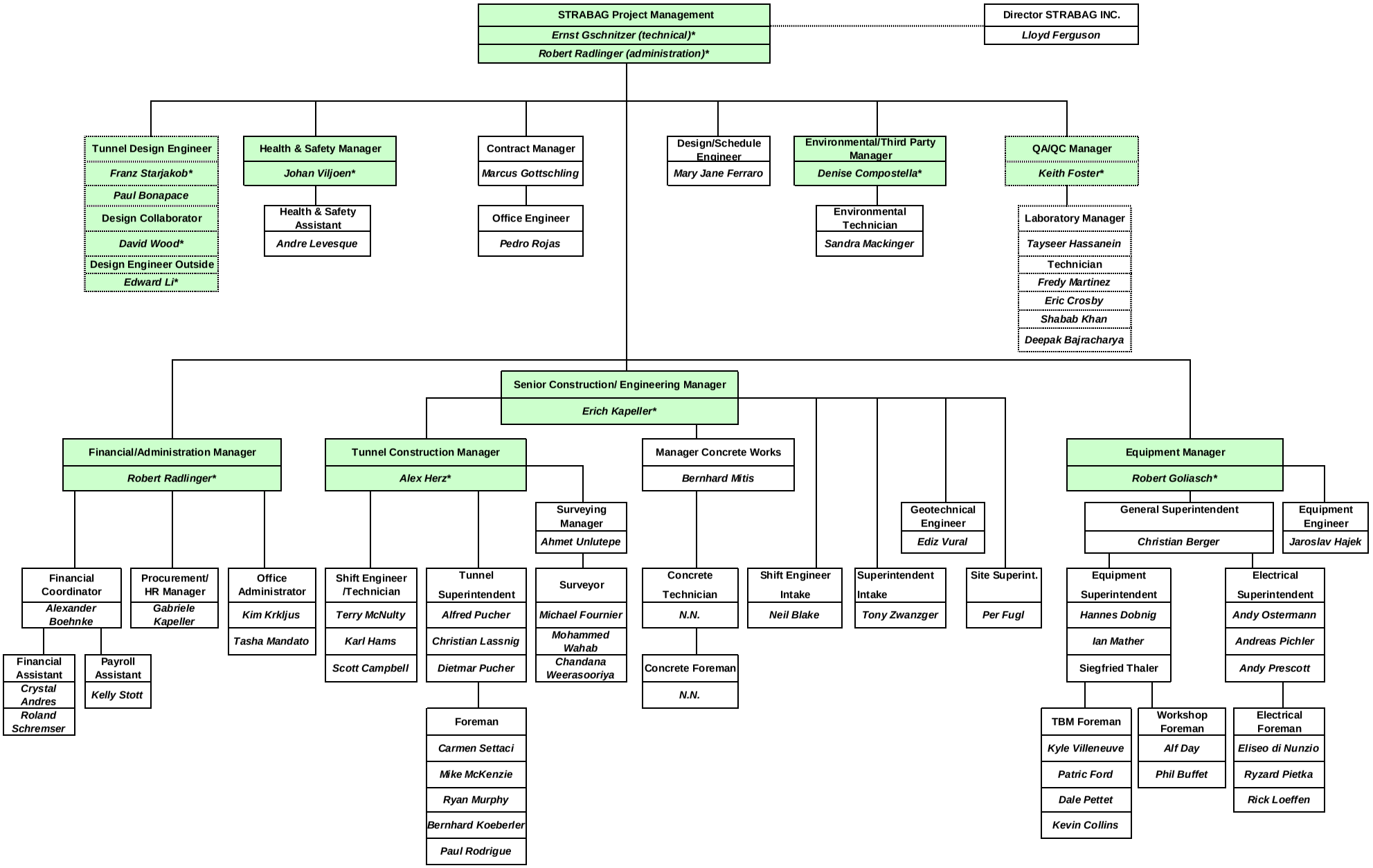
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Strabag Inc.

Quality Manual Appendices

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STRABAG ORGANIZATION CHART - July 2008



* Staff requiring approval as per DBA

Appendix B - ISO Registered Companies

The following associated companies are ISO 9001 registered (as of the signing date of the DB):

- Strabag AG.
- Dufferin Construction Inc. (Concrete Paving Only)
- Bermingham Construction Ltd.
- McNally Construction Inc.
- Allied Fabricators Inc.
- Geo Foundations Contractors Inc.
- Harris Rebar
- Atlas Copco Canada Inc.
- ILF Beratende Ingenieure ZT Gesellschaft mbH
- John Emery Geotechnical Engineering Limited
- Con Cast Pipe

STRABAG

Appendix C

Appendix C - SBG Quality Responsibility Matrix		4.1 Management responsibility	4.2 Quality system	4.3 Contract review	4.4 Design Control	4.5 Document and data control	4.6 Purchasing	4.7 Control of customer-supplied product	4.8 Product ident. & traceability	4.9 Process control	4.10 Inspection and testing	4.11 Control of inspection, measuring and test equipment	4.12 Inspection and test status	4.13 Control of nonconforming product	4.14 Corrective and preventive action	4.15 Handling, storage, packaging, preservation and delivery	4.16 Control of quality records	4.17 Internal quality audits	4.18 Training	4.19 Statistical techniques
Strabag Director		■	■	■																
Administrative Project Manager (APM)		■	■	■			■													
Technical Project Manager (TPM)		■	■	■	■		■													
Consulting Department	Design Engineer -Tunnel/Outside (DET/O)	■	■	■	■						■	■	■	■	■			■		
	Design Collaborator - Tunnel				■							■	■		■					
Financial / Administration Department	Financial Administration Manager (FAM)	■		■			■													
	Financial Coordinator					■	■		■											
	Procurement/HR Manager					■	■		■											
	Office Administrator					■				■							■			
Construction Department	Senior Construction Manager (SCM)	■		■	■			■												
	Tunnel Construction Manager (TCM)	■		■	■			■												
	Site Engineer/Technicians (Tunnel/Intake)				■			■	■	■	■	■	■	■	■		■			
	Superintendents				■			■		■				■	■					
Equipment Department	Equipment Manager (EM)	■		■			■	■												
	Equipment Engineer			■	■	■	■	■												
	Equipment Superintendents							■		■	■	■	■	■	■					
	Electrical Superintendents							■		■	■	■	■	■	■					
QA/QC Department	QA/QC Manager	■	■	■	■	■		■		■	■	■		■	■		■	■	■	■
	Lab.Manager				■	■					■		■	■	■		■			■
	Lab. Technicians										■									
Environmental Manager		■		■		■					■	■	■			■			■	■
Environmental Technician						■					■		■			■				■
Health & Safety Manager		■		■		■										■			■	
Contract Manager		■		■		■	■							■						■
Design/Schedule Engineer				■	■	■					■	■		■	■					■
Geotechnical Engineer				■	■	■					■	■	■							■
Office Engineer				■		■					■									■

Appendix D - Glossary

The following words and terms have special meanings in the industry or OPG, differing from common usage or from the definitions of ISO 9000:2000, Quality Management Systems and quality assurance - Vocabulary.

Client: Ontario Power Generation as defined in the Project Agreements (equivalent to "customer" in ISO 8402).

DB: The Design / Build Agreement.

EMP: Environmental Management Plan.

ILF: ILF Beratende Ingenieure ZT Gesellschaft mbH.

NTFP: Niagara Tunnel Facility Project.

MH: Morrison Hershfield Limited.

NCN: Nonconformance Notice issued by the Owner's Representative.

NCR: Nonconformance Report issued by OPG.

OPG: Ontario Power Generation Inc.

OR: Owner Representative.

Owner: Same as client.

QF: Quality Finding Issued by the Owner's Representative.

Quality Record: Document providing evidence of the extent of fulfillment of the quality requirements or of the performance of the Quality System for the NTFP.

SBG: Strabag Inc.

Sub-Consultant: Firm supplying professional services to Strabag Inc. (ILF and MH).

Sub-Contractor: Firm performing work on the project under contract to Strabag Inc.

Supplier[1]: Firm providing products or materials to the project under contract or purchase agreement with Strabag Inc.

WCAR: Weekly Construction Activity Report, as per Appendix 2.8 (a) "Submittals Requirements" of the DB.

[1] This usage differs from the definitions in ISO 9000:2005 and ISO 9001:2000. As used in these standards, "supplier" would refer to SBG and "subcontractor" would encompass all of "subconsultants", "subcontractors" and "suppliers" to SBG.

Appendix E - Strabag Quality Plans

Quality Plans consist of tabulations of the Contract Activity, the corresponding Quality Requirement, the responsibility and activity for Quality Control and the corresponding responsibility and verification activity or record for Quality Assurance. This section will be revised and updated to reflect progress in QC planning as design work progresses.

The content of the SBG Quality Plans is presented below:

The **Construction Quality Plan** (issued separately)is divided into the following items:

1. Steel Ribs
2. Wire Mesh
3. Rock Dowels
4. Shotcrete
5. Monitoring
6. Grouting
7. Concrete Works Final Lining
8. Concrete Works Intake and Outlet Structures
9. Waterproofing System
10. Drainage Measures
11. Tunnel Excavation and Support
12. Dewatering System Excavation and Support
13. Intake Channel Excavation
14. Approach Wall and Accelerating Wall
15. Cofferdam
16. Other Concrete Works
17. Spiling
18. Grout Tunnel

The **Design Quality Plan** is divided into the following items:

1 Preparative Phase
- 1.1 Start Up
- 1.2 Data Collection

2 Preliminary Design Phase
- 2.1 Design Basis
- 2.2 Road Works and Peripheral Works at the Intake and Outlet
- 2.3 Approach and Accelerating Wall
- 2.4 Pier Modification
- 2.5 Intake Channel
- 2.6 Cofferdams
- 2.7 Demolition of Dewatering Structure
- 2.8 Intake Gates

2.9 Diversion Tunnel
2.10 Intake and Outlet Structures
2.11 Outlet Canal
2.12 Dewatering System

3 Detailed Design, All works
3.1 Detailed Structural Analysis and Design, Detailing and Requirements
3.2 Electrical and Mechanical Installations
3.3 Miscellaneous Designs for Architectural Works (Stairs, Fences, etc)
3.4 Road and Peripheral Works
3.5 Final Constructability Review with Contractors

Attachment

To

Quality System Manual

DESIGN QUALITY PLAN

AS REQUIRED BY QUALITY MANUAL SECTION 4.2

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[ ] Denotes Responsibility

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification
1. Preparative Phase				
1.1 Start Up				
1.1.1	**Start Up Meeting**	• Review proposal document, relevant documents from data room, as-built information when available, etc. • List all requirements and scope of work. • Review Project Schedule and Submission Schedule. Reference Manuals: Start up Meeting Minutes	Review and Sign Check List. [Independent Tech.]	[ILF/MH Chief Design Engineers]
1.1.2	**Site Visit**	Visual observation of design constraints. Reference Manuals: Proposal document.	Review and Sign Check List. [Independent Tech.]	[ILF/MH Chief Design Engineers]
1.1.3	**Inspection of existing structures**	Visual inspection of existing structure affected by scope. Reference Manuals: Proposal document.	Review and Sign Check List. [Independent Tech.]	[ILF/MH Chief Design Engineers]
1.1.4	**Review of Proposal Documentation and Previous Reports**	Clarify all issues and questions where identified. Deliverables: Request for additional investigation if required. Reference Manuals: Proposal document.	Review and Sign Check List. [Independent Tech.]	[ILF/MH Chief Design Engineers]
1.2. Data collection				
1.2.1	**As-Built Information of Existing Structures**	From Owner's Representative (OR). Deliverables: Request for additional investigation if required. Reference Manuals: Start up Meeting Minutes	Review and Sign Check List. [Independent Tech.]	[ILF/MH Chief Design Engineers]
1.2.2	**Review Safety Standards and Provisions for Underwater Work**	Request for additional investigation and comments if required. Deliverables: Prepare Terms of Reference (TOR) of work for Contractor and OR approval. Reference Manuals: See Appendix 1 * (A1)	Review and Sign Check List. [Independent Tech.]	[ILF/MH Chief Design Engineers]
1.2.3	**Hydrographic Survey**	Per TOR approved. Deliverables: Hydrographic Survey Information in the form of digital survey maps and data. Reference Manuals: A1/TOR	Review and Sign Check List. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
1.2.4	**Underwater**	Per TOR approved (underwater camera recording acceptable).	Review and Sign Check List.	[MH Chief

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification
	Inspection	Deliverables: Underwater Inspection Report. Reference Manuals: A1/TOR	[Independent Tech.]	Design Engineer Outside Work]
1.2.5	**Field Survey and Setting out**	Per TOR approved. Deliverables: Field Survey Report and Survey Data findings. Reference Manuals: TOR	Review and Sign Check List. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2. Design				
2.1 Design Basis				
2.1.1	**Design Criteria and Stability Requirements**	Detailed descriptions or design assumptions, design references, acceptance criteria and the like, to permit future design to proceed. Deliverables: Issue of Design Basis Documents for Approval. Reference Manuals: A1	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[ILF/MH Chief Design Engineers]
2.1.2	**Design Loads**	Identify possible loading on structure and load combinations. Deliverables: Issue of Design Basis Documents for Approval. Reference Manuals: A1	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[ILF/MH Chief Design Engineers]
2.1.3	**Design Codes and Standards**	Identify relevant Codes and Standard pertinent to the work. Deliverables: Issue of Design Basis Documents for Approval. Reference Manuals: A1	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[ILF/MH Chief Design Engineers]
2.1.4	**Design Concepts**	• Identify and evaluate potential design solutions and propose in conjunction with builder suitable concept of the structures. • Design to provide required factors of safety against various mode of failure. Deliverables: Issue of Design Basis Documents for Approval. Reference Manuals: A1	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained [Independent Tech.]	[ILF/MH Chief Design Engineers]
2.2 Road Works and Peripheral Works at the Intake and Outlet				

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification
2.2.1	**Fences, Accesses, Accommodation and Utility Connections**	In accordance with relevant codes, builder's requirements, proposal requirements, road alignment, etc. Deliverables: Drawings and Specifications for approval. Reference Manuals: Proposal Document (PD)	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.2.2	**Water Main Relocation**	In accordance with site requirements and OPG Plant Group Requirements, address all temporary conditions. Deliverables: Specifications, Permit Applications, Issue of Drawings and Spec for approval. Reference Manuals: PD	Check relocation plan to ensure that it meets requirements. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.2.3	**Site Clearance and Formation**	In accordance with relevant codes, builder's requirements, proposal requirements, road alignment. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.2.4	**Environmental Facilities**	Deserting ponds, treatment facilities, stockpile areas to be in accordance with Proposal Documents and Owner's mandatory requirements. Deliverables: Specifications, Permit Applications, Issue of Drawings and Specifications for approval. Reference Manuals: PD and Environment Management Plan	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.3 Approach and Accelerating Walls				
2.3.1	**Alignment and Layout**	Based on PD and up-to-date hydraulic model study conducted by Owner. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.3.2	**Identify and Evaluate Alternatives, Recommendations**	Working in accordance with relevant information and verify with builder to determine most economical and constructible approach. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification
2.3.3	**Architectural Layout and Features, including life saving and fall arrest provisions)**	Working with Contractor and OR to identify all needs and provision. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.3.4	**Electrical Installations (navigation light at Accelerating Wall specifically)**	Primarily for navigation lighting. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.3.5	**Foundation Evaluation**	Use previous foundation information to determine suitability of wall foundation. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.3.6	**Structural Analysis and Design**	Stability and structural calculations and use of materials. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.3.7	**Procedures and Staging Requirements**	Proposal requirements, schedule requirements, and safety requirements to be taken into considerations. Deliverables: Issue of Staging Drawings and Specifications for approval. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.3.8	**Constructability Review**	Review with Contractor proposed work and detail and incorporate any positive improvements. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all data $ information obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.3.9	**Specifications**	Base on design, repair and design requirements as discussed with builders.	Review and Sign Check List. Monitor and review progress and authorize additional work as	[MH Chief Design Engineer

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification
		Generally follows Ontario Provincial Standard. Deliverables: Issue of Specifications for approval. Reference Manuals: A1 and PD	required. Ensure all the data and information is obtained. [Independent Tech.]	Outside Work]
2.3.10	**Permit Applications**	To review with Environmental Manager all necessary submissions and timing for permit application and provide accordingly. Deliverables: Issue of Drawings, Specifications, Design Documents and Calculations as required. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.3.11	**Other Consultation, Utilities, and the like**	Verbal and written requests. Deliverables: Issue of Minutes and Correspondences where appropriate. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.4 Pier Modifications				
2.4.1	**General Layout**	Based on Proposal Documents and up-to-date hydraulic model study conducted by Owner. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.4.2	**Architectural Layout and Features**	Working with Contractor and OR to identify all needs and provisions. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.4.3	**Foundation Evaluation**	Use previous foundation information to determine suitability of wall foundation. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: A1	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.4.4	**Structural Analysis and Design**	Stability and structural calculations and use of materials. Deliverables: Issue of Drawings and Specifications for approval.	Review and Sign Check List. Monitor and review progress and authorize additional work as	[MH Chief Design Engineer Outside Work]

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification
		Reference Manuals: A1 and PD	required. Ensure all the data and information is obtained. [Independent Tech.]	
2.4.5	**Construction Procedures and Staging Requirements**	Proposal requirements, schedule requirements, and safety requirements to be taken into considerations. Deliverables: Issue of Staging Drawings and Specifications for approval. Reference Manuals: A1	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.4.6	**Constructability Review**	Review with Contractor proposed work and detail and incorporate any positive improvements. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.4.7	**Specifications**	Base on design, repair and design requirements as discussed with builders. Generally follows Ontario Provincial Standard. Deliverables: Issue of Specifications for approval. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.5 Intake Channel				
2.5.1	**Alignment and Layout**	Based on Proposal Documents and up-to-date hydraulic model study conducted by Owner. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all data & information obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.5.2	**Foundation Evaluation**	Use previous foundation information to determine suitability of wall foundation. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: A1	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.5.3	**Analysis and Design**	Stability and structural calculations and use of materials.	Review and Sign Check List.	[MH Chief Design

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification
		Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: A1	Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	Engineer Outside Work]
2.5.4	**Construction Procedures and Staging Requirements**	Proposal requirements, schedule requirements, and safety requirements to be taken into considerations. Deliverables: Issue of Staging Drawings and Specifications for approval. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.5.5	**Constructability Review**	Review with Contractor proposed work and detail and incorporate any positive improvements. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.5.6	**Specifications**	• Base on design, repair and design requirements as discussed with builders. • Generally follows Ontario Provincial Standard. Deliverables: Issue of Specifications for approval. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.5.7	**Permit Applications**	To review with Environmental Manager all necessary submissions and timing for permit application and provide accordingly. Deliverables: Issue of Drawings, Specifications, Design Documents and Calculations as required. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.6 Cofferdams				
2.6.1	**Alignment and Layout**	Based on Proposal Documents and up-to-date hydraulic model study conducted by Owner. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: PD and A1	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification
2.6.2	**Foundation Evaluation**	Use previous foundation information to determine suitability of wall foundation. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: A1	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]]
2.6.3	**Analysis and Design**	Stability and structural calculations and use of materials. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: A1	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]]
2.6.4	**Environmental Installations**	Use of Cofferdam cells as filtering system to be reviewed with Environmental Manager to determine suitability and details. Deliverables: Drawings and necessary information for permit and approval application. Reference Manuals: PD and Environment Management Plan.	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.6.5	**Construction Procedures and Staging Requirements**	Proposal requirements, schedule, and safety requirements to be taken into considerations. Deliverables: Issue of Staging Drawings and Specifications for approval. Reference Manuals: PD and A1.	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all data & information obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.6.6	**Constructability Review**	Review with Contractor proposed work and detail and incorporate any positive improvements. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: PD and A1.	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.6.7	**Specifications**	• Base on design, repair and design requirements as discussed with builders. • Generally follows Ontario Provincial Standard. Deliverables: Issue of Specifications for approval.	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained.	[MH Chief Design Engineer Outside Work]]

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification
		Reference Manuals: PD and A1.	[Independent Tech.]	
2.6.8	**Permit Applications**	To review with Environmental Manager all necessary submissions and timing for permit application and provide accordingly. Deliverables: Issue of Drawings, Specifications, Design Documents and Calculations as required. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.7 Demolition of Dewatering Structure				
2.7.1	**General Plan and Scope, Limit of Removal**	Review as-built information and condition survey to determine, in conjunction with OR, limit of removal and scope of work. Deliverables: Issue of Drawings and Specifications for approval Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.7.2	**Structural Analysis and Design**	Stability and structural calculations and use of materials. Deliverables: Issue of Drawings and Specifications for approval Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.7.3	**Construction Procedures and Staging Requirements**	Proposal requirements, schedule requirements, and safety requirements to be taken into considerations. Deliverables: Issue of Staging Drawings and Specifications for approval Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]]
2.7.4	**Dewatering Scheme**	• Proposal requirements, schedule requirements, and safety requirements to be taken into considerations. • Discuss with builder on preferred method of construction in water. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: PD and A1.	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.7.5	**Constructability**	Review with Contractor proposed work and detail and incorporate	Review and Sign Check List.	[MH Chief Design

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification
	Review	any positive improvements. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: PD and A1.	Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained	Engineer Outside Work]]
2.7.6	**Specifications**	• Base on design, repair and design requirements as discussed with builders. • Generally follows Ontario Provincial Standard. Deliverables: Issue of Specifications for approval. Reference Manuals: PD and A1.	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.7.7	**Permit Applications**	To review with Environmental Manager all necessary submissions and timing for permit application and provide accordingly. Deliverables: Issue of Drawings, Specifications, design documents and calculations as required. Reference Manuals: PD and A1	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]]
2.7.8	**Other Consultation, Utilities, and the like**	Verbal and written requests. Deliverables: Issue of minutes and correspondences where appropriate Reference Manuals: PD and A1	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]]
2.8 Intake Gates				
2.8.1	**Obtain Dimension of Selected Gates and Details (Acquisition not Part of QC Plan)**	Working with tunnel designer and gate supplier to confirm dimensions and positions of gates and method of installation. Deliverables: Issue of Drawings and Specifications for approval Reference Manuals: Proposal Document, other information to be provided by tunnel engineer and gates supplier	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.8.2	**Design for Fixation and Secondary Concreting Details**	Working with tunnel designer and gate supplier to confirm dimensions and positions of gates and method of installation. Deliverables: Issue of Drawings and Specifications for approval Reference Manuals: Proposal Document, other information to be provided by tunnel engineer and gates supplier	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]]

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification
2.8.3	**Architectural Layout and Features (where not included in the gate system)**	Include access and operation areas to be agreed with OR. Deliverables: Issue of Drawings and Specifications for approval Reference Manuals: Proposal Document, other information to be provided by tunnel engineer and gates supplier.	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.8.4	**Electrical and Mechanical Connections and Power Supply**	Determine operation requirements and supply method for operating gate and service operator's area. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: Proposal Document, other information to be provided by tunnel engineer and gates supplier.	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.8.5	**Provisions for Gate Installation for Intake Stop Logs**	Working with tunnel designer and gate supplier to confirm dimensions and positions of gates and method of installation. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: Proposal Document, other information to be provided by tunnel engineer and gates supplier.	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.8.6	**Structural Analysis and Design**	Working with tunnel designer and gate supplier to confirm dimensions and positions of gates and method of installation. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: Proposal Document, other information to be provided by tunnel engineer and gates supplier	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.8.7	**Construction Procedures and Staging Requirements**	Working with tunnel designer and gate supplier to confirm dimensions and positions of gates and method of installation. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: Proposal Document, other information to be provided by tunnel engineer and gates supplier	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.8.8	**Constructability Review**	Working with tunnel designer and gate supplier to confirm dimensions and positions of gates and method of installation. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: Proposal Document, other information to be	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained.	[MH Chief Design Engineer Outside Work]

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification
		provided by tunnel engineer and gates supplier.	[Independent Tech.]	
2.8.9	**Specifications**	Working with tunnel designer and gate supplier to confirm dimensions and positions of gates and method of installation. Deliverables: Issue of Specifications for approval. Reference Manuals: Proposal Document, other information to be provided by tunnel engineer and gates supplier.	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.8.10	**Permit Applications**	To review with Environmental Manager all necessary submissions and timing for permit application and provide accordingly. Deliverables: Permit Applications. Reference Manuals: PD and A1.	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.8.11	**Testing Procedures**	To work with gate supplier and tunnel tester to derive testing procedure. Deliverables: Testing Procedures. Reference Manuals: PD and A1.	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.9 Diversion Tunnel				
2.9.1	**Alignment and Layout**	Based on Proposal Documents. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all data & information obtained. [Independent Tech.]	[ILF Chief Design Engineer Tunnel Work]
2.9.2	**Foundation Evaluation**	Use previous foundation information to determine suitability of foundation. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: A1	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[ILF Chief Design Engineer Tunnel Work]
2.9.3	**Analysis and Design**	Stability and structural calculations and use of materials. Deliverables: Issue of Drawings and Specifications for approval.	Review and Sign Check List. Monitor and review progress and authorize additional work as required.	[ILF Chief Design Engineer

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification
		Reference Manuals: A1	Ensure all the data and information is obtained. [Independent Tech.]	Tunnel Work]]
2.9.4	**Construction Procedures and Staging Requirements**	Proposal requirements, schedule requirements, and safety requirements to be taken into considerations. Deliverables: Issue of Staging Drawings and Specifications for approval. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[ILF Chief Design Engineer Tunnel Work]
2.9.5	**Constructability Review**	Review with Contractor proposed work and detail and incorporate any positive improvements. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[ILF Chief Design Engineer Tunnel Work]
2.9.6	**Specifications**	• Base on design, repair and design requirements as discussed with builders. • Generally follows Ontario Provincial Standard. Deliverables: Issue of Specifications for approval. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[ILF Chief Design Engineer Tunnel Work]
2.9.7	**Permit Applications**	To review with Environmental Manager all necessary submissions and timing for permit application and provide accordingly. Deliverables: Issue of Drawings, Specifications, Design Documents and Calculations as required. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[ILF Chief Design Engineer Tunnel Work]
2.10 Intake Gates				
2.10.1	**Alignment and Layout**	Based on Proposal Documents. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all data & information obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.10.2	**Foundation Evaluation**	Use previous foundation information to determine suitability of foundation.	Review and Sign Check List. Monitor and review progress and authorize additional work as	[MH Chief Design Engineer

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification
		Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: A1	required. Ensure all the data and information is obtained. [Independent Tech.]	Outside Work]
2.10.3	**Analysis and Design**	Stability and structural calculations and use of materials. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: A1	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]]
2.10.4	**Construction Procedures and Staging Requirements**	Proposal requirements, schedule requirements, and safety requirements to be taken into considerations. Deliverables: Issue of Staging Drawings and Specifications for approval. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.10.5	**Constructability Review**	Review with Contractor proposed work and detail and incorporate any positive improvements. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.10.6	**Specifications**	• Base on design, repair and design requirements as discussed with builders. • Generally follows Ontario Provincial Standard. Deliverables: Issue of Specifications for approval. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.10.7	**Permit Applications**	To review with Environmental Manager all necessary submissions and timing for permit application and provide accordingly. Deliverables: Issue of Drawings, Specifications, Design Documents and Calculations as required. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.11 Outlet Canal				
2.11.1	**Alignment and Layout**	Based on Proposal Documents.	Review and Sign Check List.	[MH Chief Design

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification
		Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: A1 and PD	Monitor and review progress and authorize additional work as required. Ensure all data & information obtained. [Independent Tech.]	Engineer Outside Work]
2.11.2	**Foundation Evaluation**	Use previous foundation information to determine suitability of foundation. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: A1	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.11.3	**Analysis and Design**	Stability and structural calculations and use of materials. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: A1	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.11.4	**Construction Procedures and Staging Requirements**	Proposal requirements, schedule requirements, and safety requirements to be taken into considerations. Deliverables: Issue of Staging Drawings and Specifications for approval. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
2.11.5	**Constructability Review**	Review with Contractor proposed work and detail and incorporate any positive improvements. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]]
2.11.6	**Specifications**	• Base on design, repair and design requirements as discussed with builders. • Generally follows Ontario Provincial Standard. Deliverables: Issue of Specifications for approval. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]]
2.11.7	**Permit Applications**	To review with Environmental Manager all necessary submissions and timing for permit application and provide	Review and Sign Check List. Monitor and review progress and authorize additional work as	[MH Chief Design

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification
		accordingly. Deliverables: Issue of Drawings, Specifications, Design Documents and Calculations as required. Reference Manuals: A1 and PD	required. Ensure all the data and information is obtained. [Independent Tech.]	Engineer Outside Work]
2.12 Dewatering System				
2.12.1	**Analysis and Design**	Stability and structural calculations and use of materials. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: A1	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[ILF/MH Chief Design Engineers Outside and Tunnel Work]
2.12.2	**Construction Procedures and Staging Requirements**	Proposal requirements, schedule requirements, and safety requirements to be taken into considerations. Deliverables: Issue of Staging Drawings and Specifications for approval. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[ILF/MH Chief Design Engineers Outside and Tunnel Work]
2.12.3	**Constructability Review**	Review with Contractor proposed work and detail and incorporate any positive improvements. Deliverables: Issue of Drawings and Specifications for approval. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[ILF/MH Chief Design Engineers Outside and Tunnel Work]
2.12.4	**Specifications**	• Base on design, repair and design requirements as discussed with builders. • Generally follows Ontario Provincial Standard. Deliverables: Issue of Specifications for approval. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[ILF/MH Chief Design Engineers Outside and Tunnel Work]
2.12.5	**Permit Applications**	To review with Environmental Manager all necessary submissions and timing for permit application and provide accordingly. Deliverables: Issue of Drawings, Specifications, Design Documents and Calculations as required. Reference Manuals: A1 and PD	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[ILF/MH Chief Design Engineers Outside and Tunnel Work]

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification
3. Detailed Design All Works				
3.1	**Detailed Structural Analysis and Design, Detailing and Requirements**	Use relevant codes and standard and agreed design information and document to prepare final design and drawings for construction. Deliverables: Issue of Construction Drawings, Specification and Quantity for Construction. Reference Manuals: PD and A1.	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[ILF/MH Chief Design Engineers Outside and Tunnel Work]
3.2	**Ditto, Electrical and Mechanical Installations**	Use relevant codes and standard and agreed design information and document to prepare final design and drawings for construction. Deliverables: Issue of Construction Drawings, Specification and Quantity for Construction. Reference Manuals: PD and A1.	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[ILF/MH Chief Design Engineers Outside and Tunnel Work]
3.3	**Miscellaneous Designs for Architectural Works (Stairs, Fences, etc.)**	Use relevant codes and standard and agreed design information and document to prepare final design and drawings for construction. Deliverables: Issue of Construction Drawings, Specification and Quantity for Approval. Reference Manuals: PD and A1.	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[ILF/MH Chief Design Engineers Outside and Tunnel Work]
3.4	**Road and Peripheral Works**	Use relevant codes and standard and agreed design information and document to prepare final design and drawings for construction. Deliverables: Issue of Construction Drawings, Specification and Quantity for Construction. Reference Manuals: PD and A1.	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[MH Chief Design Engineer Outside Work]
3.5	**Final Constructability Review with Contractors**	Review with Contractor proposed work and detail and incorporate any positive improvements. Deliverables: Issue of Construction Drawings, Specification and Quantity for Construction. Reference Manuals: A1 and PD.	Review and Sign Check List. Monitor and review progress and authorize additional work as required. Ensure all the data and information is obtained. [Independent Tech.]	[ILF/MH Chief Design Engineers Outside and Tunnel Work]

Terms of Reference: TOR
(A1): See Appendix 1

PD: Proposal Document

Appendix F – Supplier Assessment Form

The attached form is to be included in SBG's supplier assessment system.

New: 11_21_2005 / created by E.Grohe

Project:			
Trade:			
Company:		Contact person	
Contract No.:		Certified quality management	☐
Period of execution:	Month / year	Until month / year	
Settlement amount:	Euro net	Average rating	

Site Manager / Comm. Controller STRABAG prep.:

Name | Datum | Signature

Quality Assessment:

Please make hand-written notes on back of page if necessary.

No.	Criterion	Rating
1	**Quality upon Delivery** ▪ Material properties in compliance with contractual requirements ▪ Material properties in compliance with applicable DIN standards and statutory regulations ▪ Protection of material against damage and atmospheric conditions	
2	**Delivery Due Dates** ▪ Compliance with dates agreed ▪ Timely indication of disruptive events which could endanger deadlines	
3	**Conduct** ▪ Organisation of delivery process ▪ Implementation of local instructions ▪ Compliance with terms of delivery ▪ Submitted controllable invoices ▪ Co-operation / contract interpretation in a spirit of partnership ▪ Pricing in the event of changes and variation orders ▪ Delivery note: Clear indication of project / cost centre No.	
4	**Qualification** ▪ Quality of technical execution ▪ Quality of customer service ▪ Qualification of deliverer ▪ Quality of tender preparation	
5	**Completeness** ▪ of shipping documents ▪ of product description, operating instructions, certificates, licenses, safety data sheets ▪ Quality, time and controllability of subsequently submitted document ▪ Readiness to compromise / bullying behaviour	
6	**Flexibility** ▪ in the event of special requirements ▪ in the event of unscheduled orders ▪ in the event of order changes ▪ in the event of objections	
7	**Environment** ▪ Avoidance of packaging refuse ▪ Handling of hazardous materials ▪ Taking back of packaging material and rental pallets	

Assessment: 1 = excellent, 2 = good, 3 = satisfactory, 4 = fair, 5 = unsatisfactory

1=In addition to complete fulfilment of requirements, SUB has achieved a commercial or technical advantage by his own initiative and improvement and/or alternative proposals.
2=SUB has fulfilled requirements, without reservation and in every sector.
3=SUB has basically fulfilled requirements.
4=SUB has fulfilled requirements with reservations, whereby however, respective correction measures have led to takeover in compliance with quality requirements and dates set.
5=SUB has not fulfilled requirements, the work was unsatisfactory, led to correspondingly sharp criticism and had to be corrected and compensated by additional measures.

Note : ..... Date: .....

Appendix G - List of Quality System Procedures

References to quality procedures may take either of two forms. e.g., SBGQ022 or SBG-QM-PRC-022. The first form will be used in this manual. The reader should make the appropriate interpretation when required.

No.	File name	Procedure Name
1	SBGQ011	Management Review
2	SBGQ021	Quality System Procedures
3	SBGQ022	Quality Planning
4	SBGQ031	Contract Review
5	SBGQ041	Design Review
6	SBGQ042	Design Variance
7	SBGQ043	Design Evaluation and Optimization
8	SBGQ051	Document and Data Control
9	SBGQ052	Document Naming/Numbering
10	SBGQ053	Incoming/Outgoing Documentation Control
11	SBGQ054	Lines of Communication
12	SBGQ061	Purchasing
13	SBGQ071	Control of Customer Supplied Product
14	SBGQ081	Product identification and Traceability
15	SBGQ091	Process Control
16	SBGQ101	Incoming Inspection and Testing
17	SBGQ102	Positive Recall
18	SBGQ111	Calibration
19	SBGQ121	Inspection and Test Status
20	SBGQ131	Nonconformance Notice
21	SBGQ132	Nonconformance Notice Appendix A
22	SBGQ141	Corrective and Preventive Action
23	SBGQ151	Handling, Storage, Packaging, Preservation and Delivery
24	SBGQ161	Control of Quality Records
25	SBGQ162	Filing Procedure
26	SBGQ171	Quality Audits
27	SBGQ181	Training
28	SBGQ191	Sampling

STRABAG Inc.

Quality System Procedures

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MANAGEMENT REVIEW SBGQ011

1. OVERVIEW

SBG Project Management regularly assesses the Quality System to identify and plan any required improvements. The Quality Manager provides the input for this assessment and tracks the required actions.

2. MANAGEMENT QUALITY SYSTEM REVIEW:

The Quality Manager reports to the Project Management, on the suitability, adequacy and effectiveness of SBG's Quality Management System in order to determine the need for changes to system, including policy and objectives.

2.1 Report Content and Agenda:

2.1.1 Previous minutes or reports: Follow-up actions from earlier management reviews.

2.1.2 Results of audits: Summary of audits scheduled and completed and any significant findings requiring management attention.

2.1.3 Customer feedback: Nonconformance notices and Quality Findings issued by OPG. OPG reports and required actions.

2.1.4 Process performance and product conformance analyses: Issues with subcontractor, subconsultant and supplier control and unresolved concerns.

2.1.5 Status of preventive and corrective actions planned or required since previous review.

2.1.6 Changing circumstances that affect the ability of SBG to meet quality requirements.

3. Record of Review:

The Quality Manager records and distributes plans for action agreed to in the following areas and tracks progress for the next review, including the following topics.

3.1.1 Improvement of the quality management system.

3.1.2 Process, product or service audits.

3.1.3 Resource needs.

3.2 The Project Management submits the record to the Director of SBG for review and ratification.

4. REFERENCES:

ISO 9001:2000 Quality Management Systems – Requirements.

ISO/CD2 9001:2000 Committee Draft No. 2 of Quality Management Systems - Requirements, Section 5.7 Management Review (referenced as a model for agenda and report requirements)

DB Agreement and attached schedules.

5. RECORDS:

Record Name/Number	Retention Time	Retained By:
Management review reports and minutes		Document control

QUALITY SYSTEM PROCEDURES SBGQ021

OVERVIEW

1.1 This procedure establishes a recommended method and style for Managers and Administrators to prepare and issue operating procedures for activities affecting the quality of the NTFP.

1.2 The issuer of a procedure ensures distribution of the procedure and required training of affected personnel.

2. PROCEDURE:

2.1 The procedure should include an Overview containing the purpose (what it is intended to achieve), scope (the locations, occasions and personnel to which them it applies) and responsibilities (who is to perform or control the activity). If these are obvious from the title, they need not be reiterated.

2.2 It should state or show:

- What to do,
- Who does it, when, where and how ;
- What materials, equipment and documents to use, and
- How to control and record its performance.

2.3 It must also provide (usually in the header, footer or cover page) the issuing Organization (e.g. SBG), Title and Subject, Document Number, Issuing Division (e.g. Quality Assurance), Approval (signature or other indicator), Date, Revision, and Page numbering (n of m).

2.4 Procedure SBGQ031 defines the preferred document naming, numbering and computer file conventions. The issuer of a procedure should arrange for distribution of the approved version, retention of a history copy and removal of superseded copies from use.

2.5 The originator must include, reference or maintain a distribution list for controlled copies.

2.6 The issuer of a procedure or revision should obtain the agreement of those affected and arrange for any necessary training.

3. FORMAT:

3.1 A recommended format for Quality System procedures parallels the present example, with sections titled 1. Overview, 2, 3, 4, etc. steps, requirements or details, Next (e.g. 5), References, Next (e.g. 6) Records.

3.2 When possible, writers should use diagrams to simplify and clarify instructions.

4. REFERENCES:

4.1 ISO 1001:2000 Quality Management Systems – Requirements, Section 4.2.2.

5. RECORDS:

Record Name/Number	Retention Time	Retained By
History copy	per legal and contractual requirements	Responsibility of issuing department

QUALITY PLANNING SBGQ022

1. OVERVIEW

1.1 Based on the DB agreement, SBG has identified the quality characteristics of the NTFP and has prepared the initial Quality Plans for all aspects of the project.

1.2 SBG Discipline managers plan the processes and resources needed to fulfill contract requirements.

1.3 Quality Assurance identifies the verification activities and criteria for acceptability of the work and assures that necessary quality records are maintained.

2. PLAN DEVELOPMENT AND MAINTENANCE:

2.1 Quality Plans are developed and updated or revised as the need arises and are reviewed by the Discipline Manager and the Quality Manager for adequacy and accuracy before release and execution.

2.2 These plans should contain or reference sufficient information to carry out the work required. They allow management to confirm that the work done was acceptable.

2.3 All Plans are controlled documents to be issued in accordance with SBGQ051. Plans should be available in hard and electronic media.

2.4 Quality Plans are issued as tables in the following format.

- Item No.
- Activity – A brief description of the item or task under the appropriate plan.
- Quality Requirement –The characteristics to be measured or verified (including or referencing tolerances where applicable) for acceptance of the work.
- Control –The responsibility, method and frequency for review/inspection/testing.
- Verification/Record – The responsibility and reference to records that demonstrate conformance.

3. REFERENCES:

3.1 SBG Quality Manual, Section 4.2.3

3.2 DB Agreement and attached Schedules

4. RECORDS:

Record Name/Number	Retention Time	Retained By:
Quality Plans		Office Administrator

CONTRACT REVIEW SBGQ031

1. OVERVIEW

1.1 The Design / Build (DB) Agreement was reviewed and reconciled to the satisfaction of the SBG shareholders before execution in August 2005. To the extent possible, considering the size and complexity of the agreement, the requirements were mutually agreed to be adequately defined and documented, differences between the requirements of the DB and the proposal were resolved and SBG established its capability to meet the contract requirements.

1.2 This procedure addresses only the review, approval and distribution of changes made in accordance with the provisions of the agreement by amendment, change order or change request.

2. INITIATION OF CHANGE:

2.1 A Change Request is initiated by SBG or a Change Order is initiated by OPG when it is desired to:

Change Design Criteria Documents, Project Plans, Requirements, or Delivery and Milestone Plan,

Add new work or material in addition to that provided for in the Design Criteria Documents or the Project Plans, or

Dispense with, delete or change the dimensions, character, quantity, quality, description, location or position of the whole or any part of any Work

2.2 Any other change is negotiated as an amendment by the parties to the agreement. See DB Agreement, Appendix 1.1 (b) “Amendment Form”.

3. CHANGE REVIEW:

3.1 Change request review:

Change requests are prepared by the Technical or Administrative Project Manager and are reviewed by them with the Technical Committee. They are approved by the Project Manager before submission to OPG.

3.2 Change order review

Change Orders issued by OPG (DB, Volume 1, Sections 5 and 6) are reviewed by the Technical Committee to determine cost and technical implications.

3.3 Amendment review:

Amendments to the DB agreement are arrived at by written agreement among the signing parties per DB Volume 1, Sections 5 and 6. The SBG executive ensures that

the changes are defined and documented to their satisfaction and that SBG is capable of meeting the changed requirements.

4. CHANGE IMPLEMENTATION:

The Technical Project Manager retains controlled copies of all Amendments, Change Orders and Approved Change Requests and arranges for access by or distribution to all users.

5. REFERENCES:

5.1 ISO 9001:2000 Section 4.3

6. RECORDS:

Record Name/Number	Retention Time	Retained By:
RFP and amendments		Administrative Project Manager
DB Agreement		Administrative Project Manager
Amendments, Change Orders and approved Change Requests		Administrative Project Manager

DESIGN REVIEW SBGQ041

1. OVERVIEW

1.1 SBG engages qualified design engineers, communicates the design requirements and reviews and approves all designs and changes for the NTFP and all parts, components and subsystems of the Tunnel to ensure that they meet the requirements of the DB.

1.2 As a subconsultant to SBG, ILF Beratende Ingenieure (ILF) and Morrison Hershfield Limited (MH) manage the design process and coordinate the design reviews.

1.3 Refer to SBGQ043 for redesign activities managed directly by ILF or MH.

2. LIAISON

2.1 The designs, drawings and specifications will be subject to on-going informal interim reviews by the design team and by the MH and ILF Design Engineer to establish technical accuracy of the services, and conformance to the technical standards and specifications. These informal checks are done as the work is being produced, on an as needed basis.

For the Independent Technical Reviews, the work is reviewed by the Design Checker, who would normally not be involved in the design process, though he or she must be knowledgeable of the project requirements of the work. Each design process will be broken down into discrete sequential components and checks will be done against applicable design codes, standards, OPG procedures and other criteria as documented in the Design Quality Plan. The Design Checker reviews the work at completion, and signs off a Checklist to indicate that the Independent Quality Check has occurred.

A final check is made at the completion of the design and is carried out in a Technical Review Meeting.

2.2 The SBG Design/Schedule Engineer ensures receipt of interim and final design packages from the subconsultants, transmits design requirements and the results of design reviews to the subconsultants and ensures completion of any required changes or corrections.

2.3 Refer to Design Review Organization and sample Design Review Comment Sheet – attached.

3. REVIEW

The design reviews should ensure that all required inputs have been incorporated into the work and that the design outputs meet all design input requirements, make reference to acceptance criteria and identify all characteristics that are crucial to the safe and proper functioning of the different project components.

3.1 All designs, drawings and specifications will be subject to on-going informal interim reviews by the design team and by the ILF/MH Design Checker to establish technical accuracy of the services, and conformance to the technical standards and specifications. On the other hand, the SBG Design/Schedule Engineer will review design outputs to evaluate and recommend optimization where possible. The number and frequency of these informal reviews will be dependent on the complexity, duration and scope of the individual tasks.

3.2 Upon completion of each task, the work will be circulated to the Design Checkers for Independent Technical Review and acceptance checking, and then returned to the design team for revisions/corrections as required. The MH/ILF Design Engineers or their delegates prior to issue will further review all documents, reports, design criteria, completed designs and drawings, etc.

3.3 In the case where a task must be revisited due to design constraints determined after the task and Quality Check has been completed, the revised work will be re-circulated to the Design Checker for additional Independent Technical Review and acceptance checking, and then returned to the design team for revisions/corrections as required. Where comments received from the OR or Subcontractors result in significant changes to the work, such as dimensions and alignments, the same procedure will apply.

3.4 A final technical review of project drawings and specifications will be made through an ILF/MH Internal Technical Review Meeting that will be held and minutes of the meeting recorded. Senior technical personnel will be assigned to review the completed deliverables for conformance to the agreement standards, constructability, as well as identify problems and omissions. The number of reviewers assigned to the Internal Technical Review will be based on the scope and complexity of the project. An Internal Technical Review meeting will then be held to review the identified problems and verify and confirm these problems with the individual task persons. Minutes of the Internal Technical Review Meeting and mark-up drawings and other documents will form the Design Quality Control documentation for this process.

3.5 The Technical Reviews will, for the most part, consist of checklists, which will be developed to serve as guidelines for the reviews. Upon completion of Technical

Reviews, a Signed Checklist will be filed appropriately and will be available to the OR for review if requested.

3.6 All markups, calculation check sheets and check prints will be retained to facilitate verification of corrective action.

3.7 Refer to Design Review flow chart - attached.

4. CHANGES

4.1 Design changes are reviewed and approved in the same manner and by the same levels of authority as the original design.

4.2 The responsibility for coordinating, reviewing and approving changes may be assigned to a Redesign Coordinator as outlined in Procedure SBGQ043.

5. REFERENCES:

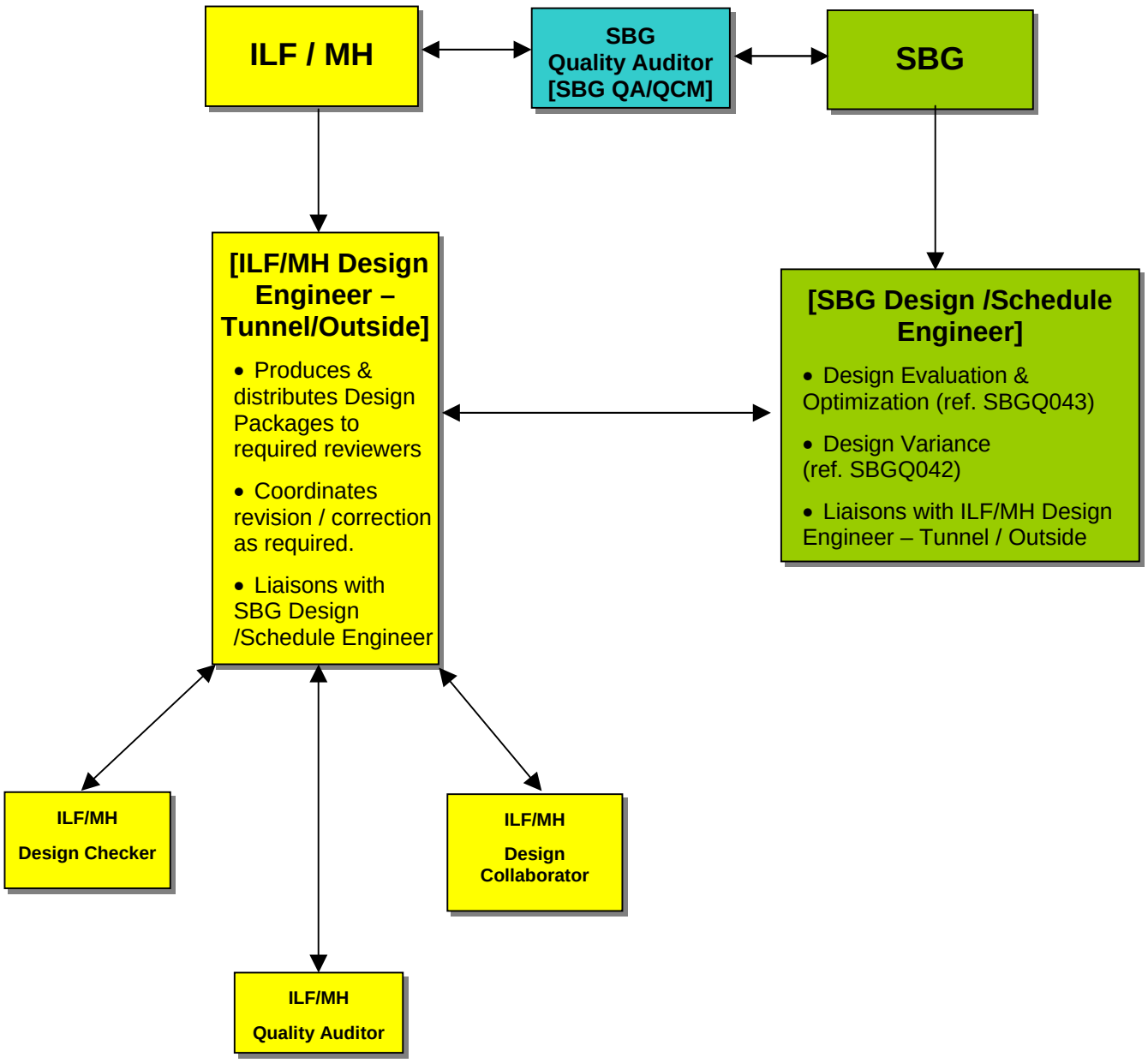
5.1 ISO 9001:2000, Section 4.4

5.2 DB Agreement

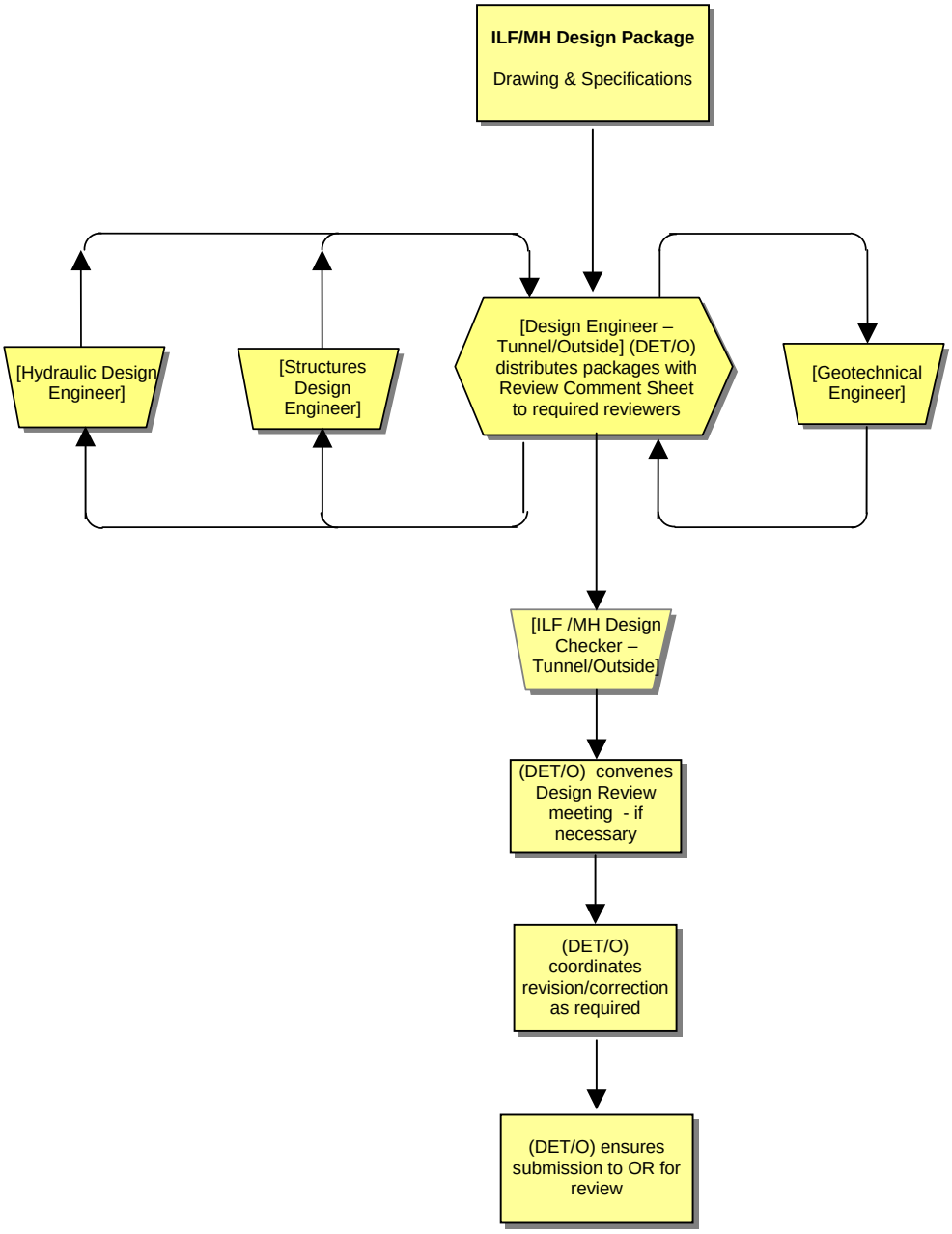
6. RECORDS:

Record Name/Number	Retention Time	Retained By:
Design outputs (Project drawings, specifications, calculations etc.)		Design Engineer (s) – Tunnel/Outside
Design review comment sheets		SBG Design/Schedule Engineer

Design Review Organization



Design Review Process



DESIGN VARIANCE SBGQ042

1. OVERVIEW

1.1 Construction that differs from design is reviewed and approved by the appropriate authorities. When the difference is intended to be of limited scope, a design variance documents the difference and provides evidence of the review. For changes of broad scope, the design should be revised and resubmitted.

1.2 This procedure applies to situations where a design change is required, by reason of unforeseen or changed field conditions, clarification of design intent, material supply constraints and requests for variance from or waiver of requirements of contracts and specifications.

1.3 The design variance is also used to record and control the review and distribution of revisions to released designs. The signatures on the Variance form are evidence of design review by the appropriate authorities.

2. PROCEDURE:

A: Originator:

2.1 Initiate a Design Variance Form completing or attaching sufficient information to justify the request as follows:
Document: Title, number, revision and clause of the governing document.
Design Requirement: Current design requirement.
Requested Variance: How the proposed result differs from the requirement or released design and the time, location, quantity or contract for which the variance is to be valid. FOR VARIANCES AGAINST SPECIFICATIONS OR REQUIREMENTS OF THE DB, A CHANGE REQUEST MUST BE MADE TO THE RELEVANT AUTHORITY.
Reason for Variance: Evidence that the proposed result meets the intent of the agreement, specifications and design including, when relevant, the safety, quality, environmental protection, maintainability, reliability and cost of the project. Reference supporting documentation such as expert opinion, studies and similar situations.
Resolution (completed by Designer): Actions and resources needed to resolve or eliminate the cause of the variance within the stated scope.

B: SBG Design/Schedule Engineer (D/SE)

2.2 Review the variance for completeness, justification and conformance to requirements.

2.3 Assign Variance number and maintain log.

2.4 Check off the necessary approvals. For efficiency, these should be limited to those responsible for the conformance of the design or work in question.
2.5 Circulate for review and approval as indicated in 2.4. Mark "DISAPPROVED" if variance is not approved.
2.6 Copy to all signatories and Technical Services (SBG CM and CMI).

C: SBG Construction Manager (CM) and Design/Schedule Engineer (D/SE)

2.7 Distribute variance to Site Offices, Surveyors and Subcontractors.
2.8 For copies distributed to subcontractors, supporting attachments not relevant to the contract in question may be omitted. In this case, the copy must be clearly marked to indicate the limitation to that contract.
2.9 Copy to Site Technicians and Superintendents

D: SBG Site Technician / Superintendent

2.10 Monitor work performed or submitted under the variance to ensure that the terms are met and that any required resolution is implemented.
2.11 Ensure that variance information is recorded in as-built plans.
2.12 Ensure variance number is recorded on all submissions and inspection reports for work performed or submitted under the variance. WORK MUST NOT BE ACCEPTED UNTIL THE VARIANCE IS APPROVED.
2.13 Verify that work done complies with all conditions of the variance.

3. REFERENCES:

3.1 ISO 9001, 7.3.7 Control of Design and Development Changes

"Design and Development Changes shall be identified and records maintained. The changes shall be reviewed, verified and validated as appropriate and approved before implementation. The review of design and development changes shall include evaluation of the effect of the changes on constituent parts and product already delivered".

3.2 ISO 9001, 4.2.3 Control of Documents

"A document procedure shall be established to define controls needed:

a) to approve documents for adequacy prior to issue"

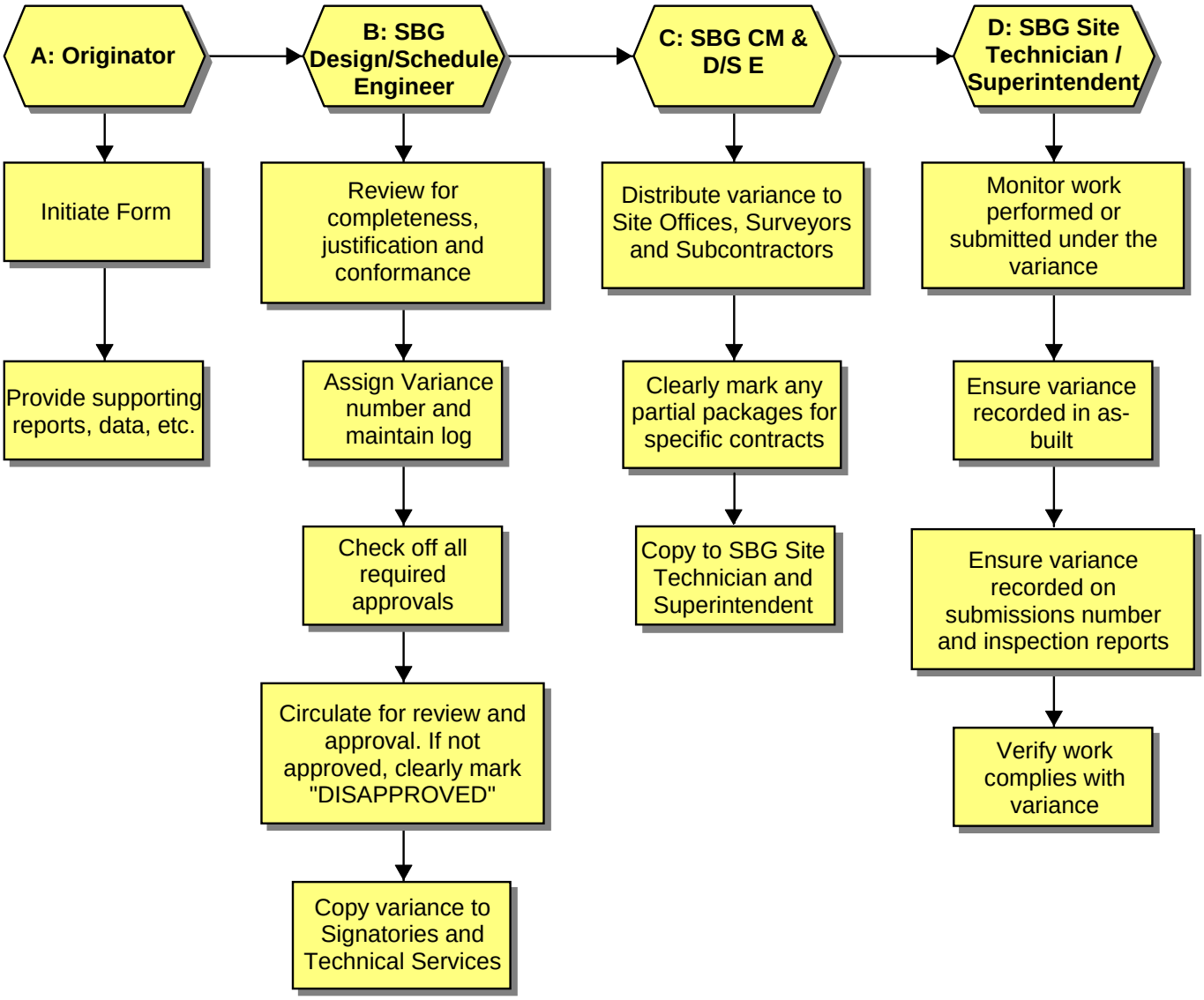
b) *to review and update as necessary and re-approve documents*

c) *to ensure that changes and the current revision status of documents are identified".*

5 RECORDS:

Record Name/Number	Retention Time*	Retained By:
Completed Variance forms and supporting documentation	7 years	SBG Design/Schedule Engineer
Variance log	7 years	SBG Design/Schedule Engineer

Design Variance



NIAGARA TUNNEL PROJECT

STRABAG

Design Variance Form

Tracking No.

DV ☐☐☐

SECTION 1 - To be completed by Originator

Date Originated	Title of Variance	Originator (Name, Title)

Document (Title, Document No.)
Doc. Title:
Doc. Number:

Design Requirement

Requested Variance

Reason for Variance

SECTION 2 - To be completed by Designer

Resolution	
☐ Approved ☐ Disapproved	Drawing Change Required Prior to Construction ☐ Yes ☐ No
Details:	

SECTION 3 - Circulation (Check applicable personnel)

☐ Design Engineer - Tunnel

Signature Date

☐ Design Engineer - Outside Works

Signature Date

☐ Geotechnical Engineer

Signature Date

☐ Design/Schedule Engineer

Signature Date

☐ Project Manager

Signature Date

☐ Senior Construction Manager

Signature Date

☐ QA/QC Manager

Signature Date

☐ Subcontractor

Signature Date

DESIGN EVALUATION AND OPTIMIZATION SBGQ043

1. OVERVIEW:

ILF and MH may select released designs for revision or redesign to realize advantages in cost, schedule or constructability. The SBG Technical Project Manager oversees the process with responsibility to ensure that the new design satisfies the agreement and the Design Quality Plan. The SBG Design/Schedule Engineer reviews in detail each component of the Subconsultant Design Package to ensure that the new design satisfies the agreement, the Design Quality Plan and is accordance with the construction process.

The Design Variance process and form are used to conduct and record the necessary review before release.

2. REDESIGN:

2.1 Refer to the flow chart on the last page.

3. REFERENCES:

3.1 SBG-041, Design Control

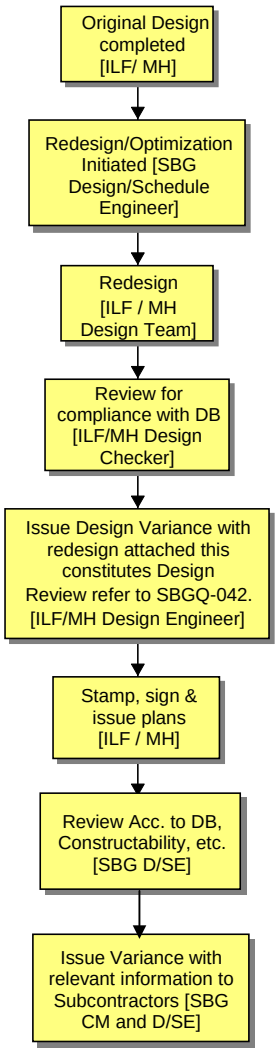
3.2 SBGQ-042 Design Variance

3.3 Design Quality Plan

4. RECORDS:

Record Name/Number	Retention Time	Retained By:
Variance	7 Years	Design/Schedule Engineer
Revised plans and supporting documentation	7 Years	Design/Schedule Engineer

Design Evaluation and Optimization



CM: Construction Manager

D/SE: Design/Schedule Engineer

DOCUMENT AND DATA CONTROL SBGQ051

1. OVERVIEW

1.1 SBG controls the development, approval, distribution and recall of documentation and data, including documents of external origin required for quality in order to ensure that correct, current information is available where required.

1.2 This procedure applies to all controlled documents and data, in any media, that are required by SBG to assure the quality of the NTFP.

2. DEFINITION

2.1 A controlled document is information, in any media, that is required for the performance of activities that affect the quality of the project. A controlled document must be accessible, in its current and correct version, to all personnel who perform the work in question.

2.2 The user of an uncontrolled document is solely responsible for determining its accuracy and completeness. Uncontrolled copies are not updated.

3. GENERATION

3.1 Documents are generated or procured to provide information or direction needed to perform tasks that affect quality.

3.2 When the DB Team requires external documents (e.g., ASTM, CSA or ISO standards) the responsible manager ensures that the appropriate number of copies are purchased and referenced as necessary in other documentation.

4. APPROVAL

4.1 The originator approves the edited document and obtains any other approvals necessary to ensure agreement and compliance; typically, the head of the originator's department. A document that affects several disciplines should be approved by the mangers of the affected functions. The approval applied to the first issue of a document establishes the required approval for subsequent changes unless otherwise decided by the manager of the issuing function.

5. ISSUING

5.1 Each function issues documents by copying or by enabling access to all users. The issuer ensures that the copy holders can be identified for subsequent distribution (e.g., distribution list). Distributed copies should be placed in the required location or sent with a Distribution Notice including appropriate filing instructions.

6. REVISIONS

6.1 The originator plans the revision and obtains review and approval in the same manner as the original. The changes should be annotated on the document or in an associated record or mark-up. The Distribution Notice accompanying the revised document should identify the change.

6.2 Revised documents are distributed to those holders who require them and superseded documents removed or marked obsolete. The originator ensures retention of one appropriately marked copy of the superseded document for record or legal purposes.

6.3 When it is determined that a document holder has no further need for the document, the issuer retrieves the copy, if possible, or notifies the holder that the copy is to be considered uncontrolled.

7. REFERENCES:

7.1 ISO 9001:2000, Section 4.2.3 Control of Documents.

7.2 SBGQ021

8. RECORDS:

Record Name/Number	Retention Time	Retained By:
Document distribution lists		Issuing function responsible for arranging storage

DOCUMENT NAMING/NUMBERING SBGQ052

1. OVERVIEW

1.1 SBG has established naming and numbering systems for distribution of controlled documents.

1.2 All SBG personnel are to use this system where practical.

1.3 The Data Control staff is responsible for logging all documents as per the code and posting these documents electronically.

2. FILE NAMES

2.1 All controlled documents have a file name to facilitate electronic filing as follows: documentname.ext, where documentname = alphanumeric sequence compatible with Win XP, ext = default extension assigned by the software used to generate the document.

2.2 CORRESPONDENCE FILE NAMING CONVENTIONS

2.3 Correspondence and electronic text files should be named in a similar fashion to facilitate electronic filing of the information and to support a consistent naming convention across the entire project.

2.4 The SBG office in Niagara Falls will retain copies of all documents. The date of the document is available in the server file directory list.

3. DOCUMENT FILE FOLDER/DIRECTORY NAMING CONVENTIONS

3.1 The Document Controller is responsible for the establishment and maintenance of the document folder/directory structure. Attachment A outlines the initial structure of the SBG filing system.

4. DRAWING FILE NAMING CONVENTIONS

The Design Manager is responsible for the assignment of all design drawing numbers. The Design/Schedule Engineering will ensure that any drawings required to be initiated by SBG, for field related activities, respects the drawing file naming convention.

5. REFERENCES:

5.1 SBGQ162 – Filing System

6. RECORDS:

Record Name/Number	Retention Time	Retained By:
Document Control Index		Document Controller

Attachment A

File Folders/Directories

SBG DOCUMENT CONTROL PROJECT FILE INDEX			
00000	General Arrangement	07000	Environmental
00060	Owner's Rep & Contractor Files	07010	Site Investigations
00063	Subcontractors (in alpha order)	07080	Hazardous Materials
00200	Meetings	07300	Waste Management
00240	Construction Activity Report	07500	Noise Theory, Control & Effects
00280	Progress Photographs	10000	Site and Improvements
00300	Schedules	20000	Building & Structures
00400	Estimates & Costs	60000	Instrumentation & Control
00539	Federal Agencies	81000	Site Administration, Unions (EPSCA)
00541	Ministry of Environment	83000	Materials Management
00549	Provincial Government	84500	Existing Construction Roads and Bridges
00576	Municipal - Countries, Regions	85100	Health & Safety
00578	Municipal - Cities, Towns	85200	Security
00600	Contractual Administration	86000	Camp Facilities & Services
00610	Suppliers	88200	Tunnel Excavation & Workshop & Electric Equipment
01900	Quality Engineering	88400	Materials Disposal
02700	Hydraulic Engineering		

INCOMING/OUTGOING DOCUMENTATION CONTROL SBGQ053

1. OVERVIEW

1.1 SBG Document Controllers catalogue, file and circulate incoming and outgoing documentation related to the Project.

1.2 The originator and recipient are responsible for ensuring that any document has the appropriate file identification.

2. DOCUMENT IDENTIFICATION

2.1 All incoming and outgoing documents are classified as to general correspondence, data records, etc. All SBG documents shall follow the established template and contain at least: Name or initials of author, Subdivision/Business Unit, date, regarding; if required: address, telephone No., distribution list, responsible person.

The Document Controller maintains and updates the document references as needed.

3. CONTROL OF DOCUMENTS

3.1 Incoming documents, hard copy

3.1.1 All mail destined for distribution within SBG should be first forwarded to the Document Controller who logs and copies or circulates it to the appropriate recipients.

3.2 Outgoing documents, hard copy

3.2.1 All outgoing documentation is copied and logged in the Central Registry.

3.3 Incoming/Outgoing Documents, electronic

3.3.1 When a document is received or transmitted electronically, an electronic or paper copy is retained. Depending on the facilities available to the recipients, it is posted on the internal network or copied to the recipient. The Document Controller ensures that electronic addressees are made aware of the document.

3.4 Document Identification

3.4.1 All documents are identifiable through a reference number and file location. Duplicates are stamped “copy” or equivalent.

3.5 Document Security and Access

3.5.1 The Data Controllers maintain a logbook to be signed and dated by personnel removing or returning files. All documents in the central registry are to be kept in filing cabinets.

3.5.2 Documents of particular sensitivity are locked in the fireproof room at the head office. Examples are; Original Proposal, Signed contracts, Governing agreements.

3.5.3 The Network Administrator ensures that data on the SBG server is regularly backed up according to their procedures.

3.5.4 The Document Controllers maintain an electronic log to allow location of documents.

4. REFERENCES:

4.1 Quality Manual, 4.5

4.2 Quality Manual, 4.16

4.3 SBGQ171, Quality Records

4.4 SBGQ062, Document Name / Numbering System

4.5 SBGQ061, Document and Data Control

5. RECORDS:

Record Name/Number	Retention Time	Retained By:
Document index	7 years	Document Control
Correspondence	7 years	Document Control

LINES OF COMMUNICATION SBGQ054

1 CONTRACTUAL

1.1 Formal communication with the Owner's Representative (OR) and Ontario Power Generation (OPG) are to be by official submittals and transmittals only through the SBG Office Manager or designate.

1.2 Informal discussions with the OR and OPG representatives regarding construction issues may be held by site inspection staff. All unofficial emails sent to the OR and subcontractors must be copied to SBG Project Manager, SBG Engineering Manager and SBG Office Manager.

2 ENVIRONMENTAL

2.1 Deficiencies noted during environmental inspections by environmental staff shall be transmitted to SBG Environmental Manager and SBG Engineering/Construction Manager. Direction for correction is not to be given by environmental staff directly to the Builder or their subcontractors.

2.2 The SBG Engineering/Construction Manager or designate will issue a written instruction of the directions given to the Builder and /or their subcontractors.

3 OPERATIONAL

2.1 Construction concerns noted by Site Inspectors will be communicated immediately to appropriate SBG Construction Managers or designate and SBG Engineering Manager.

2.2 The Site Inspectors are not to give direction, however, they are to discuss points of concern with the on-site forces. Copies of emails or any other kind of communication shall be sent to SBG Project Manager, SBG Engineering Manager and SBG Office Manager.

2.3 Any problems that require direction to the Builder and /or their subcontractors shall be directed to the Engineering/Construction Manager or designate.

2.3 The SBG Engineering/Construction Manager or designate will issue a written instruction of the directions given to the Builder and /or their subcontractors.

4 HEALTH & SAFETY

2.4 Health and safety concerns noted by Site Inspectors will be communicated immediately to SBG Health & Safety Manager or designate and SBG Engineering Manager.

2.5 The Site Inspectors are not to give direction, however, they are to discuss points of concern with the on-site forces.

2.6 Any problems that require direction to the Builder and /or their subcontractors shall be directed to the Engineering Manager or designate.

2.7 The Engineering Manager or designate will issue written instruction to the Builder and /or their subcontractors of any direction to be given.

5 DESIGN

4.1 Draft drawings submitted to the Builder and /or their subcontractors shall identify the parts for which construction can start by stamping those parts “Issued for Construction”.

4.2 Copies of these drawings are to be distributed as follows:

- OR – 5 copies
- Working – 1 copy
- Original – 1 copy
- Builder / Subcontractor – 1 copy

4.3 Communication from the Builder and/or their subcontractors on design issues shall be directed through the Engineering Manager or designate.

1. REFERENCES:

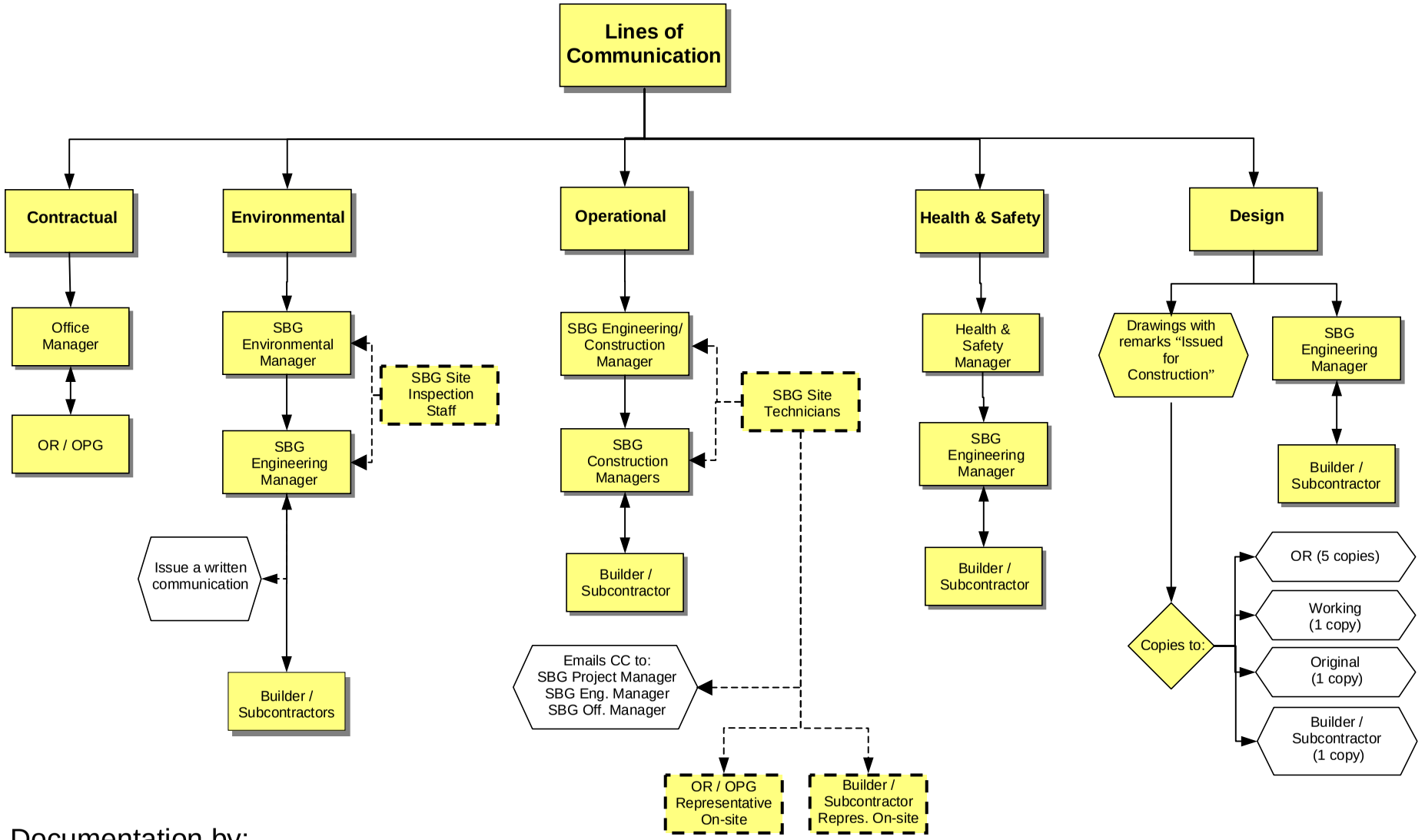
1.1 Quality Manual, 4.5

1.2 SBGQ062, Document Name / Numbering System

1.3 SBGQ061, Document and Data Control

2. RECORDS:

Record Name/Number	Retention Time	Retained By:
Document index	7 years	Document Control
Correspondence	7 years	Document Control



Documentation by:

Office Manager	Engineering Manager	Engineering Manager	Engineering Manager	Engineering Manager

PURCHASING SBGQ061

1. OVERVIEW

1.1 SBG will implement a purchasing procedure to avoid duplicate and misplaced orders from their suppliers. All individuals working on the Niagara Tunnel Facility Project for STRABAG Inc. (except Subcontractors) must comply with this procedure to keep track of SBG expenses and control costs.

The following items will be established in the protocol:

- Requisitions
- Log of Purchase Order Numbers visible to all employees
- Requisition Forms and Purchase Order Forms
- Call off Orders with suppliers for repetitive items (diesel, filters, tunnel support material, hydraulic material, hoses, gases etc.) according to an agreed price list
- Central Delivery Point on-site

1.2 All requirements, including quality, are communicated to subcontractors.

1.3 SBG will assess performance of subcontractors and suppliers to the project. Representatives of OPG may participate in any such assessment.

2. REQUISITION

2.1 The request for material/supplies/equipment/rental etc. has to be in writing on a **Requisition form** (attached to this procedure).

The **Originator** writes (hand or computer) name, phone number and department where material is required in order to allocate the costs for invoicing.

Quantity and exact **Description** of material (size, type, dimensions, quality) have to be stated as well as the **Date/Time** this is required on site. Your Requisition must be placed at least 24 hours in advance to coordinate delivery to site. If equipment needs to be rented, a time frame has to be stated in the allocated box. Originator is responsible also for timely return of rental equipment.

Technical details (required by the contract) i.e. relevant specifications, standards, codes, drawings, sketches, copies of leaflet or catalogue, must be attached to order the required material. The Originator must sign and seek approval from the Authorized Signatory (department manager). The Authorized Signatory is responsible for ensuring that all other departments who need input into the subsequent enquiry are consulted at this stage (Equipment, Construction, Safety,

Environmental, Engineering and Contractual) and forwards the completed form to Procurement Department or to Purchasing Agent for small items (up to CAN$1,500.00 total order).

3. PURCHASING

3.1 The **Procurement Dept**. will request quotes from at least two suppliers (For assets and requests with a value over CAN$10,000.00 per item at least three quotes). When the supplier is selected a Purchase Order will be assigned with the next incremented number on the **Purchase Order Log** (attached to this procedure). This Log will show Purchase Order (P.O.) number, date of order, supplier, brief description of goods, name of originator, delivery date requested. The Purchase Order Log will be accessible by the Procurement and Purchasing Department, but visible to all employees.

3.2 The Purchase Order is reviewed and signed by Procurement Manager who seeks appropriate signatures and authorization from Project Management and/or Board and subsequently will fax or transmit electronically to the supplier. A copy will be given to the originator and distribution noted on order. All suppliers are requested to show purchase order number and contact person/department on all relevant documentation (i.e. delivery tickets and invoice).

3.3 In order to ease and speed up the process of receiving material from suppliers already established, terms and conditions agreed there will be a short one page only **Purchase Order form** (attached to this procedure), for orders not exceeding a total amount of CAN$2,500.00. Nevertheless a P.O. Number has to be given by Purchasing/Procurement Dept. This will apply to TBM Department, Workshop, and Electrical Dept.

The same information as requested on Requisitions plus prices (to accurately check invoices) must be shown on this Purchase Order form. These orders need also authorization from the department manager. A copy must be shipped once a day to Procurement Department who will forward to Accounts Payable for checking invoices.

4. CALL OFF ORDERS

4.1 Material which is needed for the entire duration of the job will be ordered with CALL OFF ORDERS, i.e. fuel, oil, lubricants, filters, tunnel support material, chemicals, special bolts and wear parts for TBM, Personal Protective Equipment (PPE), tires, gases and welding supplies, etc.

4.2 These orders have to be established on a timely basis by Procurement. The approximate quantity for the duration of the job will be calculated in advance (where applicable). Prices for these items will be agreed with the supplier. Information will be given to all Strabag employees when such call off order is established with a supplier. The head of departments will delegate the responsibility of ordering such items.

A simple Call Off Order form (attached to this procedure) has been developed which requires details such as quantity and delivery date. Sign and fax completed form to supplier with a copy to Accounts Payable to permit checking of invoices.

5. CENTRAL POINT OF DELIVERY

5.1 Stores on the job site will be the single point of delivery for all suppliers except office supply and mail. The receiver must clearly print and sign the delivery tickets. The slips must be filed accordingly.

5.2 The Storekeeper on shift is responsible to inform the originator/contact person/department of material delivered by referencing the P.O. Number. The contact person/department should make sure that the contents are what were ordered. The delivery ticket should be left with the storekeeper for filing. If the delivered items do not correspond to the written delivery ticket and/or purchase order, the originator must take immediate action.

5.3 The supplier should be notified immediately of the rejected goods, and they should either pick up the goods to be returned or a new shipment should be delivered at a later date.

5.4 **Big shipments** (i.e. containers, equipment or bulk material) have to be directed loading/unloading location where a **Logistic Foreman** will be responsible to obtaining all delivery tickets from drivers. The tickets must be forwarded to the storekeeper immediately. He will also be responsible to inform the relevant person/department of arrival of the material/equipment.

5.5 Delivery tickets must be submitted to the main office/Accounts Payable each day.

6. VERIFICATION OF PURCHASED PRODUCT

6.1 OPG reserves the right to inspect or audit, at any time, at the subcontractor's or supplier's sites or premises and, if deemed necessary to make release or acceptance of product contingent on the inspection or audit results.

6.2 OPG's representatives may access SBG's subcontractor's or supplier's sites or premises for the purpose of verifying quality of materials and products. This shall always be in the presence of an SBG representative.

7. GENERAL

7.1 All suppliers will be informed to deliver material only after receiving an appropriate purchase order. Strabag Inc. requests documentation of Purchase Order Number and Originator/contact person on all relevant documents otherwise Strabag Inc. may refuse delivery and payment of invoice.

7.2 This procedure will be strictly enforced. Exemptions to this procedure will be tolerated only in cases of an emergency, critical and hazardous situation on site and/or the office is closed.

8. EVALUATION OF SUBCONTRACTORS

8.1 The type and extent of control exercised by SBG over its subcontractors is dependent upon the type of product, the impact of subcontracted product on the quality of final product and on objective evidence of performance such as quality audit reports and quality records.

8.2 The Supplier should indicate which level of Quality Program is in place at its operation. If the company is formally certified to ISO, a copy of the Registrar's Certificate is sufficient. If the company claims compliance, it should forward a copy of its Quality System Manual, along with supporting evidence, such as recognition by major customers.

9. REFERENCES:

9.1 ISO 9001:2000, 7.4 Purchasing

9.2 SBGQ022, Quality Planning

9.3 SBGQ051, Document & Data Control

9.4 SBGQ053, Incoming/Outgoing Documentation Control

9.5 SBGQ101, Inspection & Testing

9.6 SBGQ131, Nonconformances

9.7 SBGQ161, Control of Quality Records

9.8 SBGQ162, Filing procedure

9.9 SBGQ171, Quality Audits

10. PROCEDURES:

10.1 The Procurement Department maintains such procedures, forms, documents and records as are required, from time to time, to perform supplier selection and to establish contracts.

10.2 The Construction and Quality Departments ensure the quality of subcontractors' and suppliers' product and work by inspection, testing and auditing. Refer to procedures SBGQ101 and SBGQ171.

11. RECORDS:

All Purchase documentation associated with the order are Quality Records, with the exception of the Supplier Survey which will be only considered a Quality Record if used in bid evaluation (tie between bidders); including the following:

Record Name/Number	Retention Time	Retained By:
Inspection & Test results and reports	5 years	QA/QC Manager
Source Audit Reports	5 years	Data Control
Certificates of compliance/analysis	7 years	Data Control
All SBG supplier communications	5 years	Data Control

STRABAG INC.
NIAGARA TUNNEL FACILITY PROJECT

2520 Stanley Avenue
Niagara Falls, ON, L2E 6S4 niagara@strabag.ca

Tel: (905) 353 – 5500
Fax: (905) 353 – 0636

CALL OFF FORM

P.O.

Contact Name: Phone:
Fax:

Supplier:

DELIVER TO STORES

Please note on delivery ticket the P.O. Number as well as the still outstanding quantity

Fax:
att.:

According to our Purchase order and agreed terms and conditions we would like you to ship:

Item No.	Quantity	Description	Date requested on site

Comments:

Ordered by: **Date:** **Signature:**

STRABAG INC.
NIAGARA TUNNEL FACILITY PROJECT

2520 Stanley Avenue
Niagara Falls, ON, L2E 6S4 niagara@strabag.ca

Tel: (905) 353 – 5500
Fax: (905) 353 – 0636

STRABAG

PURCHASE ORDER NUMBERS

Nr.	Date	Supplier	Description	Ordered by	Dept.	Delivery date	Date of arrival
1							
2							
3							

STRABAG INC.
NIAGARA TUNNEL FACILITY PROJECT

2520 Stanley Avenue
Niagara Falls, ON, L2E 6S4 niagara@strabag.ca

Tel: (905) 353 – 5500
Fax: (905) 353 – 0636

Purchase Order No.

Contact Name:

Phone: _____ Department: _____
Fax: _____ Equipment: _____

e-mail:

to:	**Cust.No.**
att:	
Fax:	
email:	

Delivery Address:
Strabag Inc.
Niagara Tunnel Facility Project
2520 Stanley Ave.
Niagara Falls, ON, L2E 6S4
Stores

Delivery from 07:00 - 17:00

Item No.	Quantity	Part No.	Decription	Unit Price	Date Del.

Remarks:

Terms and Conditions as already agreed
All correspondence related to this delivery must show P.O. Number and contact name
This Purchase Order must not exceed the value of CAD 2.500.00

Ordered by: **Date:** **Authorized by:**

STRABAG INC.
NIAGARA TUNNEL FACILITY PROJECT

2520 Stanley Avenue
Niagara Falls, ON, L2E 6S4 niagara@strabag.ca

Tel: (905) 353 – 5500
Fax: (905) 353 – 0636

REQUISITION

Contact Name: _____ Phone: _____
Fax: _____

to: Procurement
pls.tick
Purchasing Agent

BMTI	
Electr.	
Intake	
Office	
Other	
Outlet	
TBM	
Tunnel	
Waterproof	
Workshop	
WTP	

Item No.	Quantity	Description	Date Delivery Requ.	Rental per.

Contract Item Nr. Drawings requested:

Remarks:

Attachments:

Ordered by: **Date:** **Authorized by:**

STRABAG INC.
NIAGARA TUNNEL FACILITY PROJECT
2520 Stanley Avenue
Niagara Falls, ON L2E 6S4
Tel: (905) 353 – 5500 Fax: (905) 353 – 0636 niagara@strabag.ca

Contact:
Phone:

Consignee Date:

	Pls.tick
Repair	
Return	
wrong item	

Contact:
Tel. No.

DELIVERY TICKET No.	

Item	Unit	Description	Weight lbs
		Total	

Action needed until: _____

Send quote for repair to: _____

Packing:

Forwarder:

STRABAG INC. Goods received: _____

Print name: _____

Date: _____

STRABAG INC.
NIAGARA TUNNEL FACILITY PROJECT

2520 Stanley Avenue
Niagara Falls, ON L2E 6S4

Tel: (905) 353 – 5500
Fax: (905) 353 – 0636
niagara@strabag.ca

STRABAG

Purchase Order No.:
Contact Person:

Ladies and Gentlemen:

According to your quote Nr. .... dated... we order the following items:

- ea.

Date requested on site:

Delivery address:	Strabag Inc. Niagara Tunnel Facility Project 2520 Stanley Ave. Niagara Falls, ON L2E 6S4
Delivery Terms:	**FOB job site,** If shipment comes from outside Canada please provide proper documentation for customs i.e. our tax no. 82766 6140 RM0001 on all shipping documents
Partial Deliveries:	Should there be items in backorder please make a note on the delivery ticket
Billing address:	Strabag Inc. Niagara Tunnel Facility Project 2520 Stanley Ave. Niagara Falls, ON L2E 6S4
Terms of payment:	Net 30 days after arrival of the goods at the jobsite and receipt of invoice
Provincial Sales Tax:	The supplier commits itself to advise STRABAG about eventual paid Provincial Sales Tax. It shall hand over any documentation relating to payments of PST to entitle OPG to get reimbursed.
Special instructions:	A signed purchase order must be obtained by STRABAG prior to delivery. Purchase Order Numbers and Contact Person must be clearly recorded on all relevant documentation. If this information is

inadequate we may refuse acceptance of delivery or payment of invoice.

Quality: The shipper must guarantee that the delivered goods meet the CSA Standards and adequate in Canada required standards. All items delivered shall meet construction code requirements.

Safety: The supplier and its delegates shall be aware of OSHA Regulations for construction and must comply with them while on site. They shall follow all safety instruction communicated at the time of delivery. All drivers to the site must wear PPE (hard hat, traffic vest and safety shoes) when entering the job site.

General:

STRABAG Inc. shall not be held responsible for all defective or damaged items delivered on site. The supplier shall be held liable for all damages and losses pertaining to claims.

Alterations and additional items are only valid when agreed in writing by both parties with reference to the approved purchase order.

If you have any questions, please do not hesitate to call: Gabriele Kapeller 905 353 5506

Please confirm in writing that you have received and accept this order from STRABAG Inc. and provide a delivery date.

Niagara Falls,

STRABAG INC.

Gabriele Kapeller
Procurement Manager

CONTROL OF CUSTOMER SUPPLIED PRODUCT SBGQ071

1. OVERVIEW

1.1 SBG ensures that the identification and quality of product supplied to the project by OPG is preserved in accordance with the contract. This procedure applies to all products, including materials, equipment, data, documentation, or services, to be incorporated into or used in the Project.

2. DATA AND DOCUMENTATION:

2.1 In conjunction with appropriate managers and technical staff, the Technical Services Manager ensures receipt, retention and distribution of all data and documentation provided by OPG.

2.2 The Office Administrator notifies OPG of any discrepancies in documentation or data and pursues their resolution with the appropriate authority.

3. REFERENCES:

3.1 Quality Manual 4.7

3.2 ISO 9001:2000 Section 7.5

3.3 ISO 9000:2005, Definition of Product

4. RECORDS:

Record Name/Number	Retention Time	Retained By:
Due diligence reports	7 Years	Document control

PRODUCT IDENTIFICATION AND TRACEABILITY — SBGQ081

1. OVERVIEW

SBG ensures the correct identification and traceability of products and materials purchased for the project either directly by SBG or through subcontractors.

Identification is maintained for all products incorporated into the NTFP. Traceability is maintained for those products, and to the extent specified, for which such information is required by specifications, codes, standards or SBG's contract with the supplier.

2. PROCUREMENT:

The Financial/Administration Manager ensures that contracts specify the applicable identification and traceability requirements.

3. IDENTIFICATION:

SBG documentation and records are identified and catalogued by the Document Controllers.

SBG plans and technical documents are identified and catalogued by the Tunnel Design Engineer and Technical Managers.

Purchased materials and products are identified to relevant purchase order and specifications by suitable marking, labeling or location records.

4. TRACEABILITY

Where required, purchase orders specify requirements for lot or batch numbers traceable to the supplier or manufacturer. Suppliers of these materials must provide the required traceability at or before delivery and mark products and documentation as required by the purchase order and applicable codes, specifications and standards. Technical Managers retain submission records.

5. REFERENCES:

ISO 9001:2000, Subsection 7.5.3 Identification and Traceability

6. RECORDS:

Record Name/Number	Retention Time	Retained By:
Contracts	7 Years	Financial/Administration Manager
Submissions	7 Years	Tunnel Design Engineer or Technical Managers

PROCESS CONTROL SBGQ091

1. OVERVIEW

1.1 The purpose of this procedure is to ensure that all processes affecting quality are performed under controlled conditions. This procedure applies to all processes for construction of the NTFP. Generally, this means proper progression of the work, and adherence to construction specifications and good construction practice.

1.2 The Site Technicians and Superintendents, the Quality Laboratory Manager and the Quality Manager audit to ensure that all operations are in compliance with this procedure.

1.3 Participating companies and subcontractors are responsible for implementing appropriate process controls where required.

2. PROCEDURE:

2.1 The Quality Manager ensures that all Discipline/Company Managers/Supervisors in SBG are aware of and plan for the control of processes managed by them. Details of process control measures are set out in the Quality Plans.

2.2 The Senior Construction Manager and the Financial/Administration Manager ensure, through review and approval of purchase orders and contracts, that all subcontractors are required to implement appropriate process controls. (SBGQ071)

2.3 The Field Supervisors and Quality Manager ensure, by supervision and auditing respectively, that subcontractors performing production, construction and installation of elements of the NTFP: (ref SBGQ111, SBGQ181)

- implement documented procedures where necessary to prevent quality problems;
- use suitable equipment for the work and environment;
- comply with all applicable regulations, codes, standards, quality plans and procedures;
- communicate required standards of workmanship to their employees; and
- maintain equipment appropriately for the work in hand.

2.4 Where required by the relevant Quality Plan, the Field Supervisors ensure that indicated tests, inspections, witnesses and approvals are completed.

2.5 If innovative or unproven processes or equipment are employed for any work, Construction Managers and Quality Manager, with appropriate technical advice, will prescribe tests or demonstrations (trials) to establish capability.

3. REFERENCES:

4.1 ISO 9001:2000, Section 8.2.3 Monitoring and Measurement of Process

4. RECORDS:

Record Name/Number	Retention Time	Retained By:
Contracts	7 years	Financial/Administration Manager
Inspection & test records	7 years	Data Control/ Project Laboratory
QIRs	7 years	Data Control
Audit records	7 years	QM/ Data Control

INCOMING INSPECTION AND TESTING SBGQ101

1. OVERVIEW

1.1 The purpose of this procedure is to establish a close control on the quality of materials supplied and manufactured, and work carried out by SBG; to inspect, test, and identify materials and construction according to a documented plan; to identify non-conforming product; and, to ensure that inspection and tests have been performed to meet contract specification requirements.

1.2 This procedure applies to all materials received from suppliers or produced by contractors or subcontractors. This procedure also applies to work carried out by SBG and its contractors and subcontractors.

2. RESPONSIBILITIES:

2.1 Construction Managers ensure that Field Supervisors involved in inspection have appropriate qualifications. Construction Managers ensure that the inspection and testing are carried out in accordance with the Construction Quality Plan. The Quality Engineers review Quality Control and Quality Assurance data. The Quality Laboratory Manager integrates QC and QA testing results in the project database. The Construction Managers supervise the inspection of their respective structures.

2.2 The Quality Manager assists the Construction Managers in the investigation and resolution of non-conformances. He may recommend changes to materials and construction methods.

3. GENERAL:

3.1 SBG subcontracts field and QC laboratory and independent testing laboratory inspection and testing. The type and frequency of testing and inspection are as outlined in the Construction Quality Plan.

4. RECEIVING INSPECTION AND TESTING:

4.1 All commercial suppliers must provide a certificate(s) from a qualified testing company showing that the material meets the requirements specified for the project and supply appropriate test data on a prescribed schedule related to the quantities of material involved.

4.2 If SBG's subcontractors manufacture the material, the on-site laboratory tests the material during production at the prescribed frequency. Submissions are made to the SBG Construction Managers for circulation and review.

4.3 The Quality Manager reviews the submitted results of testing, certificates and mix designs before the material is utilized in the project.

5. IN-PROCESS INSPECTION AND TESTING:

5.1 SBG requires its subcontractors to perform ongoing QC inspection to ensure that the products meet the specified requirements. SBG Site Superintendents and Technicians working under the direction of the Construction Managers ensure that the required inspections and tests are complete and acceptable before work proceeds past any hold points. The QC and QA inspections include specific checks on the most critical areas of the work and random inspection of all aspects of work.

5.2 Site Superintendents and Technicians identify and record nonconformances in the work and ensure that the appropriate corrective action is taken. The Quality Manager investigates nonconformance reports with Construction Managers and discusses appropriate actions to eliminate the nonconformance. (SBGQ131)

5.3 Field and laboratory testing is carried out in accordance with the Construction Quality Plan and verified by an Independent QA Laboratory, where indicated. The Quality Laboratory Manager reviews the results.

6. POSITIVE RECALL:

6.1 See SBG Procedure SBGQ102 for Positive Recall.

6.2 Positive recall is PROHIBITED at final inspection.

7. FINAL INSPECTION AND TESTING:

7.1 Final (acceptance) testing is carried out by the SBG Field Supervisor staff and verified by the Quality Engineers.

7.2 Final inspection must always include a verification that all tests and inspections required by the quality plan have been completed and passed, and that no outstanding positive recall notices or Non-Conformance Reports apply.

8. LABORATORY CORRELATION:

8.1 The QC laboratory, independent QA laboratory, any invited external laboratory and laboratories providing testing for commercial suppliers, are required to participate in scheduled correlation program. The Quality Laboratory Manager coordinates the tests and reviews the results of the correlation analysis.

9. VERIFICATION OF LABORATORY TESTING:

9.1 An independent Quality Assurance laboratory, in accordance with the Construction Quality Plan, verifies Quality Control testing of construction materials. The data are compared using statistical techniques. The Quality Laboratory Manager reviews the results.

10. INSPECTION AND TEST RECORDS:

10.1 SBG maintains a computerized database incorporating all significant QC and QA data from the project, which is available for viewing and review by SBG and the Quality Assurance Advisor. For major structures, a sign-off system is implemented for milestone steps.

11. REFERENCES:

11.1 ISO 9001:2000, Section 8.2.4 Monitoring and Measurement of Product

11.2 Construction Quality Control Plan

12. RECORDS:

Record Name/Number	Retention Time	Retained By:
Lab Test Reports	5 Years	Data Control
Inspection Reports	5 Years	Data Control

POSITIVE RECALL SBGQ102

1. OVERVIEW

1.1 SBG ensures that materials or products released without required test results are identified and controlled until the test results are known and properly acted upon.

1.2 Positive recall (PR) is available when materials or products are urgently needed for the project and required incoming or in-process inspection or test cannot be completed in time.

1.3 The requester's senior management is responsible for identification and control of all affected product and for rectification of all nonconformances.

2. POLICY STATEMENT:

2.1 If a required incoming or in-process inspection or test CANNOT be completed in time for materials or products that are URGENTLY needed for the project, a manager (subcontractor, subconsultant, supplier or SBG) may request release of incoming or in-process product or material, provided that:

- the requester holds the affected material until approval of the PR and
- positively identifies and records the affected products, materials and work and
- guarantees the observance of an appropriate hold point until the required tests are completed and evaluated.

2.2 By signing the PR form, the requester agrees to recall and replace any work performed under the Positive Recall in the event that the test results show the work to be nonconforming.

2.3 The Construction and Quality Managers must be satisfied that the risk to the project is acceptable and that the identification and recording permits immediate recall and replacement in the event of nonconformity.

2.4 Positive recall is PROHIBITED at final inspection.

2.5 Positive recall cannot be applied to work already completed. (Refer to procedure SBGQ0131 - Control of Nonconforming Product).

3. POSITIVE RECALL REQUEST (PR) FORM

3.1 Complete PR form SBGQ102F1 up to and including the "Hold point" area.

3.2 The Quality Manager assigns the PR No.

3.3 The requester is responsible for ensuring that work is halted at the Hold Point pending receipt and acceptance of the test results.

3.4 The Quality Manager checks the signatures required for approval on the PR form (SBGQ102F1). Quality Manager and Construction Managers (or designates) are always required. Generally one additional SBG manager must sign for impact on his own area.

4. MANAGEMENT OF POSITIVE RECALL (See attached flow chart.)

4.1 Ensure that the required tests are completed as scheduled. HALT work at the HOLD POINT if results are delayed.

4.2 Evaluate test results and complete the last area of the PR form. Issue an NCR if necessary and arrange correction of all nonconforming work.

4.3 Return the completed form to the Quality Manager.

5. REFERENCES:

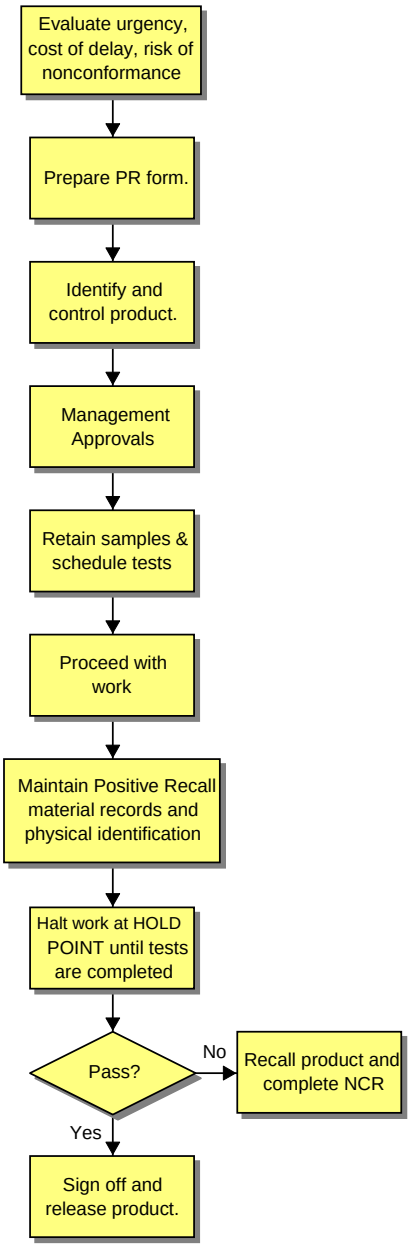
5.1 SBGQ0141 - Control of Nonconforming Product

5.2 SBGQ112F1 - Positive Recall form

6. RECORDS:

Record Name/Number	Retention Time	Retained By:
Completed PR Documentation	7 years	Quality Manager
Test & Inspection Records	7 years	Documentation

Positive Recall for URGENT Project Needs



CALIBRATION SBGQ111

1. OVERVIEW

1.1 SBG ensures that inspection, measuring and test equipment used for acceptance of work is calibrated to ensure accurate measurements.

2. RESPONSIBILITIES:

2.1 All SBG employees using inspection, measuring and test equipment are responsible for seeing that any item of equipment is not used when its calibration period has expired, returning such item for calibration or, if appropriate, for performing the calibration.

2.2 The Tunnel Construction Manager ensures that a list of all equipment in the calibration system is maintained, calibration schedule is prepared and calibration records are maintained.

2.3 Test equipment used by the testing laboratories engaged for QC and QA testing on the Project must be calibrated according to the Quality Systems of the respective laboratories.

2.4 The Environmental Monitoring Laboratory ensures that measuring equipment affecting the accuracy of compliance measurements is calibrated.

3. PROCEDURE:

3.1 General:

The responsible manager or supervisor for any facility or group using measuring and test equipment maintains a list of calibrated equipment, schedules calibration at appropriate intervals and maintains calibration records.

3.2 Calibration records:

Calibration records include:

Equipment identifier - type and serial or asset number

Location

Identity calibrator

Standard or procedure used

Acceptance criteria

Date of calibration

Date of next calibration required

Condition as found and as left

Calculations and derived data

3.3 Standards:

Equipment is calibrated against standards traceable to NRC or other national or international metrology standards.

3.4 Identification:

The Equipment Calibration List includes the type of equipment, location, calibration required, standards or procedures and interval.

Calibrated equipment is labeled with identifier, date of calibration, date of next calibration and identity of calibrator. If it is impractical to apply a label to the item, it is kept in the equipment case.

3.5 Environment:

Measurements and calibrations are performed in the environment specified in the applicable standard or code or in the manufacturer's specifications.

3.6 Schedule:

Items are scheduled for calibration within the prescribed interval. New equipment is inspected and calibrated prior to use unless received with a current certificate of calibration.

3.7 Out of tolerance:

Items found to be out of tolerance are recalibrated (repaired if necessary). If immediate repair or calibration is not possible, the equipment is removed from use and properly labeled.

If equipment is found to be out of tolerance, the responsible supervisor reviews previous measurements and calibration results to assess the validity of measurements since the last calibration.

4. REFERENCES:

4.1 ISO 9001:2000, Section 8.2.4 Monitoring and Measurement of Product

5. RECORDS:

Record Name/Number	Retention Time	Retained By:
Equipment Calibration List	5 years	Responsible organization
Calibration records	5 years	Responsible organization

INSPECTION AND TEST STATUS SBGQ121

1. OVERVIEW

SBG ensures that the inspection and testing status of materials and construction works is known.

This procedure applies to all materials and construction works incorporated into the NTFP where testing or inspection are required by the Quality Plans or applicable standards or codes.

2. RESPONSIBILITIES:

The Construction Managers and their staff are responsible for identifying the status of inspection and testing for materials and construction works inspected by the SBG Field Supervisors.

The Quality Laboratory Manager ensures that the test data accumulated by the Project Laboratory is regularly entered into the Laboratory Information Management System (LIMS), which is developed & maintained by JEGEL. Other inspection and test data is maintained in hard copy or electronic format by appropriate laboratory or organization.

The Construction Managers or designate are responsible for checking the status before subsequent construction can proceed or supplied material is used.

3. MATERIALS, COMPONENTS AND WORKS:

SBG maintains computerized databases incorporating all significant QC and QA inspection and test data. SBG staff and OPG or its representatives have access to copies of the databases.

For major structures, a sign-off system ensures that required test and inspection is complete before identified milestone steps, to ensure that the Field Supervisors have approved the work before subsequent construction can proceed.

Suppliers of construction materials provide certification (submissions) to the Construction Managers that the materials meet Project specifications. Technical specialists within SBG review submissions for compliance to the Project specifications. Submissions are returned to suppliers as “No Comment” (submission meets requirements), “Comments” (submission meets requirements with comments) or “Resubmit” (submission requires further documentation for review).

Submissions are circulated to Field Supervisors and the Project Laboratory for information.

The Construction Managers or designate check the status before subsequent construction can proceed or supplied material is used.

The Construction Managers or Site Engineer/Technicians provide the Project Laboratory with sufficient information to ensure testing of the work is properly scheduled.

4. LABORATORY:

The Project Laboratory reviews schedules provided by the Construction Managers to ensure that testing is completed when and where required by the Construction Quality Plan.

Laboratories providing services to the Project are required to maintain current certification by CSA, CCIL, or other pertinent organizations, depending on the service performed.

Laboratories are required to participate in correlation programs organized by the Project Laboratory.

5. REFERENCES:

ISO 9001:2000, Section 8.2.4 Monitoring and Measurement of Product

ISO 9001:2000, Section 8.4 Analysis of Data

QA/QC Database

6. RECORDS:

Record Name/Number	Retention Time	Retained By:
QC/QA Database	7 years	Project Laboratory
Submissions for Material or Product	7 years	Technical Services

NONCONFORMANCES SBGQ131

1. OVERVIEW

1.1 SBG ensures that nonconforming product is prevented from unintended use or installation by identifying, documenting, evaluating and dispositioning it. When practical, the nonconforming product is segregated from product in use.

1.2 SBG notifies the functions concerned of the nonconformance and the action taken.

2. NONCONFORMANCE NOTICES:

2.1 NCNs are issued when the NC is deemed MAJOR (NCs significantly impacting the delivery, safety, operation or maintenance of the facility) or SYSTEMIC (recurring NCs of the same type).

2.2 NCNs are sent by the Engineering Manager or the Quality Manager directly to the Responsible Manager and carry potential penalties if not resolved.

3. DEFINITIONS:

Numbers in parentheses refer to the applicable paragraph of ISO 8402:2000.

3.1 **nonconformity** (2.10) means nonfulfillment, departure or absence of a specified requirement, including quality characteristics or quality system elements.

3.2 **disposition** of nonconformity (4.15) means action taken to resolve an existing nonconformity. The action may be repair, rework, regrade, dispose of, waiver (concession) or amendment of a document or a requirement.

4. IDENTIFICATION:

4.1 Any SBG employee, subcontractor, supplier or subconsultant must immediately identify nonconforming work or product to the responsible person or organization in order to initiate appropriate action.

4.2 When necessary to prevent use or mix-up pending disposition, the affected product should be clearly identified by signs, labels, barriers or other appropriate means and, if practical, be segregated from conforming product. For example, stockpiles or areas of unacceptable material in quarry and crusher operations should be taped off or signed to prevent use or shipment.

5. DOCUMENTATION:

5.1 When SBG Quality Manager or Construction staff identify nonconforming work or practices, they must:

5.1.1 Verbally inform the responsible organization or person immediately and record the nonconformance in a diary or journal.

5.1.2 If the work is not promptly corrected, issue a memo (speedy memo) describing

the nonconforming work and requesting a written commitment to corrective action.

5.1.3 If the timely, effective corrective action is not implemented, or if it is not possible or practical to make the work fully conforming, issue an NCN following the attached flow chart and example. (Note: Slight variations in the layout and content of the NCN form are acceptable.)

5.2 The time allowed for response to verbal and memo notifications depends on the risk to safety, environment or quality that will be caused by delay. IF THERE IS AN IMMEDIATE DANGER TO LIFE OR HEALTH (IDLH), OR IF DELAY WOULD EXPOSE SBG TO SIGNIFICANT COSTS OR PENALTIES, CORRECTIVE ACTION MUST BE IMMEDIATE.

6. EVALUATION AND DISPOSITION:

6.1 The originator must discuss any NCN with the responsible organization and hand it to the appropriate representative (Field Supervisor, Quality, Safety or Environment representative, foreperson or site office), who signs under SUPPLIER/ SUBCONTRACTOR (or RECEIVED BY/DATE, depending on the version of the form).

6.2 The Quality Manager reviews the nonconformance, determines the appropriate disposition and obtains the required approvals. Input should be obtained, as appropriate, from the supplier, subcontractor, SBG Design, Quality, Environmental, Safety, Construction and other functions, OPG, and appropriate technical experts.

6.3 Supporting memos and reports should be attached or referenced.

6.4 Repaired or reworked product must be re-inspected to the applicable requirements in accordance with the Quality Plan and the actual condition recorded (including photographs) in test and inspection records.

7. NOTIFICATION AND TRACKING:

7.1 The attached flowchart shows the distribution, tracking and filing of the NCN and NCN Appendix A. The time allowed for response by the responsible organization is indicated.

7.2 The Quality Manager logs all NCNs issued with the following information: NCN number, brief description of the nonconformance, responsibility for corrective action, disposition, dates, and other details as required.

7.3 Upon completion of root cause and proposed corrective action sections, the Quality Manager copies the NCN to OR for review and consent to proposal.

7.4 The originator of the NCN ensures that the corrective action is completed and is effective and completes the corresponding part of the notice.

7.5 The Quality Manager updates the log and files the completed notice.

8. REFERENCES:

8.1 ISO 9001:2000, 8.3 Control of Nonconforming Product

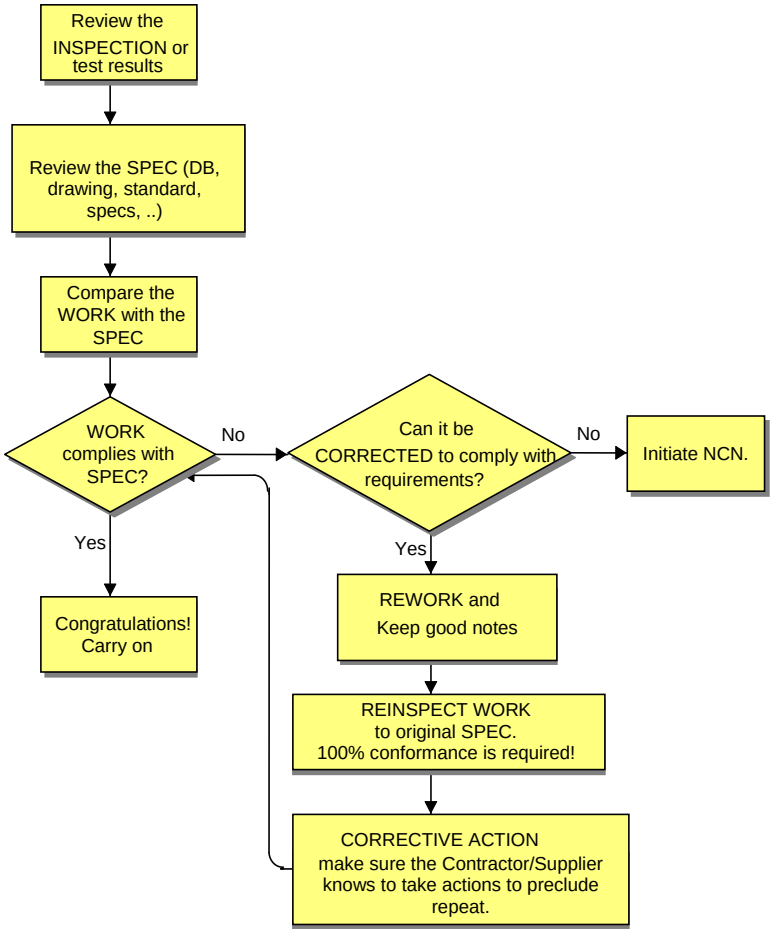
8.2 ISO 9000:2005, Quality Management Systems – Fundamentals and Vocabulary

8.3 SBGQ-151

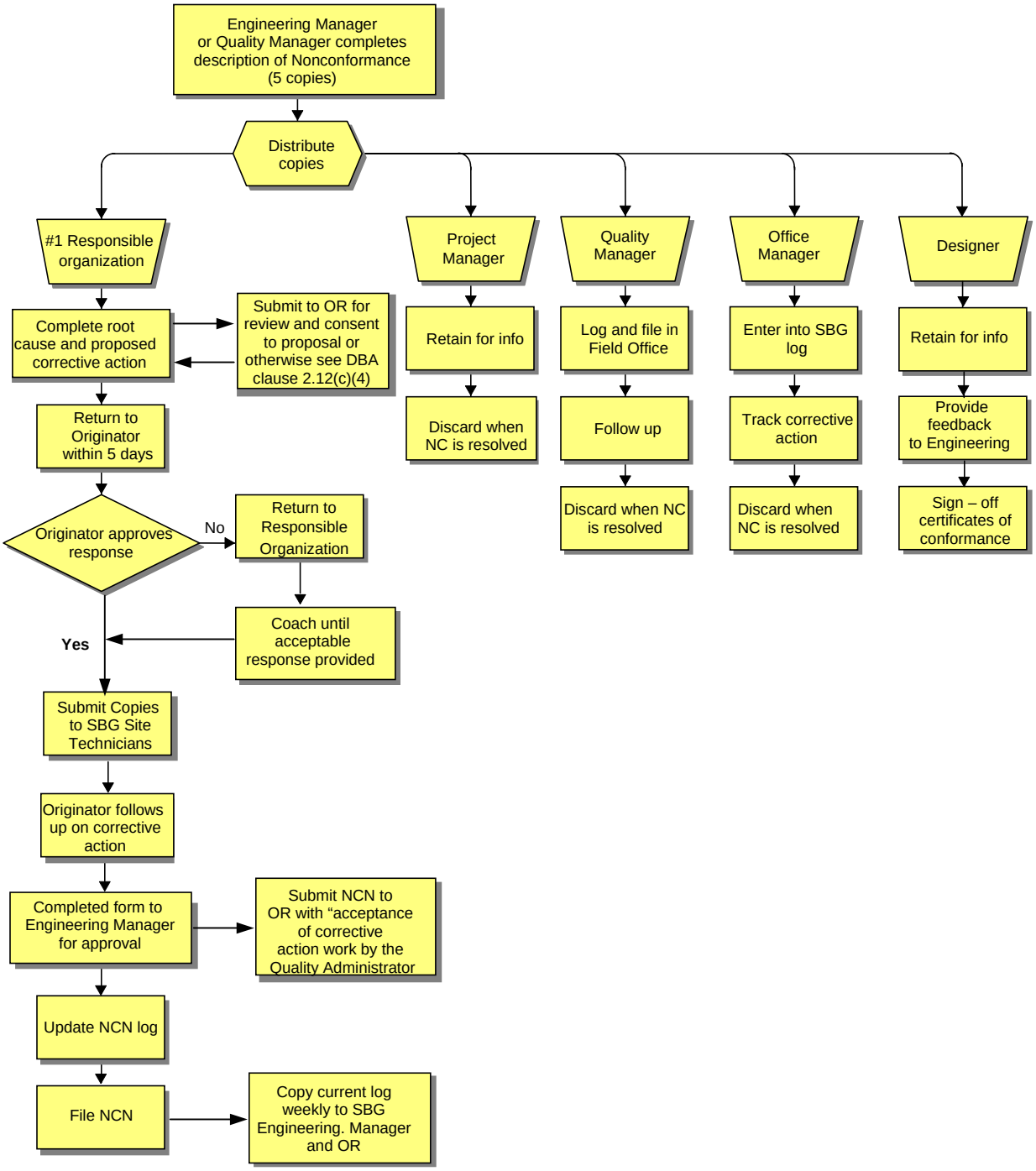
9. RECORDS:

Record Name/Number	Retention Time	Retained By:
Completed NCN	7 years	Document Control
NCN log	7 years	Document Control

Nonconformance Notices



Nonconformance Notices



QUALITY ASSURANCE NONCONFORMANCE NOTICE

To: Ontario Power Generation *OPG*	**Contract:** Design/Build Agreement dated August 18, 2005 between STRABAG INC (the "Contractor") and OPG (the "Agreement") **QA Nonconformance Notice No.:** *Sequential No.* **Date**: *Date/time of issue*

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 the quality assurance program required by the Agreement as described below:

MATERIAL/WORK AFFECTED: *Description & location of nonconforming work.*	
REQUIREMENT: *Specification or standard that applies*	**AUDITOR/INSPECTOR:** *Originator's name.*
Nonconformance Type ❑ MATERIAL NONCONFORMANCE ❑ WORK NONCONFORMANCE ❑ INTERNAL AUDIT ❑ EXTERNAL AUDIT	
DESCRIPTION OF NONCONFORMANCE OR PROBLEM: *Describe how the work differs from requirements. Originator completes to end of this section*	

The Contractor proposes:

(a) to take the remedial and corrective action as described in Appendix A to this Notice: or	
(b) to "use as is" for the reasons described in Appendix A to this Notice.	

STRABAG INC.

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 Contract or the Final Submittals, whichever is applicable.	

DATED: _____

ONTARIO POWER GENERATION

BY: _____

Name
Title

NCN APPENDIX A SBGQ132

1. OVERVIEW

1.1 SBG endeavors to respond to and resolve each Nonconformance Notice (NCN) issued by the Engineering Manager or Quality Manager (QM) promptly and fully. This procedure is to provide guidance to SBG managers to comply with the QM's systems and forms.

1.2 SBG Management has undertaken to respond to NCNs within 30 days of receipt.

1.3 Disclaimer: This procedure is a guideline to support effective responses by SBG. All responsibility for communicating requirements and reacting to SBG's NCN responses rests with the QM.

2. NCN APPENDIX A:

2.1 The NCN Appendix A is used to document a nonconformance (NC) detected in the course of audits and surveillance by Strabag QC Staff.

2.2 The auditor issues the NCN Appendix A directly to the auditee, and endeavors to obtain a written response on the form as soon as possible.

2.3 The recipient completes the ROOT CAUSE and CORRECTIVE ACTION sections and returns the NCN to the SBG representative. If a root cause and corrective action cannot be determined with reasonable effort, the originator and recipient should agree to enhanced inspection or surveillance to ensure that nonconforming work is promptly detected and corrected. The originator signs accepting the corrective action proposed by the subcontractor. (Ref. SBGQ-141)

3. DEFINITIONS:

Numbers in parentheses refer to the applicable paragraph of ISO 8402:2000.

3.1 **Waiver** or **Concession** (4.17) means written authorization from the authority for the requirement to use or release a product, for a limited time or quantity, having specific nonconforming characteristics within specified limits.

3.2 **Repair** (4.18) means action taken on a nonconforming product so that it will fulfill the intended usage requirements although it may not conform to the originally specified requirements. Repair includes remedial action taken to restore, for usage, a once conforming but now nonconforming product, for example, as part of maintenance.

3.3 **Rework** (4.19) means action taken on a nonconforming product so that it will fulfill the specified requirements.

3.4 **Regrade** means to accept product for another use for which it meets the requirements.

3.5 **Scrap** means to physically remove product from use and dispose of it in accordance with applicable laws and regulations.

4. REFERENCES:

4.1 ISO 9001:2000, 4.13

4.2 ISO 8402:2000

4.3 SBGQ-151

5. RECORDS:

Record Name/Number	Retention Time	Retained By:
NCN Appendix A	7 years	Document control

NCN APPENDIX A

AREA AUDITED: *Physical location of the nonconforming work or material.*	**NCN No.:** *Initials & sequential No. or preprinted No.*
MATERIAL/WORK AFFECTED: *Description & location of nonconforming work.*	**DATE/TIME:** *Date/time of issue.*
REQUIREMENT: *Specification or standard that applies.*	**AUDITOR/INSPECTOR:** *Originator's name.*
SUPPLIER/SUBCONTRACTOR: *Company name.*	❑ MATERIAL NONCONFORMANCE ❑ WORK NONCONFORMANCE ❑ INTERNAL AUDIT ❑ EXTERNAL AUDIT
RECEIVED BY/DATE: *Name of auditee's representative & date.*	**CONTRACT REF:** *SBG contract reference.*
DESCRIPTION OF NONCONFORMANCE OR PROBLEM: *Describe how the work differs from requirements.* *Originator completes to end of this section.*	

DISPOSITION	❑ SCRAP	❑ REWORK	❑ REGRADE	❑ REPAIR	❑ ACCEPT	WAIVER No.

APPROVALS	Design/Schedule Engineer	Designer	Quality Manager
	Construction Manager		

Over ⇒

NCN APPENDIX A

TO BE COMPLETED BY AUDITED ORGANIZATION:	
REMEDIAL AND CORRECTIVE ACTIONS: **Responsible:** *Person responsible for completing corrective action*	**by Date:** *Due date for corrective action to be completed*
ROOT CAUSE OF PROBLEM: *Underlying reason the problem occurred.* *Determine if possible with reasonable cost and effort. Otherwise state "not known".*	
PLANNED REMEDIAL AND CORRECTIVE ACTION: *Actions to remediate the nonconforming item and to prevent recurrence of the problem. Refer to procedure SBGQ141.* *If a root cause cannot be determined with serious but reasonable effort, state what additional quality controls will be implemented to detect and correct any recurrences; e.g., additional inspection or surveillance.*	
TO BE COMPLETED UPON VERIFICATION OF CORRECTIVE ACTION	
VERIFIED EFFECTIVE: AUDITOR/QUALITY ADMINISTRATOR: DATE: *Verify and record date of effective remedial and corrective action.*	

CORRECTIVE AND PREVENTIVE ACTION SBGQ141

1. OVERVIEW

1.1 Where possible, SBG ensures that the root causes of nonconformances are identified and addressed to prevent recurrence and to prevent occurrence in similar or related circumstances. This procedure applies to all material, work and management system deficiencies identified or anticipated during the project.

1.2 DEFINITIONS:

1.3 **Corrective action** is action taken to eliminate the causes of an **existing** nonconformity, defect or other undesirable situation in order to prevent **recurrence**.

1.4 **Preventive action** is action taken to eliminate the causes of a **potential** nonconformity, defect or other undesirable situation in order to prevent **occurrence**.

1.5 The distinction between "correction" and "corrective action" is also important. "**correction**" refers to the disposition of an existing nonconformity by repair, rework or adjustment; "**corrective action**" refers to the elimination of the causes of nonconformity.

1.6 Both corrective and preventive actions may involve changes in procedures and systems to achieve quality improvement and may apply to material or product failures, work not done to specification or management system failures.

1.7 **NCN** (Nonconformance Notice) record of nonconformance issued by SBG.

2. CORRECTIVE ACTION PROCEDURE:

2.1 When a problem is identified, the Field Supervisor or Quality Engineer coordinates the following reactions to nonconformances reported from inspections, tests or audits:

a) investigation and response to the NCN;

b) investigation of the cause of the nonconformity and recording the results of the investigation;

c) determination of appropriate corrective actions to eliminate the cause of the nonconformity;

d) follow up to ensure that corrective action is taken and that it is effective.

2.2 Record the results of these actions on the appropriate spaces of the form or cross-referenced memoranda and reports. Return NCN records to the QM.

2.3 The Quality Administrator reviews the NCR log for indications of recurrent or unresolved problems and initiates additional actions as required.

3. PREVENTIVE ACTION PROCEDURE:

3.1 The Quality Manager or his representative reviews NCNs, and Audit Reports to identify similar situations, locations or materials where problems may be prevented from occurring.

3.2 When a probable nonconformance is identified, the Quality Manager his representative solicits input from the appropriate personnel to investigate and recommend preventive action as follows:

a) assess the likelihood and consequences of the nonconformance in question and decide whether further action is warranted;

b) review relevant quality records (NCNs, corrective actions, variances, concessions, audit results) to detect, analyze and eliminate potential causes of nonconformities,

c) determine the steps and responsibilities to deal with the potential causes identified, and

d) coordinate the proposed preventive action and report progress to the Quality Manager.

4. REFERENCES:

4.1 ISO 9001:2000, section 4.14

4.2 SBGQ131 Nonconformances

5. RECORDS:

Record Name/Number	Retention Time	Retained By:
Completed NCN	7 years	Quality Manager
NCN Log	7 years	Quality Manager

HANDLING, STORAGE, PACKAGING, PRESERVATION AND DELIVERY SBGQ151

1. OVERVIEW

1.1 SBG requires employees, suppliers and subcontractors to protect the quality of product and materials incorporated into the Project and to follow prescribed practices for safety and environmental protection.

2. RESPONSIBILITIES:

2.1 All persons handling, moving or storing products and materials for the Project are required to observe the applicable procedures, regulations, specifications, codes and standards to ensure safety, environmental protection and quality.

2.2 The Field Supervisors, with support from the Discipline Managers (e.g., Environment, Design, Quality), are responsible for monitoring conformance to these requirements.

2.3 Suppliers and subcontractors are responsible for directing and supervising their employees to ensure compliance.

2.4 SBG and its subconsultants, suppliers and subcontractors are required to take appropriate measures to protect the integrity and completeness of data and documentation retained for or supplied to the Project.

3. HANDLING:

3.1 Handling methods must comply with prescribed practices in accordance with applicable specifications, standards and codes. Any product or material damaged in handling must be treated as nonconforming product in accordance with SBGQ131.

3.2 Where necessary, suppliers and subcontractors should provide training and work instructions for the guidance of their direct employees.

4. STORAGE:

4.1 SBG, subconsultants, subcontractors and suppliers must provide and maintain appropriate storage areas or facilities, with security where necessary, to preserve quality and to protect products and materials from damage, loss or deterioration.

4.1.1 Examples are: Stockpiling of granulars, storage and conditioning of welding consumables, site storage of reinforcing steel, etc.

4.2 Products and materials stored for later use must be reinspected where required by applicable codes or standards to detect deterioration, contamination or damage.

5. PACKAGING:

5.1 Products and materials that require protection from environmental exposure or that present a hazard to the environment or safety are shipped and stored in manufacturers' packaging. Any repackaging must achieve the same objectives in accordance with applicable specifications, standards and codes.

5.1.1 Examples are: fuels, solvents, waterproofing compounds and membranes, epoxies, etc.

5.2 Users are required to verify the usability of materials subject to "shelf life" or "use before date" restrictions.

6. PRESERVATION:

6.1 Where products require more than routine storage, packaging or protection to ensure quality, the responsible managers provide procedures and facilities to preserve such products in accordance with applicable specifications, standards and codes.

6.1.1 Examples are: protection of exposed waterproofing membrane, prescribed painting, coating or sealing of metal surfaces, protection of incomplete work, etc.

7. DELIVERY:

7.1 Unless contractually stated otherwise, suppliers and carriers are required to protect the quality of all products and materials until delivery to the point of use, and to comply with all laws, regulations and permits pertaining to the delivery.

8. REFERENCES:

8.1 ISO 9001:2000 Quality systems - Model for quality assurance in design, development, production, installation and servicing

9. RECORDS:

Record Name/Number	Retention Time	Retained By:
No records are generated or modified in the performance of this procedure.		

CONTROL OF QUALITY RECORDS SBGQ161

1. OVERVIEW

1.1 SBG retains records demonstrating the quality of materials, products and work and the performance of the quality system in appropriate filing systems or requires subconsultants, suppliers and subcontractors to maintain the required records.

2. INTERPRETATION:

2.1 Quality records are documents that provide evidence of the extent of fulfillment of the requirements for quality or the performance of the Quality System for the NTFP.

3. REQUIREMENTS:

3.1 Any person responsible for permanent or temporary record retention must maintain a suitable storage location to prevent loss, damage and unauthorized access or alteration.

3.2 The storage requirements for any record may be met by forwarding to the Data Control staff for cataloguing and permanent storage.

3.3 Each department or group is responsible for maintaining their own working files.

3.4 Records are filed to facilitate easy retrieval. The Documentation Controllers are responsible or maintaining a suitable cataloguing system in coordination with the users.

3.5 Records may be retained in any form; e.g., electronic, paper copy, microfilm.

3.6 Electronic records are backed-up by the Network Administrator daily, weekly and monthly. Monthly back-ups are stored off site.

3.7 The attachment to this procedure gives a preliminary list of quality records.

4. REFERENCES:

4.1 ISO 9001:2000, Section 4.2.4 Control of Records

4.2 ISO 9000:2005 Quality Management Systems – Fundamentals and Vocabulary

5. RECORDS:

5.1 Records to be retained are identified in the procedure where they are created or captured. Execution of this procedure does not create any new records.

Record Name/Number	Retention Time	Retained By:
n/a	n/a	n/a

Attachment:

The following is a preliminary list of quality record categories to be kept. This list is not exhaustive and will be modified as required to reflect the needs of the quality management plan without further updating of this procedure.

- Contract review
- Corrective and preventive action
- Customer-supplied product
- Design changes
- Design review
- Design validation
- Design verification
- External audits and follow-up activities.
- Identification and traceability
- Inspection and test records
- Inspection, measuring and test equipment
- Internal quality audits and follow-up activities
- Management review
- Non-conformance
- Peer reviews;
- Positive recall records
- Process control
- Quality Plans
- Quality system records
- Record drawings, standards and specifications;
- Suppliers, subconsultants, subcontractors
- Training

FILING PROCEDURE SBGQ162

1. OVERVIEW

1.1 The SBG Document Controllers maintain filing systems to retain and retrieve Quality Records and other business records at the Project Office and at field offices.

1.2 At the discretion of the responsible manager, other file systems and locations may be established for their purposes.

2. RECORD IDENTIFICATION:

2.1 The filing system conforms to the document name/numbering system, as maintained and updated from time to time by the Document Controllers.

2.2 DOCUMENT LOGGING AND DISTRIBUTION:

2.3 Internally Generated Documents (hard copy). The Document Controller determines the appropriate index numbers for logging and filing.

2.4 Externally Generated Documents (hard copy). Incoming documents are logged by the Document Controller who forwards them to the addresses.

2.5 Electronic Documents. Electronic documents are identified, logged and posted on the internal network. The originator distributes the document, or a notice, by e-mail.

2.6 Documents present in both paper and electronic form may be logged, filed and circulated electronically or as hard copies.

3. DOCUMENT FORMAT:

3.1 The following software packages are in standard use by SBG:

Word Processing -	Microsoft Word XP
Drafting-	AutoCAD, Version 2002 or Micro station Version 2004 or later.
Sketches-	Microsoft Visio 03 or CorelDraw, Version 9.0
Spreadsheets-	Microsoft Excel XP and 2003
Presentation-	Microsoft PowerPoint 2003
Virus Protection:	AVG Antivirus, latest version available, upgraded regularly.

3.2 Document names should be given the default file extension for the software being used.

4. DOCUMENT IDENTIFICATION:

4.1 The Document Controllers apply a circulation stamp to each document and enter a reference number for circulation, further action and filing.

4.2 The Documentation Controller maintains a sign-out log for records removed from the file. Except for brief borrowing, it is preferred that the document be copied and stamped “COPY”. Copies may be destroyed after use.

5. DOCUMENT SECURITY/ACCESS:

5.1 Documents are filed by Document Control in filing cabinets in the head office.

5.2 Site offices maintain suitable, similar filing and circulation systems.

5.3 The System Administrator regularly backs up electronic files on the SBG server.

6. REFERENCES:

6.1 Quality Manual, 4.16

6.2 SBGQ171 Quality Records

6.3 SBGQ062 – Document Name / Numbering System

7. RECORDS:

Record Name/Number	Retention Time	Retained By:
Document Logs	3 Years	Document Control

QUALITY AUDITS SBGQ171

1. OVERVIEW

1.1 SBG assesses its Quality Management Systems for conformance to the agreement and for opportunities for improvement.

1.2 SBG assesses the quality performance of suppliers, subcontractors and subconsultants for conformance to quality requirements.

2. RESPONSIBILITY AND AUTHORITY:

2.1 Quality Manager or designate:

2.1.1 Manages the audit program.

2.1.2 Assigns qualified, independent auditors.

2.1.3 Ensures audits scheduled according to importance and status of activities.

2.1.4 Reviews audit results and recommendations and reports to the Project Manager for Executive Review.

2.2 Auditor:

2.2.1 Plans audits and prepares audit checklists.

2.2.2 Schedules audits with the auditee when necessary to minimize disruption.

2.2.3 Conducts audits, including opening and closing meetings when appropriate.

2.2.4 Maintains required records.

2.2.5 Issues the audit report.

2.2.6 Issues NCNs if auditee fails to do so.

2.2.7 Tracks corrective actions.

2.3 Auditee (the individual or organization being audited)**:**

2.3.1 Provides access to personnel, facilities and records as required by the audit plan.

2.3.2 Issues necessary NCNs.

2.3.3 Responds to the audit report and carries out corrective actions.

3. TRAINING:

3.1 Auditors are trained in quality auditing with reference to ISO 19011:2002 Guidelines for Quality and/or Environmental Management Systems Activity. Prior experience or accreditation is acceptable in lieu of training.

3.2 Auditors are required to familiarize themselves with this procedure and with the governing requirements of the activity to be audited. (e.g., contracts, policies, procedures, plans.)

4. SCHEDULING AND PLANNING:

4.1 The Quality Manager issues an overall Audit Schedule showing the areas and activities to be audited and the recommended frequency of auditing.

4.2 The auditor coordinates audits with project work schedules where possible. Determine from Scheduling and Procurement Departments whether there are new contracts or approaching milestones (check progress during the audit).

4.3 Areas that show a history of problems that have unresolved corrective actions or that have had significant organizational or technical change since the last audit should be audited more frequently. Normally, audits are scheduled in areas with significant risks, identified problems or high volume of activity.

4.4 The auditor reviews the requirements, previous audit report and corrective actions for the activity and prepares or updates the audit checklist.

4.4.1 The audit plan should include verification of correct document revisions in use and verification of corrective actions since the previous audit.

5. AUDITING

5.1 Opening Meeting. If necessary for understanding and cooperation, convene a brief meeting with the auditee to review the scope, objectives and schedule of the audit. This may include a review of the previous audit report, verification of corrective actions and identification of significant changes affecting quality.

5.2 Interview personnel, review documentation and observe activities and conditions to assess their effectiveness and conformance to SBG requirements and to the auditee's policies and procedures.

5.2.1 Use checklists and ISO 9001 as guides. Pursue additional lines of inquiry to determine the extent and significance of observations.

5.2.2 Keep a concise record of observations including the source of the requirement, people contacted, identity and revision of documents examined, locations of activities witnessed and the auditor's conclusion as to effectiveness and conformance to requirements.

5.2.3 Where possible, retain a copy of the evidence of nonconformance, e.g., log sheets, memos, NCNs, test data, photographs, or sketches.

5.3 Verify progress on previous nonconformances and recommendations.

5.4 Note opportunities for quality improvement arising from observations or auditees' comments, regardless of conformance.

5.5 Note any observation that schedule commitments may be jeopardized. (e.g., low or nonconforming inventories, lack staff or capacity, inactivity)

6. REPORTING:

6.1 Format - Record the audit requirements and observations on the Audit Form maintained on the server at:

\\nia01win\data1\SHARED\NIAGARA TUNNEL\Audits\Audit Forms\AUDFRM
and file the electronic copy in the appropriate "report" directory subdirectory in:

\\nia01win\data1\SHARED\NIAGARA TUNNEL\Audits\Reports

6.2 The audit report, which is completed on the Audit Form, should include a conclusion on the effectiveness of the activities audited. It may also include, as appropriate, an assessment of the adequacy of resources for quality, opportunities for improvement comments on positive observations.

6.3 The auditee (preferably) or the auditor issues a Nonconformance Notice or Report if required to control and correct nonconforming work identified in the audit. Refer to SBGQ131.

6.4 Non-conformances identified in the Audit Report require the auditee's response and action regardless of any other notification. Important: An observation of non-conformance may be cancelled only if a) the objective evidence or its interpretation is incorrect, or b) the requirement does not apply.

7. CLOSING:

7.1 Assess observations and issue the audit report as soon as possible after the audit.

7.2 Track the corrective action and schedule a follow-up visit or audit if necessary.

7.3 File the Audit Report with completed checklists, notes, data and supporting documents.

8. REFERENCES:

8.1 ISO 9001:2000 Quality Management Systems - Requirements.

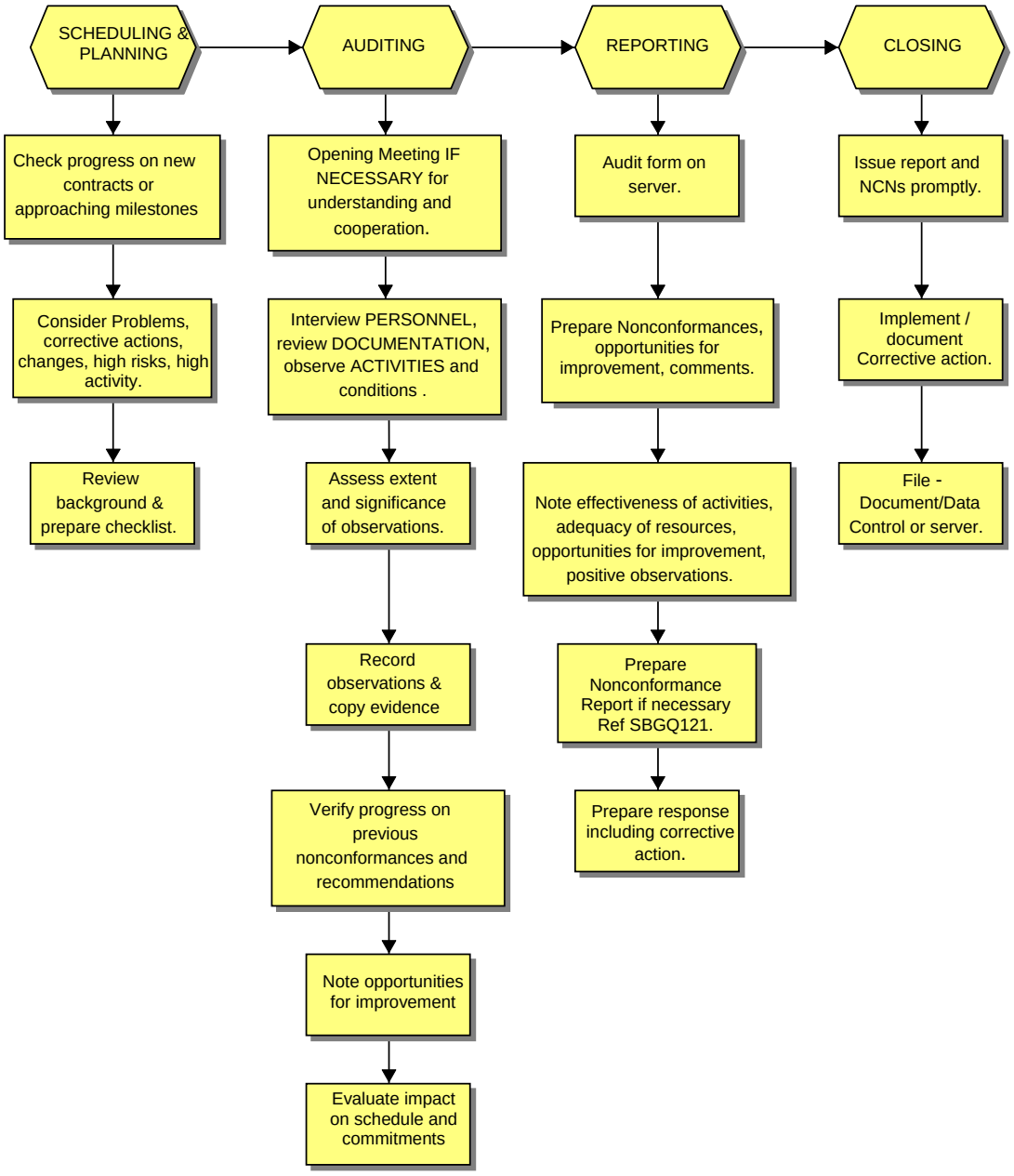
8.2 ISO 19011:2002 Guidelines for Quality and/or Environmental Management Systems Activity.

9. RECORDS:

9.1.1 The following records are completed in the course of this procedure.

Record Name/Number	Retention Time	Retained By:
Audit Schedule	5 years	QA
Audit Checklist/ Report	7 years	QA
Nonconformance Report	Ref SBGQ131.	
Auditor Training Record	Ref SBGQ181.	

QUALITY AUDITS – OUTLINE OF AUDITORS' ACTIVITIES



ONTARIO POWER GENERATION

STRABAG

AUDIT OF QUALITY CONTROL PROCESS

QP Section	1	Steel Ribs

	Yes	No	N/A	Remarks
Document and Data Control				
Is information (including Quality System Manual) available to all parties?				
Has a distribution list system been implemented?				
Is the information adequate to perform the tasks?				
Have the documents been approved for construction?				
Are the documents current?				
Are nonconformances noted/reported to Technicians & Supervisors?				
Inspection Reports				
Do Site Supervisors have necessary information to complete tasks?				
Do Site Supervisors understand the requirements?				
Are records complete?				
Have nonconformances been noted?				
Are nonconformances properly detailed?				
Are records copied/sent to Tunnel Construction Manager?				
Product Identification and Traceability				
Is the product/material properly identified (size, grade, etc)?				
Is tracking from production to installation being carried out?				
Materials Testing				
Are Technicians properly equipped to complete tasks?				
Is the test equipment in good order (calibrated, etc.)?				
Are materials tested in accordance with specified frequency?				
Are materials being tested/reported on a timely basis?				
Have mill certificates been provided?				
Are site staff (Technicians & Subcontractors) advised of test results?				

Auditor: _____ Auditee: _____ Date: _____

dd mm yyyy

ONTARIO POWER GENERATION

STRABAG

AUDIT OF QUALITY CONTROL PROCESS

QP Section	2	Wire Mesh

	Yes	No	N/A	Remarks
Document and Data Control				
Is information (including Quality System Manual) available to all parties?				
Has a distribution list system been implemented?				
Is the information adequate to perform the tasks?				
Have the documents been approved for construction?				
Are the documents current?				
Are nonconformances noted/reported to Technicians & Supervisors?				
Inspection Reports				
Do Site Supervisors have necessary information to complete tasks?				
Do Site Supervisors understand the requirements?				
Are records complete?				
Have nonconformances been noted?				
Are nonconformances properly detailed?				
Are records copied/sent to Tunnel Construction Manager?				
Product Identification and Traceability				
Is the product/material properly identified (size, grade, etc)?				
Is tracking from production to installation being carried out?				
Materials Testing				
Are Technicians properly equipped to complete tasks?				
Is the test equipment in good order (calibrated, etc.)?				
Are materials tested in accordance with specified frequency?				
Are materials being tested/reported on a timely basis?				
Have mill certificates been provided?				
Are site staff (Technicians & Subcontractors) advised of test results?				

Date: ____/____/____
dd mm yyyy

Auditor: _____

ONTARIO POWER GENERATION

STRABAG

AUDIT OF QUALITY CONTROL PROCESS

QP Section	3	Rock Dowels

	Yes	No	N/A	Remarks
Document and Data Control				
Is information (including Quality System Manual) available to all parties?				
Has a distribution list system been implemented?				
Is the information adequate to perform the tasks?				
Have the documents been approved for construction?				
Are the documents current?				
Are nonconformances noted/reported to Technicians & Supervisors?				
Inspection Reports				
Do Site Supervisors have necessary information to complete tasks?				
Do Site Supervisors understand the requirements?				
Are records complete?				
Have nonconformances been noted?				
Are nonconformances properly detailed?				
Are records copied/sent to Tunnel Construction Manager?				
Product Identification and Traceability				
Is the product/material properly identified (size, grade, etc)?				
Is Tracking from production to installation being carried out?				
Materials Testing				
Are Technicians properly equipped to complete tasks?				
Is the test equipment in good order (calibrated, etc.)?				
Are materials tested in accordance with specified frequency?				
Are materials being tested/reported on a timely basis?				
Have mill certificates been provided?				
Are site staff (Technicians & Subcontractors) advised of test results?				

Date: ____/____/____
dd mm yyyy

Auditor: _____

ONTARIO POWER GENERATION

STRABAG

AUDIT OF QUALITY CONTROL PROCESS

QP Section	4	Shotcrete

	Yes	No	N/A	Remarks
Document and Data Control				
Is information (including Quality System Manual) available to all parties?				
Has a distribution list system been implemented?				
Is the information adequate to perform the tasks?				
Have the documents been approved for construction?				
Are the documents current?				
Are nonconformances noted/reported to Technicians & Supervisors?				
Inspection Reports				
Do Site Supervisors have necessary information to complete tasks?				
Do Site Supervisors understand the requirements?				
Are records complete?				
Have nonconformances been noted?				
Are nonconformances properly detailed?				
Are records copied/sent to Tunnel Construction Manager?				
Product Identification and Traceability				
Is the product/material properly identified (size, grade, etc)?				
Is tracking from production to installation being carried out?				
Materials Testing				
Do Site Technicians have a copy of mix designs				
Are Technicians properly equipped to complete tasks?				
Is the test equipment in good order (calibrated, etc.)?				
Are materials tested in accordance with specified frequency?				
Are materials being tested/reported on a timely basis?				
Have mill certificates been provided?				
Are site staff (Technicians & Subcontractors) advised of test results?				

Date: ____ / ____ / ____
dd mm yyyy

Auditor: _____

ONTARIO POWER GENERATION

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AUDIT OF QUALITY CONTROL PROCESS

QP Section	5	Monitoring

	Yes	No	N/A	Remarks
Document and Data Control				
Is information (including Quality System Manual) available to all parties?				
Has a distribution list system been implemented?				
Is the information adequate to perform the tasks?				
Have the documents been approved for construction?				
Are the documents current?				
Are nonconformances noted/reported to Technicians & Supervisors?				
Inspection Reports				
Do Technicians have necessary information to complete tasks?				
Do Technicians understand the requirements?				
Are records complete?				
Have nonconformances been noted?				
Are nonconformances properly detailed?				
Are records copied/sent to Tunnel Construction Manager?				
Product Identification and Traceability				
Is the product/material properly identified (size, grade, etc)?				
Is tracking from production to installation being carried out?				
Materials Testing				
Are Technicians properly equipped to complete tasks?				
Is the test equipment in good order (calibrated, etc.)?				
Are materials tested in accordance with specified frequency?				
Are materials being tested/reported on a timely basis?				
Have mill certificates been provided?				
Are site staff (Technicians & Subcontractors) advised of test results?				

Date: ____/____/____
dd mm yyyy

Auditor: _____

ONTARIO POWER GENERATION

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AUDIT OF QUALITY CONTROL PROCESS

QP Section	6	Grouting

	Yes	No	N/A	Remarks
Document and Data Control				
Is information (including Quality System Manual) available to all parties?				
Has a distribution list system been implemented?				
Is the information adequate to perform the tasks?				
Have the documents been approved for construction?				
Are the documents current?				
Are nonconformances noted/reported to Technicians & Supervisors?				
Inspection Reports				
Do Technicians have necessary information to complete tasks?				
Do Technicians understand the requirements?				
Are records complete?				
Have nonconformances been noted?				
Are nonconformances properly detailed?				
Are records copied/sent to Tunnel Construction Manager?				
Product Identification and Traceability				
Is the product/material properly identified (size, grade, etc)?				
Is tracking from production to installation being carried out?				
Materials Testing				
Do Site Technicians have a copy of mix designs				
Are Technicians properly equipped to complete tasks?				
Is the test equipment in good order (calibrated, etc.)?				
Are materials tested in accordance with specified frequency?				
Are materials being tested/reported on a timely basis?				
Have mill certificates been provided?				
Are site staff (Technicians & Subcontractors) advised of test results?				

Date: ____ / ____ / ____
dd mm yyyy

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AUDIT OF QUALITY CONTROL PROCESS

QP Section	7	Concrete Works-Tunnel	

	Yes	No	N/A	Remarks
Document and Data Control				
Is information (including Quality System Manual) available to all parties?				
Has a distribution list system been implemented?				
Is the information adequate to perform the tasks?				
Have the documents been approved for construction?				
Are the documents current?				
Are nonconformances noted/reported to Technicians & Supervisors?				
Inspection Reports				
Do Technicians have necessary information to complete tasks?				
Do Technicians understand the requirements?				
Are records complete?				
Have nonconformances been noted?				
Are nonconformances properly detailed?				
Are records copied/sent to Tunnel Construction Manager?				
Product Identification and Traceability				
Is the product/material properly identified (size, grade, etc)?				
Is tracking from production to installation being carried out?				
Materials Testing				
Do Site Technicians have a copy of mix designs				
Are Technicians properly equipped to complete tasks?				
Is the test equipment in good order (calibrated, etc.)?				
Are materials tested in accordance with specified frequency?				
Are materials being tested/reported on a timely basis?				
Have mill certificates been provided?				
Are site staff (Technicians & Subcontractors) advised of test results?				

Date: ____ / ____ / ____
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Auditor: _____

ONTARIO POWER GENERATION

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AUDIT OF QUALITY CONTROL PROCESS

QP Section	8	Concrete Works Intake & Outlet

	Yes	No	N/A	Remarks
Document and Data Control				
Is information (including Quality System Manual) available to all parties?				
Has a distribution list system been implemented?				
Is the information adequate to perform the tasks?				
Have the documents been approved for construction?				
Are the documents current?				
Are nonconformances noted/reported to Technicians & Supervisors?				
Inspection Reports				
Do Technicians have necessary information to complete tasks?				
Do Technicians understand the requirements?				
Are records complete?				
Have nonconformances been noted?				
Are nonconformances properly detailed?				
Are records copied/sent to Senior Construction Manager?				
Product Identification and Traceability				
Is the product/material properly identified (size, grade, etc)?				
Is tracking from production to installation being carried out?				
Materials Testing				
Do Site Technicians have a copy of mix designs				
Are Technicians properly equipped to complete tasks?				
Is the test equipment in good order (calibrated, etc.)?				
Are materials tested in accordance with specified frequency?				
Are materials being tested/reported on a timely basis?				
Have mill certificates been provided?				
Are site staff (Technicians & Subcontractors) advised of test results?				

Date: ____/____/____
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Auditor: _____

ONTARIO POWER GENERATION

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AUDIT OF QUALITY CONTROL PROCESS

QP Section	9	Waterproofing System

	Yes	No	N/A	Remarks
Document and Data Control				
Is information (including Quality System Manual) available to all parties?				
Has a distribution list system been implemented?				
Is the information adequate to perform the tasks?				
Have the documents been approved for construction?				
Are the documents current?				
Are nonconformances noted/reported to Technicians & Supervisors?				
Inspection Reports				
Do Technicians have necessary information to complete tasks?				
Do Technicians understand the requirements?				
Are records complete?				
Have nonconformances been noted?				
Are nonconformances properly detailed?				
Are records copied/sent to Tunnel Construction Manager?				
Product Identification and Traceability				
Is the product/material properly identified (size, grade, etc)?				
Is tracking from production to installation being carried out?				
Materials Testing				
Are Technicians properly equipped to complete tasks?				
Is the test equipment in good order (calibrated, etc.)?				
Are materials tested in accordance with specified frequency?				
Are materials being tested/reported on a timely basis?				
Have mill certificates been provided?				
Are site staff (Technicians & Subcontractors) advised of test results?				

Date: ____/____/____
dd mm yyyy

Auditor: _____

ONTARIO POWER GENERATION

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AUDIT OF QUALITY CONTROL PROCESS

QP Section	10	Drainage Measures

	Yes	No	N/A	Remarks
Document and Data Control				
Is information (including Quality System Manual) available to all parties?				
Has a distribution list system been implemented?				
Is the information adequate to perform the tasks?				
Have the documents been approved for construction?				
Are the documents current?				
Are nonconformances noted/reported to Technicians & Supervisors?				
Inspection Reports				
Do Technicians have necessary information to complete tasks?				
Do Technicians understand the requirements?				
Are records complete?				
Have nonconformances been noted?				
Are nonconformances properly detailed?				
Are records copied/sent to Senior Construction Manager?				
Product Identification and Traceability				
Is the product/material properly identified (size, grade, etc)?				
Is tracking from production to installation being carried out?				
Materials Testing				
Do Site Technicians have a copy of mix designs				
Are Technicians properly equipped to complete tasks?				
Is the test equipment in good order (calibrated, etc.)?				
Are materials tested in accordance with specified frequency?				
Are materials being tested/reported on a timely basis?				
Have mill certificates been provided?				
Are site staff (Technicians & Subcontractors) advised of test results?				

Date: ____/____/____
dd mm yyyy

Auditor: _____

ONTARIO POWER GENERATION

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AUDIT OF QUALITY CONTROL PROCESS

QP Section	11	Tunnel Excavation and Support

	Yes	No	N/A	Remarks
Document and Data Control				
Is information (including Quality System Manual) available to all parties?				
Has a distribution list system been implemented?				
Is the information adequate to perform the tasks?				
Have the documents been approved for construction?				
Are the documents current?				
Are nonconformances noted/reported to Technicians & Supervisors?				
Inspection Reports				
Do Technicians have necessary information to complete tasks?				
Do Technicians understand the requirements?				
Are records complete?				
Have nonconformances been noted?				
Are nonconformances properly detailed?				
Are records copied/sent to Tunnel Construction Manager?				
Product Identification and Traceability				
Is the product/material properly identified (size, grade, etc)?				
Is tracking from production to installation being carried out?				
Materials Testing				
Do Site Technicians have a copy of mix designs				
Are Technicians properly equipped to complete tasks?				
Is the test equipment in good order (calibrated, etc.)?				
Are materials tested in accordance with specified frequency?				
Are materials being tested/reported on a timely basis?				
Have mill certificates been provided?				
Are site staff (Technicians & Subcontractors) advised of test results?				

Date: ____/____/____
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Auditor: _____

ONTARIO POWER GENERATION

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AUDIT OF QUALITY CONTROL PROCESS

QP Section	12	Dewatering System Excavation

	Yes	No	N/A	Remarks
Document and Data Control				
Is information (including Quality System Manual) available to all parties?				
Has a distribution list system been implemented?				
Is the information adequate to perform the tasks?				
Have the documents been approved for construction?				
Are the documents current?				
Are nonconformances noted/reported to Technicians & Supervisors?				
Inspection Reports				
Do Technicians have necessary information to complete tasks?				
Do Technicians understand the requirements?				
Are records complete?				
Have nonconformances been noted?				
Are nonconformances properly detailed?				
Are records copied/sent to Tunnel Construction Manager?				
Product Identification and Traceability				
Is the product/material properly identified (size, grade, etc)?				
Is tracking from production to installation being carried out?				
Materials Testing				
Do Site Technicians have a copy of mix designs				
Are Technicians properly equipped to complete tasks?				
Is the test equipment in good order (calibrated, etc.)?				
Are materials tested in accordance with specified frequency?				
Are materials being tested/reported on a timely basis?				
Have mill certificates been provided?				
Are site staff (Technicians & Subcontractors) advised of test results?				

Date: ____/____/____
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Auditor: _____

ONTARIO POWER GENERATION

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AUDIT OF QUALITY CONTROL PROCESS

QP Section	13	Intake Channel Excavation

	Yes	No	N/A	Remarks
Document and Data Control				
Is information (including Quality System Manual) available to all parties?				
Has a distribution list system been implemented?				
Is the information adequate to perform the tasks?				
Have the documents been approved for construction?				
Are the documents current?				
Are nonconformances noted/reported to Technicians & Supervisors?				
Inspection Reports				
Do Technicians have necessary information to complete tasks?				
Do Technicians understand the requirements?				
Are records complete?				
Have nonconformances been noted?				
Are nonconformances properly detailed?				
Are records copied/sent to Senior Construction Manager?				
Product Identification and Traceability				
Is the product/material properly identified (size, grade, etc)?				
Is tracking from production to installation being carried out?				
Materials Testing				
Do Site Technicians have a copy of mix designs				
Are Technicians properly equipped to complete tasks?				
Is the test equipment in good order (calibrated, etc.)?				
Are materials tested in accordance with specified frequency?				
Are materials being tested/reported on a timely basis?				
Have mill certificates been provided?				
Are site staff (Technicians & Subcontractors) advised of test results?				

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dd mm yyyy

Auditor: _____

ONTARIO POWER GENERATION

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AUDIT OF QUALITY CONTROL PROCESS

QP Section	14	Approach Wall and Accelerating Wall

	Yes	No	N/A	Remarks
Document and Data Control				
Is information (including Quality System Manual) available to all parties?				
Has a distribution list system been implemented?				
Is the information adequate to perform the tasks?				
Have the documents been approved for construction?				
Are the documents current?				
Are nonconformances noted/reported to Technicians & Supervisors?				
Inspection Reports				
Do Technicians have necessary information to complete tasks?				
Do Technicians understand the requirements?				
Are records complete?				
Have nonconformances been noted?				
Are nonconformances properly detailed?				
Are records copied/sent to Senior Construction Manager?				
Product Identification and Traceability				
Is the product/material properly identified (size, grade, etc)?				
Is tracking from production to installation being carried out?				
Materials Testing				
Do Site Technicians have a copy of mix designs				
Are Technicians properly equipped to complete tasks?				
Is the test equipment in good order (calibrated, etc.)?				
Are materials tested in accordance with specified frequency?				
Are materials being tested/reported on a timely basis?				
Have mill certificates been provided?				
Are site staff (Technicians & Subcontractors) advised of test results?				

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Auditor: _____

ONTARIO POWER GENERATION

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AUDIT OF QUALITY CONTROL PROCESS

QP Section	18	Grout Tunnel	

	Yes	No	N/A	Remarks
Document and Data Control				
Is information (including Quality System Manual) available to all parties?				
Has a distribution list system been implemented?				
Is the information adequate to perform the tasks?				
Have the documents been approved for construction?				
Are the documents current?				
Are nonconformances noted/reported to Technicians & Supervisors?				
Inspection Reports				
Do Technicians have necessary information to complete tasks?				
Do Technicians understand the requirements?				
Are records complete?				
Have nonconformances been noted?				
Are nonconformances properly detailed?				
Are records copied/sent to Senior Construction Manager?				
Product Identification and Traceability				
Is the product/material properly identified (size, grade, etc)?				
Is tracking from production to installation being carried out?				
Materials Testing				
Do Site Technicians have a copy of mix designs				
Are Technicians properly equipped to complete tasks?				
Is the test equipment in good order (calibrated, etc.)?				
Are materials tested in accordance with specified frequency?				
Are materials being tested/reported on a timely basis?				
Have mill certificates been provided?				
Are site staff (Technicians & Subcontractors) advised of test results?				

Date: ____/____/____
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Auditor: _____

ONTARIO POWER GENERATION

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AUDIT OF QUALITY CONTROL PROCESS

Design Works

	Yes	No	N/A	Remarks
Review of Input Information				
Input information is available to Designer				

(GBR, DB agreement, surveys, studies and reports, plans and as-built information for crown completed works, safety audits (safety by design), standards and regulations, communications and agreements with third parties. (e.g., government agencies, municipalities, affected landowners.), OR reviewed submittals.

Quality Control Design Process				
Design drawings and reports stamped by certified Engineer				
Is Design Quality Control process documentation properly kept?				
Current copies of all project plans, specifications and method statements are available at the Designer Office?				
Is there a copy of the Project Quality System Manual at the Designer's Office?				
Design Review				
Are final checks being performed by Design Engineer?				
Are design reviews documented?				
Are the documents being filed and organized properly?				
Are Site visits are carried out as planned				
Design Variance				
Is there a log of Design Variances?				
Are all necessary approvals recorded?				
Are design variances distributed to all pertinent parties on a timely.				
Compliance with Design variance is being verified for work done				
Design Approach to Non-conformances				
Are Nonconformances properly investigated with correvtive action?				
Are the documents being filed and organized properly?				

Auditor: _____ Auditee: _____ Date: ____ / ____ / ____

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TRAINING SBGQ181

1. OVERVIEW

1.1 SBG requires that all personnel whose work affects the quality of the Project are appropriately qualified by experience, education, training and credentials.

1.2 Suppliers, subcontractors and subconsultants to the project are responsible for defining training requirements and ensuring that personnel within their organizations are properly qualified.

1.3 Professionals and licensed personnel are responsible for maintaining their qualifications.

2. RESPONSIBILITY

2.1 SBG managers ensure that training requirements are defined, appropriate to the authority and responsibility of the position, complexity of the assignment, degree of supervision exercised and applicable laws and regulations.

2.2 The manager ensures that personnel are trained for their position or are appropriately supervised.

2.3 The Quality, Environmental and Safety Managers maintain courses and provide orientation training to all staff engaged on the project.

2.4 Discipline managers are responsible for prescribing and coordinating training for their staff, and for suppliers, subcontractors and subconsultants where appropriate, to accommodate technical or administrative changes affecting their work.

2.5 Human Resources file SBG employees' resumes, job descriptions and reviews. Personal information in these files is confidential and will not be divulged.

2.6 Document Control files records of employees' training. Attendance lists, certificates of attendance or equivalent evidence is retained or referenced for this information.

3. REFERENCES:

3.1 ISO 9001:2000, 4.18

4. RECORDS:

Record Name/Number	Retention Time	Retained By:
Position requirements/descriptions	5 Years	Office Administrator
Personnel Resumes and Qualifications	5 Years	Office Administrator

Record Name/Number	Retention Time	Retained By:
Personnel performance reviews	5 Years	Office Administrator

SAMPLING SBGQ191

1. OVERVIEW

1.1 SBG mandates the use of appropriate statistical methods to establish, control and verify process capability and product characteristics

2. GENERAL

2.1 This procedure applies to data gathered in the process of laboratory and field testing

2.2 RESPONSIBILITY AND AUTHORITY

2.3 The sampling plans are as specified in the Construction Quality Plan and in referenced standards.

2.4 The Independent Laboratory engaged by SBG is responsible for maintaining the procedures required to sample work and materials as required by the Construction Quality Plan.

3. REFERENCES:

3.1 ISO 9001:2000, 8.4 Analysis of Data

3.2 Construction Quality Plan

4. RECORDS:

Record Name/Number	Retention Time	Retained By:
Sampling Plans	5 Years	Independent Test Laboratory
Inspection/Test Reports	7 Years	Independent Test Laboratory
Test database (test records in computerized database)	7 Years	Independent Test Laboratory

Appendix H: Quality System Manual Structure

<table>
<tr><th colspan="3">QUALITY SYSTEM MANUAL</th></tr>
<tr><td rowspan="5">Appendices</td><td colspan="2">Appendix A - Corporate Organization, Relationships and Responsibilities</td></tr>
<tr><td colspan="2">Appendix B - ISO Registered Participants</td></tr>
<tr><td colspan="2">Appendix C - Quality Responsibility Matrix</td></tr>
<tr><td colspan="2">Appendix D - Glossary</td></tr>
<tr><td>Appendix E - SBG Quality Plans</td><td>
Construction Quality Plan

1. Steel Ribs
2. Wire Mesh
3. Rock Dowels
4. Shotcrete
5. Monitoring
6. Grouting
7. Concrete Works Final Lining
8. Concrete Works Intake and Outlet Structures
9. Waterproofing System
10. Drainage Measures
11. Tunnel Excavation and Support
12. Dewatering System Excavation and Support
13. Intake Channel Excavation
14. Approach Wall and Accelerating Wall
15. Cofferdam
16. Other Concrete Works
17. Spiling
18. Grout Tunnel

Design Quality Plan

1. Preparative Phase
1.1 Start Up
1.2 Data Collection
2. Preliminary Design Phase
2.1 Design Basis
2.2 Road Works and Peripheral Works at the Intake and Outlet
2.3 Approach and Accelerating Wall
2.4 Pier Modification
2.5 Intake Channel
2.6 Cofferdams
2.7 Demolition of Dewatering Structure
2.8 Intake Gates
2.9 Diversion Tunnel
2.10 Intake and Outlet Structures
2.11 Outlet Canal
2.12 Dewatering System
3. Detailed Design, All works
3.1 Detailed Structural Analysis and Design, Detailing and Requirements
3.2 Electrical and Mechanical Installations
3.3 Miscellaneous Designs for Architectural Works (Stairs, Fences, etc)
3.4 Road and Peripheral WorksFinal Constructability Review with Contractors
</td></tr>
</table>

	Appendix F – Supplier Assessment Form	
	Appendix G – List of Quality System Procedures	1. Management Review 2. Quality System Procedures 3. Quality Planning 4. Contract Review 5. Design Review 6. Design Variance 7. Design Evaluation and Optimization 8. Document and Data Control 9. Document Naming/Numbering 10. Incoming/Outgoing Documentation Control 11. Purchasing 12. Control of Customer Supplied Product 13. Product identification and Traceability 14. Process Control 15. Incoming Inspection and Testing 16. Positive Recall 17. Calibration 18. Inspection and Test Status 19. Non-conformances 20. NCN Appendix A 21. Corrective and Preventive Action 22. Handling, Storage, Packaging, Preservation and Delivery 23. Control of Quality Records 24. Filing Procedure 25. Quality Audits 26. Training 27. Sampling
	Appendix H: Quality System Manual Structure	

CONSTRUCTION QUALITY PLAN

OCTOBER 27, 2008

An Attachment To

Quality System Manual Version 4.0

AS REQUIRED BY QUALITY SYSTEM MANUAL SECTION 4.2

CONFIDENTIAL AND PROPRIETARY INFORMATION

CONTROLLED DOCUMENT

Version: 10/27/2008

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[ ] Denotes Responsibility

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification / Record
1. Steel Ribs (Support measures for the tunnel excavated at the NTFP) *Latest Specification dated: 20/11/2007*				
1.1	**Rolled steel ribs:** First protection against break out.	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 yield strength of 235 MPa. 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 shipment. Each rib set, when assembled with the connections fully and tightly bolted, shall lie within + 25 mm of a true plane. The ribs shall be erected within + 150 mm of the positions shown on the drawings unless otherwise approved by the Engineer and shall not deviate by more than -/+ 20 mm from the dimensions shown on the drawings. Standards: CSA G 40.20, CSA G 40.21, ASTM A992, ASTM A 992M, DIN 17100 and DIN 4100. Drawings: NAW-130-DOV-29230- (0018 to 0021), 0033, (0044 to 0048) Project Specification: R-NAW130-83000-0006-04 (20/11/2007). Method Statement for Spiling.	[Strabag Tunnel Technician] shall check type, size and spacing of the rolled steel ribs and verify conformance with the drawings and method statements (inspections shall be recorded in Form 7). The steel ribs shall be erected within the specified tolerances and shall be firmly expanded against the rock or the shotcrete. . A test certificate of the steel rib shall be provided by the [Manufacturer] once before use. Spots checks shall be provided by the [Manufacturer] during construction for quality control purposes.	The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. [SBG Tunnel Construction Manager, Engineering Manager and Tunnel Design Engineer]
1.2	**Steel Rib Connections:** Screws or bolts that connect steel rib segments	The connections shall be fully embedded in shotcrete. No voids should be created behind the connections. Standards: CSA G 40.20 and G 40.21 – 98, ASTM A 992 / A 992 M, DIN 17100 and DIN 4100. Drawings: NAW-130-DOV-29230- (0018 to 0021), 0033, (0044 to0048)	The correct construction in accordance with drawings, specifications and method statements shall be checked by visual inspection. Inspections shall be recorded on Form No. 7 [Strabag Tunnel Technician]	The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. [SBG Tunnel Construction Manager, Engineering Manager and Tunnel Design

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification / Record
		Project Specification: R-NAW130-83000-0006-04 (20/11/2007). Method Statement for Spiling.		Engineer]
2. Wire Mesh (Forming part of the rock support for the: Diversion Tunnel, Intake excavation, Outlet Excavation and other excavations at the NTFP) *Latest Specification dated: 20/11/2007*				
2.1	**Wire Mesh:** Used for: • Protection against breakout of rocks. • Reinforcement required in the shotcrete lining. • Improvement of shotcrete's composite behavior.	Wire mesh shall have a square pitch pattern of 100 mm to 150 mm in both directions and the bar diameter shall range from 5 mm to 8 mm as specified on drawings. The wire mesh shall be of high-tensile steel quality with minimum yield strength of 400 MPa to 500 MPa. The steel shall be classified as weldable. The reinforcement bars shall be of high-tensile steel quality with minimum yield strength of 400 MPa to 500 MPa. The steel shall be classified as weldable. Overlap specifications: - Radial overlap: minimum 200 mm. - Longitudinal overlap: minimum 150 mm Standards: CSA A 23.1 – 94, DIN 1045 (EC 2). Drawings: NAW-130-DOV-29230- (0017 to 0021), 0033, (0044 to 0048) Project Specification: R-NAW130-83000-0006-04 (20/11/2007). Method Statement for Spiling.	The correct construction in accordance with drawings, specifications and method statements shall be checked by visual inspection and recorded in Form 7 [Strabag Tunnel Technician]. A test certificate of the steel material in the steel mesh shall be provided by the [Manufacturer] once before use. Spots checks shall be provided by the [Manufacturer] during construction for quality control purpose.	The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. [SBG Tunnel Construction Manager, Engineering Manager and Tunnel Design Engineer]
3. Rock Dowels (Support measures for the tunnel excavation and other cavities or pits at the NTFP) *Latest Specification dated: 20/11/2007*				
3.1	**Rock Dowels**	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 characteristic load is defined with: Minimum 100 kN for dowels Type I Minimum 240 kN for dowels Type II	Preconstruction suitability tests: Prior to installation, 10 trial rock dowels of each type of dowel to be used in the works shall be installed and tested. *Swellex Type or Similar*: 5 of the trial rock dowels shall be tested after 1 hour at 60 % of the characteristic load.	Records shall be kept for each dowel tested in accordance with procedure SBGQ151 of the Quality Manual and copies of all records shall be maintained on site after installation of the dowel or completion of the testing. The dowels which fail testing have to be

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification / Record
		For rock dowels SN type: The minimum steel cross – section should not be smaller than: 300 mm^2 for Rock Dowels Type I. 400 mm^2 for Rock Dowels Type II. Dimension of the anchor face plates shall be (length/width/thickness): • On the rock surface: 60 / 60 / 6 (mm) Rock Dowels Swellex Type. 100 / 100 / 6 (mm) Rock Dowels SN Type I. 150 / 150 / 8 (mm) Rock Dowels SN Type II. • For anchoring of steel ribs: 60 / 60 / 6 (mm) for steel channel b <= 100. 80 / 80 / 8 (mm) for steel channel b > 100 Requirements on Drawings: • Rock Dowel L: 2400 mm for Rock Support Type 2, 4000 mm for Rock Support Types 3, 4, 4Q, 4R, and 4S and 6000 mm for Rock support Types 5 and 6. • Type of Rock Dowel specified: Swellex MN 24 or Equivalent (Resin Grouted SN Dowel) for Rock support Types 2 to 6. Standards: DIN 21521, DIN 51522. Drawings: NAW-130-DOV-29230- (0018 to 0020), 0033, (0044 to 0048) Project Specification: R-NAW130-83000-0006-04 (20/11/2007). Method Statement for Spiling	*SN Type – Resin or Resin Grouted*: 5 of the trial rock dowels shall be tested after 1 hour at 60% of the characteristic load. The remaining dowels shall be tested at the characteristic load between 1 and 21 days after installation 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. QC Tests: (subject to Spec Revisions by Designer) Pull-out tests shall be used for testing Resin Type, Swellex Type or Self-Drilling Type (IBO) Rock Dowels. Three rock dowels every 150 m of tunnel shall be tested between 1 and 21 days after installation. The quality control criteria are met, if the rock dowel is able to sustain a load of 185 kN for at least 10 minutes. Test results are recorded in Form 6A [Strabag Tunnel Technician]. The proportion of the dowels tested may be reduced, if consistent and acceptable test results are obtained for the previous 50 dowels tested, subject to approval by the Tunnel Design Engineer. The quantity of rock dowels installed (on the steel ribs and rock) and the correct construction in accordance with drawings, specifications and method statements shall be checked by visual inspection and recorded in Form 7. [SBG Tunnel Technician]	replaced and the testing procedure repeated. The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. [SBG Tunnel Construction Manager, Engineering Manager and Tunnel Design Engineer]
3.2	Cement Grout	Cement grout shall achieve such characteristic strength that the SN dowels will be able to bear 40% of its capacity after 6 hours and 100% of its	Sets of six cubes of cement grout shall be taken once every month when installation of grouted rock dowels is in progress. [JEGEL]	QA: review of Manufacturer's records.

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		capacity after 12 hours. Standards: CSA A 23.2-8A Drawings: NAW-130-DOV-29230- (0018 to 0020), 0033, (0044 to 0048) Project Specification: R-NAW130-83000-0006-04 (20/11/2007). Method Statement for Spiling	Sampling, preparation, curing and testing shall be in accordance with CSA A23.2-1B. Half of the cubes shall be tested at 1 day and the remainder at 28 days. The strength from any single test result shall not be less than the average compressive strength minus: • 1 N/mm^2 for cement grouted tested after 1 day • 6 N/mm^2 for cement grouted tested after 28 days Specifications and drawings shall be reviewed by [Strabag Tunnel Technicians] prior to execution of work.	The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. [SBG Tunnel Construction Manager, Engineering Manager and Tunnel Design Engineer]
4. Shotcrete (Shotcrete lining forming part of the rock support for the Diversion Tunnel, Intake and Outlet Excavation and other excavations at the NTFP) – *Latest Specification dated: 29/06/2006*				
4.1 Components 4.1.1	**Cement**	The cement shall comply with the following: • Cement Type: GU, S GGBFS and Gub-SF **Proportioned to a Type MSb, Blended Moderate Sulphate-Resistant (CSA A23.1, Table 7).** • Fineness: not less than 340 m^2/kg. • Bleeding: not more than 20 cm^3. Standards: CSA A3001, CSA 23.1, ASTM C 150 / C 595, DIN 1164, DIN 18200, EN 196. Shotcrete Specification dated: 29/06/2006 Shotcrete Mix Design dated: Nov. 1, 2006 Shotcrete Mix Design dated: Nov. 27, 2007	For the entire quantity delivered, the manufacturer shall provide the cement analysis. Test procedure for cement is described in Shotcrete Specification dated 29/06/2006, Section 6.2.1 (Testing frequency: once each month, except when cement production is less than 1500 t). Cement shall be stored in a suitable bin or building to protect it against dampness and inclement weather. [Manufacturer]	QA: review of Manufacturer's records. The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. [Quality Manager]
4.1.2	**Aggregates**	The combined gradations for fine and coarse aggregates shall be in accordance with Fig 1 of the NTFP Shotcrete Specification. Maximum particle size: shall be less than 14 mm. The percentage of particles smaller than 0.08 mm shall not exceed 6 % (Shotcrete Specification, dated: 29/06/2006).	The aggregates shall be sampled in accordance with the requirements of CSA A23.2-1A. As a minimum, testing shall be carried out once a month (or as indicated) to verify: • Sieve analysis (CSA A23.2-2A) –5,000 t • Organic impurities (CSA A23.2-7A) – 50,000 t	QA: review of supplier's records. The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report.

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		The deviation of the selected gradation should not exceed the values given in Shotcrete Specification dated: 29/06/2006, Table 1. Fine and coarse aggregates shall be clean. Organic impurities in fine aggregate shall be in accordance with CSA A23.1, Subsection 4.2.3.3.3. Aggregate samples complying with gradation requirements shall not exceed the limits for Micro-Deval, Clay lumps and Low-density granular materials, prescribed in CSA A23.1, Table 12. Frozen aggregates shall not be used. Standards: CSA 23.1, CSA A23.2-1A, ASTM C 33, DIN 1045, ENV 206, DIN 18200, DIN 18851, EC 2. Doc. R-NAW 130-83000-0001-02 Shotcrete Specification dated: 29/06/2006 Shotcrete Mix Design dated: Nov. 1, 2006 Shotcrete Mix Design dated: Nov. 27, 2007	• Clay lumps (CSA A23.2-3A) – 50,000 t • Low-density granular materials (CSA A23.2-4A) – 50,000 t Additionally, Alkali-aggregate reactivity (CSA A23.2-25A and CSA A23.2-27A) shall be examined once for each type of aggregate used (once per year). The supplier is responsible to assure that aggregate used meets all the requirements contained in the Shotcrete Specification dated 29/06/2006 and in QC Plan. Each nominal size of aggregate shall be separately stored in a freely draining stockpile in a manner that will prevent contamination, intermixing and segregation. [Dufferin Concrete]	[Quality Manager]
4.1.3	**Water**	Shall be clean and free of harmful matter in such quantities as would affect the properties of steel or shotcrete in the plastic or hardened state. Potable water is suitable and need not be tested. All other water shall be tested according to CSA A23.1-04,4.2.2. Standards: CSA 23.1, ACI 506R-90 (R95), ACI 318, DIN 1045, ENV 206, DIN 18200, DIN 18851, EC 2, EN 196. Shotcrete Specification dated: 29/06/2006	If water is not potable, it shall be tested to assure that 28 day strength of cores from shotcrete made with it are at least 90 % of that of cores from shotcrete made with distilled water. (CSA A23.1, Subsection 4.2.2). Testing frequency: once each mix. [Dufferin Concrete]	QA: review of Manufacturer's records. The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. [Quality Manager]
4.1.4	**Admixtures**	Only the minimum quantity of accelerators necessary shall be permitted in normal shotcreting operations, and this quantity shall be determined by trials as specified in Shotcrete Specification dated: 29/06/2006.	Accelerator setting time and strength decrease shall be tested as indicated in Shotcrete Specification dated: 29/06/2006, Section 6.2.2.1 and cubes according to CSA A3004-C2. (Testing frequency: once each mix)	QA: Review of Manufacturer's records. The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity

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		Accelerator strength decrease: Target value <15 % Plasticizers and retarders shall be checked regularly for setting time, water reduction and effect on strength development. Macro Synthetic Structural Fibres used for shotcrete shall be suitable for increasing the energy of absorption of the shotcrete. The fibre content shall not exceed 9kg/m^3 shotcrete by far. Standards: CSA 23.1, CSA A3004-C2, ASTM C494, ASTM C1550, ACI 506R-90 (R95), DIN 267, DIN 1045, ENV 206, DIN 1164, DIN 18200, DIN 18851, EC, EN 196. Shotcrete Specification dated: 29/06/2006 Shotcrete Mix Design dated: Nov. 1, 2006 Shotcrete Mix Design dated: Nov. 27, 2007	Plasticizer and retarders shall be tested once each mix according to ASTM C494. If used, Fibres will be tested once each mix according to ASTM C1550. The energy absorption of fiber-reinforced shotcrete shall be equal to or higher than 300 Joules. [Admixture Supplier]	Report. [Quality Manager]
4.2 Shotcrete 4.2.1	**Shotcrete (Strength Tests)**	Shotcrete shall be dense and homogeneous without segregation of aggregates or other visible imperfections. The compressive strengths shall be: 0.5 MPa after 30 minutes. 6.0 MPa after 24 hours. 25 MPa after 28 days (before correction factor is applied). 21.75 MPa at 28 days (after correction factor is applied) Requirements on drawings: • Shotcrete Grade: 25 MPa @ 28 days • Shotcrete reinforced with polypropylene	Test panels shall be produced and stored under the same conditions as the in-situ shotcrete. Core samples shall be taken and tested for compressive strength at 1 and 28 days (5 cores each). Compressive strength testing shall be performed on cores drilled in the direction of shotcrete application through the whole thickness (according to CSA A23.2-14C). Cores shall be 100 mm in diameter and at least 100 mm in length (after trimming). The time of coring shall be as close as possible to 24 hours after placing. Cores for 28 day strength can be obtained at the same time and stored in the laboratory.	The Tunnel Construction Manager and The Engineering Manager will report all non-conforming work to the Owner upon notification from the Site Technicians. All QC reports will be provided to the Owner in monthly Quality reports. The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. The minimum compressive strength at 28

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		fibres (length of fibres: 40-50 mm).
		• Thickness
		  • Rock Support Type 1: 50 mm
		  • Rock Support Type 2: 70 mm
		  • Rock Support Type 3: 100 mm
		  • Rock Support Type 4: 130 mm
		  • Rock Support Type 5: 160 mm
		  • Rock Support Type 6: 260 mm
		
		Standards: CSA 23.1, CSA A23.1-2C, CSA A23.2-3C, CSA A23.2-9C, ACI 506.2-95, ACI 506.R-90 (R95), DIN 267, DIN 1045, ENV 206, DIN 1164, DIN 18200, DIN 18851, EC, EN 196.
		Drawings: NAW 130–DOV–29230–(0018 to 0021), 0033
		Shotcrete Specification dated: 29/06/2006
		Shotcrete Mix Design dated: Nov. 1, 2006
		Shotcrete Mix Design dated: Nov. 27, 2007
			Frequency of coring shall be such as to obtain 5 cores each for 1 and 28 day tests for every 2,500 m^2 of shotcrete used in the works. Depending of the compliance of test results, the circumstances of application and the importance of construction, the number and frequency of tests will be reduced (to every 5000 m^2, 1 and 28 day strengths).
			
			Test for 1-day compressive strength shall be carried out between 22 and 48 hours, preferably at 24 h ± 2 h.
			
			Indirect penetration and pull out test (CSA.2-15C) methods may be used instead of testing cores to determine the 1-day strength of shotcrete. Mechanical rebound hammers shall NOT be used to determine the indirect compressive strength of shotcrete.
			
			The cores shall be visually inspected to verify that the shotcrete is dense and homogeneous without segregation of aggregate or other visible imperfections.
			
			[STRABAG - JEGEL]
				days determined in the works shall not be 4 MPa lower than the specified characteristic strength. The mean value of all test results comprising a compressive strength test shall be at least 4 MPa higher than the specified characteristic strength, or (1.48*σ) MPa higher than the specified characteristic strength, in the situation that at least 15 test results are available and σ being the standard deviation.
				
				The mean compressive strength taken on 5 cores from a test panel represents a single test result. When the compressive strength of one specimen deviates by more than 15 % from the mean value for 5 tests, the strength test result for that specimen is ignored. The single test result is the mean value of all test results for specimens from the panel, which remain within the 15 % limit. At least 3 compressive strength results must remain within the 15 % limit for the panel to be considered valid.
				[JEGEL]

4.2.2	**Shotcrete (Slump Test)**	Target Slump: 210 mm ± 40 mm. Standards: CSA 23.1, CSA A23.1-2C, CSA A23.2-5C, ACI 506.2-95, ACI 506.R-90 (R95), DIN 1045, ENV 206, DIN 18200, DIN 18851, EC 2. Drawings: NAW 130–DOV–29230–(0018 to 0021), 0033 Shotcrete Specification dated: 29/06/2006 Shotcrete Mix Design dated: Nov. 1, 2006 Shotcrete Mix Design dated: Nov. 27, 2007	Slump shall be randomly by QC. Testing procedure according to CSA A23.2 – 5C. [Dufferin] The slump tolerance shall be ± 40 mm. [SBG Tunnel Construction Manager and Engineering Manager]	Slump tests of shotcrete shall be carried out following the same procedure as QC. Slump will be checked once for each load during the first five loads of the day, if the results are consistent with specifications these tests will be carried out every fifth load during that day until a non-conformance occurs, and revert to five consecutive loads for testing. The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. [JEGEL]

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4.2.3	**Shotcrete (Thickness)**	The required minimum thickness for shotcrete is defined as 80 % of the nominal value specified on the Drawings as follows: • Rock Support Type 1: 50 mm • Rock Support Type 2: 70 mm • Rock Support Type 3: 100 mm • Rock Support Type 4: 130 mm • Rock Support Type 5: 160 mm • Rock Support Type 6: 260 mm Shotcrete Surface Requirements (From the Specification of Waterproofing System. 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 200 mm. • Sharp edges of protruding iron parts shall be removed or shall be covered with shotcrete with a minimum thickness of 20 mm (e. g. steel ribs, heads of rock dowels). At locations where the required surface condition is not met, **regulating shotcrete** must be applied. The following minimum requirements shall apply: • The ratio of diameter to the height of local "inaccuracies" due to excavation must be at least 10:1 • Surface evenness having a minimum radius of 0.20 m. • Care shall be taken to ensure that all rebound is removed, especially in the invert.	The thickness of shotcrete shall be checked using studs, double headed nails, steel mesh bars or other suitable indicator, perpendicular to the surface. Where closely spaced steel ribs (<2.0 m) can be used as indicator, no other routine shotcrete thickness check is required. Shotcrete thickness checks shall be recorded in Form 7. Waviness and roughness (QA/QC processes and testing procedure to be specified) Tunnel diameter and roundness after shotcrete is applied will be checked by [SBG Surveyor] every 6 m of tunnel using Total Station. [SBG Tunnel Technician]	QA consists of verification of reports. The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. [SBG Tunnel Construction Manager and Engineering Manager]

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		Standards: ACI 506.R-90, ACI 506.2-95 Drawings: NAW 130–DOV–29230–(0018 to 0021), 0033 Shotcrete Specification dated: 29/06/2006 Specification of Waterproofing System dated: 28/02/2007		
5. Monitoring (Requirements for the execution of all monitoring measures at the NTFP)				
5.	**Monitoring** measures during construction of the main tunnel, outlet and intake structures.	The minimum requirements for each instrument are established in the Specification of Monitoring for Excavation and Operation of the Tunnel dated: 20/11/2007 The Location and type of instruments shall be as shown on the drawings or as otherwise specified. 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. b) Leveling studs and geodetic leveling equipment. c) Tape extensometer (if theodolite for optical measurement is not used) d) Rod extensometers e) Piezometers Extensometers and Piezometers to be permanently linked to data logger at the ground surface. Tunnel Piezometers to be installed at Station 2+988.365 m and Station 9+100.000 approximately (location to be confirmed, subject to flow test requirements), as shown in Drawing NAW-130-DOV-29230-0029.	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 when required. The contractor shall ensure that the entire instrumentation in use has been correctly calibrated. The contractor shall carry out periodic checks to confirm the validity of equipment calibration in accordance with manufacturer's instruction and to carry out adjustments if found necessary. The process for the surveying QC is as follows: - Surveyors collect the data for each method at intervals specified in the Method Statement for Convergence Measurements. - The Head of the Surveying Department reviews data for completeness and acceptance. - Approved surveying data is sent to the Sr. Construction Manager, Construction Manager, Geotechnical Department, Designer Representative for review. [SBG Engineers and Technicians On Site]	The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. QA Surveying is carried out by an independent agency [Monteith] Hired by the OR

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		Drawings: NAW-130-DOV-29230- (0016, 0022, 0023, 0029) Specification of Monitoring for Excavation and Operation of the Tunnel dated: 21/11/2007 DB: Appendix PR-00-5005. Method Statement for convergence measurement		
6. Grouting (Grouting measures performed inside the Diversion Tunnel at the NTFP*) Specification dated 15/05/2008*				
6.1	**Interface Grouting** The final lining will be pre-stressed with high pressure grouting at the interface between the initial lining and the waterproofing system.	The minimum requirements are established in the Specification Contact Grouting and Interface Grouting dated: 15/05/2008. The fixing materials used for interface grouting shall be tested for suitable performance. 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 at stationary monitoring sections. (c) Piezometers measurements at locations where such instruments have been installed prior to concreting. (d) Extensometer measurements at locations where such instruments have been installed prior to concreting.	All components must have a valid quality certificate and a valid permission for the intended use. The materials used as grouting hoses and grouting valves shall be tested to a pressure of 30 bar (22 bar maximum pressure plus safety margin) internal and external pressure. The resistance of grout hoses against pipe burst and the flow of water when exposed to hydrostatic pressure shall be recorded. [Manufacturer] The correct construction shall be checked by [Strabag Tunnel Technician] using monitoring methods in accordance with drawings, specifications and method statements	The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. [SBG Tunnel Construction Manager, Engineering Manager and Tunnel Design Engineer]
6.2	**Contact Grouting** Injected between the back of the final lining concrete and the waterproofing membrane			The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. [SBG Tunnel Construction Manager, Engineering Manager and Tunnel Design Engineer]
6.3 **Grouting Materials**	**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	The water temperature during mixing and grouting shall range between 5℃ and 25℃. [SBG Tunnel Technicians On Site]	The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. [Quality Manager]

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6.3.1		water, adequate water analyses shall be carried out prior to the works. The water temperature during mixing and grouting shall range between 5℃ and 25℃. Draft Specification Contact Grouting and Interface Grouting dated: 15/05/2008.		
6.3.2	**Cement**	Cement grout consisting of General Use (GU) ortland Cement compatible with the final lining concrete shall be used for contact grouting. A cement blend that is durable to sustain the aggressive ground- and groundwater conditions (HS or HSb) shall be used for interface grouting outside the waterproofing membrane system. A suitable fineness of grinding shall be determined in the tests. The Blaine fineness shall be at least 3200 cm2 / g. The quality of the cement (strength, setting time) shall correspond with the working time required and the ultimate pressure required. Draft Specification Contact Grouting and Interface Grouting dated: 15/05/2008.	For the entire quantity delivered, the [manufacturer] shall provide the cement analysis. Cement shall be stored in a suitable bin or building to protect it against dampness and inclement weather. [SBG Engineers and Technicians On Site]	QA: review of Manufacturer's records. The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. [Quality Manager]
6.3.3	**Grout**	The components of grout mixes shall consist of water and binder in form of cement and cementitious material. Bentonite or additives like hardener or plasticizers shall be allowed subject to the approval of the Engineer. The water/binder ratio of the grout shall be as low as possible for grout injections. A target ratio of 0.5 shall be used in the standard case. In exceptional cases and subject to the approval of the Engineer, a range between 0.4 and 2.0 may be permitted. Grouts with larger water contents are not permitted. Cement grout shall achieve a characteristic strength of • 10 N/mm2 tested after 7 days • 35 N/mm2 tested after 28 days The suitable water/binder ratio in the different pressure stages shall be examined by the trials. In	Sampling, preparation, curing and testing shall be in accordance with EN 196-1 or CSA A23.2-8A. Sets of six cubes of cement grout shall be taken once every month (once every 2 weeks at start of grouting until mix/batch is proven) when grouting works are in progress. Half of the cubes shall be tested at 7 days 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. [JEGEL]	The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. [Quality Manager]

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		particular the water/binder ratio required for hardening of grout and not leaving any surplus water shall be determined. The composition of the grout mixture for interface grouting operations shall be approved by the Engineer. Draft Specification Contact Grouting and Interface Grouting dated: 15/05/2008.		
6.4 Materials 6.4.1	**Packers**	For contact grouting single packers shall be used. Interface grout shall be injected via connective fittings using a stop valve for blockage of grout. The packers/stop valves shall be able to seal the grouthole until the grout is set even after the pumping system has been disconnected. Once pressure is applied, the packers must be in tight contact with the grout hole or grouting hose wall. The length of the packers shall be selected in a way that prevents dislocations during grout injections. The anticipated cross-section for grout flow must not be reduced at any location.	All components must have a valid quality certificate and a valid permission for the intended use. The correct construction shall be checked by [Strabag Waterproofing Department] using monitoring methods in accordance with drawings, specifications and method statements	QA Inspection To be performed by [Strabag Concrete/Tunnel Technician] The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. [Quality Manager]
6.4.2	**Contact Grouting Cone**	Cone cast radially into the final lining concrete (55 mm diameter at the intrados of the final lining, 40 mm diameter at the extrados of the final lining) and used to insert contact grout between final lining and waterproofing membrane. Each concrete bay of 12.5 m length shall comprise 18 to 24 contact grouting cones distributed evenly or at other suitable pattern to be determined by testing. The form (“spy”) used to cast the contact grouting cone shall be fitted with soft rubber material at the extrados of the final lining to avoid damage of the waterproofing membrane and shaped to support “self blockage”.	All components must have a valid quality certificate and a valid permission for the intended use. The correct construction shall be checked by [Strabag Waterproofing Department] in accordance with drawings, specifications and method statements	QA Inspection To be performed by [Strabag Concrete/Tunnel Technician] The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. [Quality Manager]
6.4.3	**Grouting Hoses**	The grouting hoses for interface grouting shall be pressure tested up to 22 bar inside and outside pressure and the required wall thickness selected accordingly. The synthetic material shall be compatible to the synthetic material used for the waterproofing membrane system. Grout hoses shall be perforated with openings of min. 4 mm diameter arranged in 5 groups of two	All components must have a valid quality certificate and a valid permission for the intended use. The correct construction shall be checked by [Strabag Waterproofing Department] in accordance with drawings, specifications and method statements	QA Inspection To be performed by [Strabag Concrete/Tunnel Technician] The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. [Quality Manager]

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		holes at the location of the grouting outlet valves. The valves are arranged at 3.0 m centres along the hose. Each grouting valve is to be protected by a sleeve made of rubber or similar material against the infiltration of concreting fines. The sleeve shall adequately cover all openings in the hose comprising one "valve". Hoses are installed radially at a uniform spacing (approximately 3.6 m) along the Tunnel.		
6.4.4	**Sleeves**	Sleeves for outlet valves comprise 4 mm thick soft rubber sleeves, approximately 300mm long and covering the groups of 10 holes drilled at intervals along the pipe. These sleeves (manchettes) are generally spaced at 3.0 m centres and are fixed in position to prevent sliding.	All components must have a valid quality certificate and a valid permission for the intended use. The correct construction shall be checked by [Strabag Waterproofing Department] in accordance with drawings, specifications and method statements	QA Inspection To be performed by [Strabag Concrete/Tunnel Technician] The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. [Quality Manager
6.4.5	**Synthetic Jackets**	Grout hoses to be used for the 2nd Phase of Interface Grouting must be placed into a jacket of synthetic sheet with a thickness of 150 microns and a circumference of 600 mm to facilitate the distribution of grout into the final lining/ initial lining interface. The jackets shall be bonded to the grouting hose with tape and carefully fixed approximately spaced at 1.0 m centres and flattened out to the shotcrete surface.	All components must have a valid quality certificate and a valid permission for the intended use. The correct construction shall be completed by [Strabag Waterproofing Department] using monitoring methods in accordance with drawings, specifications and method statements	QA Inspection To be performed by [Strabag Concrete/Tunnel Technician] The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. [Quality Manager]
6.4.6	**Connective Fittings**	The ends of the grout hoses accessible from the tunnel 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 or an equivalent fitting to suit the installation of stop valves. The connective fittings shall be clearly marked (with colours) if used for different grouting phases. The sockets shall be closed with caps before interface grouting and once the interface grouting operation is finished.	All components must have a valid quality certificate and a valid permission for the intended use. The correct construction shall be checked by [Strabag Waterproofing Department] in accordance with drawings, specifications and method statements	QA Inspection To be performed by [Strabag Concrete/Tunnel Technician] The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. [Quality Manager]

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6.4.7	**Grout Blocking Rings**	A grout blocking ring consists of a piece of geotextile fleece, which is not backed with synthetic material. The geotextile fleece (approximately 0.5 m wide) shall be folded to not less than four layers like an accordion. To ensure that the grout blocking ring for interface grouting is held in place on the shotcrete surface, an elastic metal strip of 1 mm thickness shall be embedded into the geotextile fleece. Install radially between every 4th and 5th grouting pipe. Hiltibolts or similar fixing shall nail the grout-blocking ring at 1 m centres to the shotcrete surface. The backing membrane of the geotextile fleece shall be hot-welded to the grout blocking ring to prevent the flow of grout along the back of the waterproofing system. To avoid that the contact grout does escape through construction joints, elastomeric strips shall be installed in each circumferential construction joint.	All components must have a valid quality certificate and a valid permission for the intended use. The correct construction shall be checked by [Strabag Waterproofing Department] in accordance with drawings, specifications and method statements	QA Inspection To be performed by [Strabag Concrete/Tunnel Technician] The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. [Quality Manager]
6.4.8	**Relief Hole**	The any surplus water from interface grouting shall be released through a 24 mm O.D. stainless steel cylinder, which intersects the final concrete lining and is flanged to the waterproofing membrane equal to the grout hose. An inside tread shall allow closure with a stainless steel cap.	All components must have a valid quality certificate and a valid permission for the intended use. The correct construction shall be checked by [Strabag Waterproofing Department] in accordance with drawings, specifications and method statements	QA Inspection To be performed by [Strabag Concrete/Tunnel Technician] The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. [Quality Manager]
7. Concrete Works Final Lining (Requirements for the execution and commissioning of the final lining for the Diversion Tunnel at the NTFP) – *Latest Specification dated: 30/08/2007*				
7.1	**Final lining concrete**	Aggregates: • The grading curve shall be determined during suitability testing. The deviation from the selected gradation should not exceed the values listed in Specification of Final Lining Concrete	*Aggregates:* Sampling of aggregate shall be in accordance with CSA A23.2-1A. The following tests shall be carried out according to	Tests for the QA are temperature, slump, air content, Density and compressive strength. Procedures for the QA tests are the same as QC.

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification / Record

		dated: 30/08/2007, Table 1.
		• The maximum aggregate size shall be 37.5 mm.
		• The percentage of particles smaller than 0.06 mm shall not exceed:
		  • 1 % for coarse aggregate.
		  • 3% for fine aggregate. This limit shall be 5 % if the clay size material does not exceed 1% of the total fine aggregate sample.
		• Fine and coarse aggregate shall be clean. Organic impurities in fine aggregate shall be in accordance with CSA A23.1, Subsection 4.2.3.3.3.
		• Aggregate samples complying with gradation requirements shall not exceed the limits for Micro-Deval, Clay lumps, Low-density granular materials, flat and elongated particles and unconfined freeze-thaw test prescribed in CSA A23.1, Table 12.
		• The percentage of brittle particles shall be less than 5 %.
		• Frozen aggregates shall not be used. The minimum permissible temperature shall be +3 ^{o}C.
		• All aggregates shall have a specific gravity of not less than 26 KN/m^3.
		<u>Cement:</u>
		• The cement shall comply with CSA A3001 and CSA 23.1, Tables 6, 7 & 8. (**Dufferin** has proposed Type GU$_b$ – S)
		• Initial setting time not less than 1.5 hours.
		• Fineness: Not less than 340 m^2/kg, if content of pulverized fuel ash (fly ash) greater than 20 %, not less than 380 m^2/kg.
		• Bleeding: not more than 20 cm^3, if content of
			procedure and frequency indicated:
			• Sieve analysis (CSA A23.2-2A): once per 5,000 tonnes.
			• Organic impurities (CSA A23.2-7A): once per 50,000 tonnes.
			• Clay lumps (CSA A23.2-3A): once per 50,000 tonnes.
			• Low-density granular materials (CSA A23.2-4A): once per 50,000 tonnes.
			• Micro-Deval (CSA A23.2-23A and CSA A23.2-29A): 3 per year or once every 50,000 tonnes.
			• Unconfined freeze-thaw (CSA A23.2-24A): 3 per year or once every 50,000 tonnes.
			• Alkali-aggregate reactivity (CSA A23.2-14A and CSA A23.2-25A) shall be examined for each type of aggregate used in the concrete mix (once per year). Evaluation of the potential for alkali-aggregate reactivity and the selection of preventive measures shall be performed following CSA A23.2-27A. The need for data to demonstrate compliance with this requirement will be waived if the source is on the Ministry of Transportation's Regional Aggregate Sources List for Structural Concrete Fine and Coarse Aggregates.
			
			[Dufferin Concrete]
			
			Each nominal size of aggregate shall be separately stored in a free draining stockpile in a manner that will prevent contamination, intermixing and segregation. The aggregates shall be protected against dryness, wetness and freezing.
			
			For the purpose of concrete production, the individual aggregates components have to be measured by weight using automatic equipment.
				Slump, temperature and air content will be checked once for each load during the first five loads of the day, if the results are consistent with specifications these tests will be carried out every fifth load during that day until a non-conformance occurs, and revert to five consecutive loads for testing until compliance is obtained.
				
				Density will be tested once per week each mix.
				
				Compressive strength will be checked every 100 m^3, one set of cylinders will be obtained for 28 day strength testing.
				
				One set of cylinders per day during the first 30 days have to be obtained for 90 day compressive strength test in order to determine its relationship with 28 day compressive strength. This procedure will be repeated if the concrete mix designs change. Ninety day breaks will also be carried out for each 1000 m^3 unless specified strength is reached at 28 days.
				
				Water/Cement ratio will be every other block for the first 100 blocks (CSA A23.2-12C).
				
				In-situ Temperature development: test in the first 5 blocks then every 40 blocks.

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification / Record
		pulverized fuel ash greater than 20 %, not more than 15 $cm^{3.}$. • Compressive strength after one day (24 h ± 1 h) on mortar cubes shall not be less than 9 MPa. • The temperature of the cement at the time of use in the mixing plant must not be higher than 60 °C. 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. Drinking water is suitable and will not be tested. The use of recycled water is not permitted. Admixtures: Shall comply with CSA A23.1 and must not affect the concrete's hardening, strength and durability. Chlorides or material containing chlorides which promote steel corrosion may not be added to reinforced concrete or concrete which will be in contact with reinforced concrete. The prerequisite for the use of admixture is a qualification test to be performed by the Contractor. Concrete: (CSA A23.1) Abrasion resistance and limited heat of hydration • Water cement ratio ≤ 0.5. • The concrete mix shall be adjusted to meet the respective seasonal conditions. • Minimum cementing materials 300 kg/m^3. • Required release strength 3.0 MPa. • Minimum strength prior to traffic operation 12 MPa.	*Cement and cementing materials:* (CSA A3001) The following tests shall be carried out by the manufacturer every 4 months: • Compressive strength • Specific surface • Chemical analysis [St. Lawrence Cement] Cement shall be stored in a suitable bin or building to protect it against dampness and inclement weather. For the concrete production, cement has to be measured by weight, using automatic weighing equipment. Water: shall be tested to assure that 28 day strength of mortar cubes made with it are at least 90 % of that of mortar cubes made with distilled water. [Dufferin Concrete] For the concrete production, water has to be measured by weight using automatic equipment. *Admixtures:* The certificates issued by the supplier have to be checked at each batch to the site. [Supplier] For the concrete production, admixtures have to be measured by weight using automatic equipment.	The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. [JEGEL]

<table>
<tr><th>Item No.</th><th>Activity</th><th>Quality Requirement</th><th>Quality Control</th><th>QA / Verification / Record</th></tr>
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Required compressive strength 35 MPa after 28 days.
Required compressive strength 38 MPa after 90 days.
Slump after mixing and 1.5 hours later ≥ 160 mm.
Air content: 3% - 6%
Concrete components shall be measured with an accuracy of 3 %.
Chloride Diffusion Factor (Effective Chloride Transport Coefficient) acc. to NTBUILD 443 not greater than 1.5 E-7 cm^2/s (or equivalent ASTM C1202 with appropriate limits for instance).
The target temperature of the fresh concrete shall be in accordance with CSA A23.1, Table 14 (10 – 30 ^oC).
Temperature during hardening shall be between 30 ^oC and 45 ^oC.
The concrete must be cured during the first four days.
Thickness: 600 mm (or as shown on drawings).

Standards: CSA 23.1, CSA 23.2, CSA 23.3, CSA A3001, ACI 506.2-95, ACI 506R-90 (R95), DIN EN 196, DIN EN 197-1, DIN EN 206, DIN 1045-1, DIN 1045-2, DIN 1045-3, DIN EN 12620, DIN EN 12350, DIN EN 12390.

Drawings: NAW-130-DOV-29230-(0017, 0024 to 0028)

Specification of Final Lining Concrete dated: 30/08/2007.
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<u>Concrete</u>: (sampling accordance with CSA A23.2-1C).

<u>Fresh concrete</u> tests have to be carried out according to the following criteria:
<table>
<tr><th>Test</th><th>Procedure</th><th>Frequency</th></tr>
<tr><td>Slump</td><td>CSA A23.2-5C</td><td>Random</td></tr>
<tr><td>Air Content</td><td>CSA A23.2-4C</td><td>2 per day</td></tr>
<tr><td>Density</td><td>CSA A23.2-6C</td><td>2 per day</td></tr>
</table>
<u>Hardened concrete</u> shall be tested according to these criteria:
<table>
<tr><th>Test</th><th>Frequency</th><th>Procedure</th><th>Age</th></tr>
<tr><td>Compressive strength (7)</td><td>One set of cylinders every 100 m^3</td><td>CSA A23.2-9C</td><td>After 7 days (compressive strength)</td></tr>
<tr><td>Compressive strength (90)</td><td>One set of cylinders every 100 m^3</td><td>CSA A23.2-9C</td><td>After 90 days (compressive strength)</td></tr>
<tr><td>Air Void System</td><td>Once per year</td><td>ASTM C 457</td><td>After 7 days</td></tr>
</table>
Check 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.

[Dufferin Concrete will be responsible for the QC of concrete. SBG Tunnel Construction Manager will be
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Item No.	Activity	Quality Requirement	Quality Control	QA / Verification / Record
			responsible for the QC of the work execution]	
7.2	**Formwork**	A formwork with smooth surface shall be used. The shutter length (formwork construction length) should be 12 m to 12.5 m approximately. The forms shall have a minimum thickness of 20 mm and shall be of uniform width. Formwork and formwork joints have to be completely tight to prevent the leakage. The formwork should be fixed on a shutter that is designed to the requirements of the concreting procedure. Standards: Drawings: NAW-130-DOV-29230-(0017, 0024 to 0028) Specification of Final Lining Concrete dated: 30/08/2007.	The correct construction in accordance with drawings, specifications and method statements shall be checked by visual inspection. [SBG Tunnel Technician]	The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. [SBG Tunnel Construction Manager and Engineering Manager]
7.3	**Joints**	All joints shall be butt joints. The offset within the joints in the curves shall not exceed 77 mm. Standards: ACI 224.3R – 95, Drawings: NAW-130-DOV-29230-(0017, 0024 to 0028) Specification of Final Lining Concrete dated: 30/08/2007.	The correct construction in accordance with drawings, specifications and method statements shall be checked by SBG Engineers and Technicians On Site. [Manufacturer is responsible for the QC of materials and SBG Engineers and Technicians On Site are responsible for the QC of execution of this activity]	The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. [SBG Tunnel Construction Manager and Engineering Manager]
7.4	**Curing**	Until the concrete is sufficiently hardened, it is to be protected against detrimental influences, such as: excessive warming, drying out due to sun or wind, running water, chemical attack, etc. Standards: CSA 23.1, CSA 23.2, CSA 23.3, DIN EN 196, DIN EN 197-1, DIN EN 206, DIN 1045-1, DIN 1045-2, DIN 1045-3, DIN EN 12620, DIN EN 12350, DIN EN 12390. Drawings: NAW-130-DOV-29230-(0017, 0024 to 0028)	The correct execution of this activity shall be checked by visual inspection. [SBG Tunnel Technicians]	The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. [SBG Tunnel Construction Manager, Engineering Manager and Tunnel Design Engineer]

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification / Record
		Specification of Final Lining Concrete dated: 30/08/2007.		
8. Concrete Works Intake and Outlet Structures (concrete works for the Intake Structure, Outlet Structure and Outlet Canal at the NTFP) – *Latest Specification dated: 16/11/2007*				

8.	**Concrete Works Intake and Outlet Structures**	Aggregates:
		• The grading curve shall be determined during suitability testing. The deviation of the given specified gradation should not exceed the values listed in Specification of Concrete for Structures dated: 16/11/2007, Table 1.
		• The maximum aggregate size shall be ≤40 mm.
		• The percentage of particles smaller than 0.06 mm shall not exceed (CSA A23.1, Table 12):
		  • 1 % for coarse aggregate.
		  • 3% for fine aggregate. This limit shall be 5 % if the clay size material does not exceed 1% of the total fine aggregate sample.
		• Fine and coarse aggregate shall be clean. Organic impurities in fine aggregate shall be in accordance with CSA A23.1, Subsection 4.2.3.3.3.
		• Aggregate samples complying gradation requirements shall not exceed the limits for Micro-Deval, Clay lumps, Low-density granular materials, flat and elongated particles and unconfined freeze-thaw test prescribed in CSA A23.1, Table 12.
		• The percentage of brittle particles shall be less than 5 %.
		• Frozen aggregates shall not be used. The minimum permissible temperature shall be +3°C.
		• All aggregates shall have a specific gravity of not less than 26 KN/m^3.
			Aggregates:
			Sampling of aggregate shall be in accordance with CSA A23.2-1A.
			The following tests have to be carried out according to procedure and frequency indicated:
			• Sieve analysis (CSA A23.2-2A): once per 5,000 tonnes.
			• Organic impurities (CSA A23.2-7A): once per 50,000 tonnes.
			• Clay lumps (CSA A23.2-3A): once per 50,000 tonnes.
			• Low-density granular materials (CSA A23.2-4A): once per 50,000 tonnes.
			• Unconfined freeze-thaw (CSA A23.2-24A): 3 per year or once every 50,000 tonnes.
			• Micro-Deval (CSA A23.2-23A and CSA A23.2-29A): 3 per year or once every 50,000 tonnes.
			• Alkali-aggregate reactivity (CSA A23.2-14A and CSA A23.2-25A) shall be examined for each type of aggregate used in the concrete mix (once per year). Evaluation of the potential for alkali-aggregate reactivity and the selection of preventive measures shall be performed following CSA A23.2-27A. The need for data to demonstrate compliance with this requirement will be waived if the source is on the Ministry of Transportation's Regional Aggregate Sources List for Structural Concrete Fine and Coarse Aggregates.
			[Dufferin Concrete]
			Each nominal size of aggregate shall be separately stored in a freely draining stockpile in a manner that will prevent
				Tests for the QA are temperature, slump, air content and compressive strength. Test procedures for the QA tests are the same as those for QC.
				Slump, temperature and air content will be checked by [JEGEL Lab. Technician] once for each of the first five loads. If conformance is obtained, then every 5th load will be tested. If a nonconformance occurs, then testing will revert to every load until five consecutive loads again show conformity.
				Compressive strength will be checked every 100 m^3, one set of cylinders will be obtained for 90 day strength test.
				One set of cylinders per day during the first 30 days shall be obtained for 90 day compressive strength test in order to determine its relationship with 28 day compressive strength. This procedure will be repeated if the concrete mix design changes. 28-day breaks will also be carried out for each 1000 m^3.
				The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report.

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification / Record
		Cement and cementing materials: • Minimum cement volume 270 kg/m^3. (**Dufferin** has proposed Type GU$_b$ – S) • Recommended minimum cementing material (slag) 50 kg/m^3 or recommended 'blended cement volume of 320 kg/m^3. • Initial setting time not less than 3 hours. • Fineness: Not less than 340 m^2/kg, if content of pulverized fuel ash greater than 20 %, not less than 380 m^2/kg. • Bleeding: not more than 20 cm^3, if content of pulverized fuel ash greater than 20 %, not less than 15 cm^3. • Compressive strength after one day (24 h ± 1 h) on mortar cubes not less than 9 MPa. • The temperature of the cement at the time of use in the mixing plant must not be higher than 60 °C. 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. Drinking water is suitable and may not be tested. The use of recycled water is not permitted. Admixtures: must not affect the concrete's hardening, strength and durability or cause corrosion to the reinforcement. Concrete Outlet Structure: (CSA 23.1) • Exposure Class **C-1** according to CSA A23.1, Tables 1 and 2. • Water cement ratio Max. = **0.45**. • Slump after mixing and 1.5 hours later ≥ 160 mm. • Air content: **3% - 6% (to be confirmed, dependent on aggregate size)**	contamination, intermixing and segregation. For the purpose of concrete production, the individual aggregates components shall be measured by weight using automatic equipment. *Cement and cementing materials:* (CSA A3001) The following tests have to be carried out by the manufacturer every 4 months: • Compressive strength • Specific surface • Chemical analysis [Supplier] Cement shall be stored in a suitable bin or building to protect it against dampness and inclement weather. For the concrete production, cement shall be measured by weight, using automatic equipment. Water: If not potable, water shall be tested to assure that 28 day strength of mortar cubes made with it are at least 90 % of that of mortar cubes made with distilled water. [Dufferin Concrete] For the concrete production, water has to be measured by weight using automatic equipment. *Admixtures:* The certificates issued by the supplier have to be checked at each batch to the site. [Supplier]	[JEGEL]

<table>
<tr><th>Item No.</th><th>Activity</th><th>Quality Requirement</th><th>Quality Control</th><th>QA / Verification / Record</th></tr>
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• Minimum cement volume: 270 kg/m^3.
• Recommended cementing material (slag) volume 50 kg/m^3 (minimum) or
• Recommended “blended cement” volume 320 kg/m^3
• Required compressive strength 35 MPa after 90 days.
• Chloride Diffusion Factor (Effective Chloride Transport Coefficient) acc. to NTBUILD 443 not greater than 1.5 E-7 cm^2/s (or equivalent ASTM C 1202 RCPT for instance).
• Concrete composition shall meet the requirements for resistance against chlorides as well as thawing and freezing.

Concrete Intake Structure: (CSA 23.1)
• Exposure Class C-1 according to CSA A23.1, Tables 1 and 2.
• Exposure Class S-1 according to CSA A23.1, Tables 2 and 3.
• Water cement ratio Max. = 0.45.
• Slump after mixing and 1.5 hours later ≥ 160 mm.
• Air content: 3% - 6% (to be confirmed, dependent on aggregate size)
• Minimum cement volume: 270 kg/m^3.
• Recommended cementing material (slag) volume 50 kg/m^3 (minimum) or
• Recommended “blended cement” volume 320 kg/m^3
• Required compressive strength 35 MPa after 90 days.
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For the concrete production, admixtures have to be measured by weight using automatic equipment.

Concrete: (sampling to CSA A23.2-1C).
Fresh concrete tests have to be carried out according to these criteria:
<table>
<tr><th>Test</th><th>Procedure</th><th>Frequency</th></tr>
<tr><td>Slump</td><td>CSA A23.2-5C</td><td>2 per day</td></tr>
<tr><td>Air Content</td><td>CSA A23.2-4C</td><td>2 per day</td></tr>
<tr><td>Bulk Density</td><td>CSA A23.2-6C</td><td>2 per day</td></tr>
</table>
Hardened concrete have to be tested according to these criteria:
<table>
<tr><th>Test</th><th>Frequency</th><th>Procedure</th><th>Age</th></tr>
<tr><td>Compressive strength (7)</td><td>One set of cylinders every 100 m^3</td><td>CSA A23.2-9C</td><td>After 7 days (compressive strength)</td></tr>
<tr><td>Compressive strength (28)</td><td>One set of cylinders every 100 m^3</td><td>CSA A23.2-9C</td><td>After 28 days (compressive strength)</td></tr>
<tr><td>Air Void System</td><td>Once per year</td><td>ASTM C 457</td><td>After 7 days</td></tr>
</table>
[Dufferin Concrete will be responsible for the plant QC of concrete (air content, slump, cylinders). SBG Tunnel Construction Manager will be responsible for the QC of the work execution]
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</table>

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification / Record
		• Chloride Diffusion Factor (Effective Chloride Transport Coefficient) acc. to NTBUILD 443 not greater than 1.5 E-7 cm^2/s **(or equivalent ASTM C1202 for instance with correlation to determine appropriate limits).** • Concrete composition shall meet the requirements for resistance against chlorides, freezing and thawing as well as resistance against severe sulphate attack. <u>Concrete Subbase</u>: • Maximum aggregate size: 40 mm • Required compressive strength: 15 MPa @ 28 days. • Thickness: 100 mm on average. <u>Permanent Concrete Slab</u>: • Exposure Class C-1 according to CSA A23.1, Tables 1 and 2. • Maximum water cement ratio = 0.45. • Maximum aggregate size: 40 mm • Minimum cement volume: 270 kg/m3. • Recommended cementing material (slag) volume 50 kg/m^3 (minimum) or • Recommended "blended cement" volume 320 kg/m^3 • Required compressive strength: 35 MPa @ 28 days. • Thickness: 50 mm to 300 mm. <u>Temporary Concrete Slab</u>: • Exposure Class C-1 according to CSA A23.1, Tables 1 and 2. • Maximum aggregate size: 40 mm		

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification / Record
		• Minimum cement volume: 270 kg/m3. • Recommended cementing material (slag) content 50 kg/m^3 (minimum) or • Recommended "blended cement" content 320 kg/m^3 • Required compressive strength: 35 MPa @ 28 days. • Thickness: Up to 600 mm. Reinforcement: according to Section 2 of this document. Underground injections and Interface grouting according to Sections 6 and 7 of this document respectively. Compressible material layer: polystyrol material with an original thickness of 10 cm. Standards: CSA 23.1, CSA 23.2, CSA 23.3, CSA A3001, DIN EN 196, DIN EN 197-1, DIN EN 206, DIN 1045-1, DIN 1045-2, DIN 1045-3, DIN EN 12620, DIN EN 12350, DIN EN 12390. Drawings: NAW-130-DOV-29700-(0005 and 0006), NAW-130-DOV-29300-0018 Specification of Concrete Structures dated: 16/11/2007		
9. Waterproofing System (Dual and Single Layer Waterproofing Systems will be installed in the Diversion Tunnel at the NTFP) – *Latest Specification dated: 09/08/2007*				
9.1 **Membrane Backed Geotextile**	**Geotextile Fleece**	• Geotextile Fleece Material: PP (Polypropylene) • Area weight: 600 g/m^2 (± 5%) for the Invert • Area weight: 500 g/m^2 for the Arch • Thickness under a pressure of 200 kPa ≥ 1.7	Suitability Testing to be completed at least 21 days prior to trial waterproofing installations [Sika] Geotextile Fleece with Backing Membrane: Testing During Plant Production: to be performed by the Manufacturer and documented at these specified intervals:	QA Inspection by [Strabag Site Technician]

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification / Record
9.1.1		mm • Tensile breaking force longitudinal > 32 KN/m / Elongation at break (tension) > 90 % • Tensile breaking force transversal > 17 KN/m Elongation at break (tension) ≥ 90 % • Perforation force > 3 KN and < 20 KN • Fire Resistance: Nonflammable Ensure that polyethylene backing faces the shotcrete Minimum overlapping of fleece strips is 100 mm. Standards: EN 964, EN 965, EN ISO 10319, EN 12236. Drawings: NAW-130-DOV-29230-(0017, 0024 to 0028) Specification of Waterproofing System Doc. No. RNAW130-83000-0009-02 dated 09/08/2007 Method Statement – Single layer Waterproofing System	• Material: 1 x each shift • Product identification: 1 x each shift • Product appearance: 1 x each shift • Area weight: 1 x each shift • Thickness under pressure: 2 x each shift • Tensile breaking force: 2 x per week • Elongation at break (tension): 2 x per week • Perforation force: 2 x per week On Site Checks: The products sheets containing test results for the items mentioned above shall be checked on site for each delivery. - Material - Product identification - Product appearance - Area weight - Thickness under pressure	The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report.

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification / Record
9.1.2	**Backing Membrane**	• Backing membrane: PE (Polyethylene) • Product appearance: No blisters, cracks, nests or holes. • Thickness Minimum 0.15 mm • Elongation at break ≥ 90 % • Fire resistance: Non flammable Drawings: NAW-130-DOV-29230-(0017, 0024 to 0028) Specification of Waterproofing System Dated 09/08/2007 Method Statement – Single layer Waterproofing System	Only fleece materials, which meet the specified requirements, may be installed in the tunnel. The shotcrete surface must be checked by [Strabag Waterproofing Department] before placing the geotextile fleece. [Testing During Production: Manufacturer (Sika)] [QC Inspection Strabag Waterproofing Department]	
9.2	**Waterproofing Membrane**	• Material Polyolefines (FPO or TPO) or equivalent PE product • Product identification Manufacturer, thickness, type, production date • Product appearance No blisters, cracks, or nests, full areal bond between signal layer and membrane • Single membrane thickness 3.0 mm, - 5 %, +10% • Dual membrane thickness (without nobs) 2.0 mm + 1.5 mm, - 5 %, +10% • Elongation at break (tear) Test Method: SIA 280 > 200 % • Cold bending performance Test Method: SIA 280 No cracks at -10℃ • Elongation at heat Test Method: SIA 280 < 2 % • Slot-Pressure Test Test Method: SIA 280 No leak after 1 hour at 0.5 N/mm2	Testing During Production: [Manufacturer (Sika)] • Material: 1 x each shift • Product identification: 1 x each shift • Product appearance: 1 x each shift • Membrane thickness: 1 x each shift • Breaking strength (tear): 1 x per week • Elongation at break (tear): 1 x per week QC: On Site Checks by [Strabag Waterproofing Department]: The products sheets containing test results for the items mentioned above shall be checked on site for each delivery. - Material - Product identification - Product appearance	The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report.

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification / Record
		• Thermal aging Test Method: SIA 280 Reduction in mass: < 2% Reduction in elongation at break: < 30% • Storage in warm water for 8 months Test Method: SIA 280 Cold bending performance: No cracks at-10℃ Reduction in mass: < 2% Reduction in elongation at break: < 30% • Perforation Test Method: SIA 280:No perforation for test tool weight falling from 750 mm • Test for prefabricated seams Test Method: DIN 16 726: Break next to weld, no pealing off or sliding • Durability at compressive pressure Test Method: SIA 280 7 N/mm2 • Storage in salt water (10 % NaCl) at 23° C for 28 days Test Method: DIN 16 726, 5.18 Reduction in tear strength < 20 % Reduction in tear elongation < 20 % • Storage in sulfuric acid (5%) at 23°C for 28 days Test Method: DIN 16 726, 5.18 Reduction in tear strength < 20 % Reduction in tear elongation < 20 % • Storage in caulk water (saturated with Ca (OH) 2) at 23°C for 28 days Test Method: DIN 16 726, 5.18 Reduction in tear strength < 20 % Reduction in tear elongation < 20 %	- Membrane thickness Only PVC membranes, which meet the specified requirements, may be installed in the tunnel. After installation of the waterproofing membrane, the surface shall be visually inspected and documented by [Strabag Waterproofing Department] to detect damage before concrete is placed. Single layer membrane systems shall be visually inspected and documented by [Strabag Waterproofing Department] to detect damage before concrete is placed. Ensure that: The double seams of the waterproofing membrane produced on site are to be tested with compressed air of 2.0 to 2.5 Bar. 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 and repair seams shall be tested with a screwdriver or a vacuum bell jar applying a “low” pressure of 0.2 Bar over 10 minutes. Test equipment must be calibrated for the trial and at intervals not to exceed one year. [QC Inspection and On-site Testing Strabag Waterproofing Department]	

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification / Record
		• Fire resistance Test Method: DIN 4102-1: B2 • Chloride ion diffusion Test Method: EN 1931 • Chloride Diffusion Factor D < 1.0 10-14 m2/s Dual layer membrane systems shall be tested by connection to a vacuum system. The exact testing procedure is to be proposed by the membrane installer in a Method Statement. No detrimental effects to the performance of the waterproofing membrane system shall be allowed as a result of the proposed testing arrangement. Each “pillow” shall be tested before concreting of the final lining. Initially 0.7 Bar of vacuum pressure (=suction at low 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 concreting is carried out with additional layers of membrane welded on to the damaged areas, if damage can be located from the inside of the tunnel. If the damage cannot be located, or the damage is inaccessible, a new pillow will be installed while leaving the damaged pillow in place. The repaired pillows have to be vacuum tested once repair work is completed. All devices for vacuum testing left on the membrane, have to be placed in such a way that no damage does occur to the waterproofing system during concreting and subsequent grouting operations.		

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification / Record
		Drawings: NAW-130-DOV-29230- (0017, 0024 to 0028) Specification of Waterproofing System Dated 09/08/2007 Method Statement – Single layer Waterproofing System		
9.3	**Joint Tapes**	Ultimate tensile strength at +23 °C (acc. to EN ISO 527): > 10 MPa. 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. Standards: EN ISO 527. Drawings: NAW-130-DOV-29230-(0017, 0024 to 0028) Appendix PR-00-5011 Specification of Waterproofing System Dated 09/08/2007	Manufacturer's tests certificates shall be provided. [Manufacturer (Sika)]	QA Inspection by [Strabag Site Technician] The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report.
9.4	**Water stops**	The waterstops for the waterproofing of movement joints shall be manufactured from non-reclaimed, durable, weldable plasticized material. Waterstops, which have to be connected to the waterproofing membrane, have to be of the same material as the membrane itself (FPO/TPO). All waterstops materials shall contain softening agents with a polymer molecular structure. The minimum material requirements shall be as follows: • ultimate tensile strength at + 23℃ (acc. to EN ISO 527) > 10 N/mm²	The Contractor shall furnish copies of the manufacturer's test certificates for the water stops to be supplied [Strabag]. The correct construction in accordance with drawings, specifications and method statements shall be checked by [SBG Engineers and Technicians] On Site.	QA Inspection by [Strabag Site Technician] The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report.

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification / Record
		• elongation at break: at + 23℃ (acc. to EN ISO 527) > 350 % at - 20℃ (acc. to EN ISO 527) > 200 % • minimum thickness at movement joints: 4 mm • minimum thickness at construction joints: 3.5 mm Specification of Waterproofing System Dated 09/08/2007		
10. Drainage Measures (For water seeping into the tunnel through the initial lining or the tunnel surface, and water from the surrounding rock mass, in the Diversion Tunnel at the NTFP)				
10.	**Drainage Measures**	Drainage measures components are: Drainage mats, drainage pipes, invert drainage, pump sumps, collection tank, settling tank, underground grouting. Appendix PR-00-5011	All components must have a valid quality certificate and a valid permission for the intended use. The quality of the measures taken shall be controlled by continuous visual inspection. [SBG Engineers and Technicians On Site]	The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. [SBG Tunnel Construction Manager and Engineering Manager]
11. Tunnel Excavation and Support (commissioning of the tunnel excavation and support works in the Diversion Tunnel at the NTFP)				
11.1	**Explosives**	Explosives and detonators shall be licensed, stored in separate vessels (maximum during two days). Shall only be handled and used by the Contractor's duly authorized personnel. Drawings: NAW-130-DOV-29700-(0003, 0004, 0009 to 0011). Appendix PR-00-5013	All statutory requirements for the storage and use of explosives have to be considered. The Contractor shall provide notice of the use and storage of explosives to all security services and responsible authorities for approval. [SBG Engineers and Technicians On Site]	The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. [SBG Tunnel Construction Manager, Engineering Manager and Tunnel Design Engineer]
11.2	**Support Elements**	• Steel Ribs: acc. to Section 1 of this document. • Wire Mesh: acc. to Section 2 of this document. • Rock Dowels: acc. to Section 3 of this	• Steel Ribs: acc. to Section 1 of this document. • Reinforcement: acc. to Section 2 of this document. • Rock Dowels: acc. to Section 3 of this document.	The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report.

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification / Record
		document. • Shotcrete: acc. to Section 4 of this document. Appendices PR-00-(5001 to 5004)	• Shotcrete: acc. to Section 4 of this document. [SBG Tunnel Technician] [SBG Geotechnical Engineer] will record on a permanent basis the Rock Support Type and supporting documentation.	[SBG Tunnel Construction Manager, Engineering Manager and Tunnel Design Engineer]
11.3	**TBM**	The specifications for the TBM are contained in DB Volume 2, Appendix 1.1(t). Other specific requirements about operation of the TBM are in Volume 2, Appendix PR-00-5013, Subsection 3.2. Guidelines: CEN TC 151 WG4 N8 Guidelines: CEN TC 151 WG4 N7 Guidelines: CEN TC 151 WG4 N22 Drawings: NAW 130-DOV-29700-(0012 and 0014) DB: Appendix PR-00-5013. – Volume 2, Appendix 1.1(t). SBG Docs Nos: R-NAW130-20102-(0001 to 0013) and R-NAW130-88200-0010.	The TBM shall meet all the requirements solicited in DB and in drawings. The tunnel alignment and grade constraints, the tunnel line and level report and all other geometric parameters as well as pertinent Drawings addressed in the Doc. No. R-NAW130-20102-0004-01.doc, dated January 24, 2006 shall be satisfied and verified by [SBG Surveyor]. Tunnel roundness and diameter will be checked by [SBG Surveyor] every 6 m of tunnel. [TBM Manufacturer (Equipment) and SBG Tunnel Construction Manager and Engineering Manager (Operation)]	The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. [SBG Tunnel Construction Manager, Engineering Manager and Tunnel Design Engineer]
12. Dewatering System Excavation and Support (Draft) (commissioning and execution of excavation and support works for the Dewatering System in the Diversion Tunnel at the NTFP)				
12.1	**Steel**	Steel shall be a high quality steel according to CSA 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	Mill Certificates of the steel pipes shall be provided by the [Manufacturer] for each delivery. Coating QC documentation shall be provided by The [Manufacturer].	For all works, a diary shall be kept on a day-to-day basis, describing activities, progress, notes, etc. The Quality Manager shall be responsible to keep records of this activity and include

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification / Record
		segment. Specification of Dewatering System Shafts. Method Statement for Dewatering Shafts.	The correct construction in accordance with drawings, specifications and method statements shall be checked by visual inspection. (Inspections shall be recorded in Form No. 11). [SBG Engineers and Technicians On Site]	in the Weekly Construction Activity Report. [SBG Tunnel Construction Manager, Engineering Manager and Tunnel Design Engineer]
12.2	**Coating**	The installed steel pipes shall be coated with epoxy to ensure corrosion protection. Onsite coating shall be done in accordance with the coating manufacturer's specifications dated Sep. 2007 and Method Statement Specification of Dewatering System Shafts. Method Statement for Dewatering Shafts.	A test certificate of the applied coating shall be provided by the [Manufacturer] for each delivery. Visual inspection shall be done after delivery and during construction for quality control purposes. Coating thickness using the wet film gauge method and Holiday testing shall be performed. Inspections shall be recorded in Form No. 11. " Inspection of Dewatering Shaft Pipe Joints" [Lone Star] [SBG Engineers and Technicians On Site]	The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. [SBG Tunnel Construction Manager, Engineering Manager and Tunnel Design Engineer]
12.3	**On Site Welds**	Weld inspection of the shaft pipes shall be done in accordance with Strabag General Welding Inspection Specification of Dewatering System Shafts. Method Statement for Dewatering Shafts. Strabag General Welding Inspection	Onsite welds shall be inspected in accordance with Strabag General welding inspection by a certifies welder and recorded on Form 11 " Inspection of Dewatering Shaft Pipe Joints" [Lone Star]	The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. [SBG Tunnel Construction Manager, Engineering Manager and Tunnel Design Engineer]
12.3	**Annular Grouting Material**	Shall consist of sand, cement and water, using approximately two parts of sand, one part of cement and one part of water. The compressive strength of grout shall be at least 35 MPa after 28 days.	Sets of six cubes of cement grout shall be taken once per day when grouting is in progress. [JEGEL] Sampling, preparation, curing and testing shall be in	The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report.

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification / Record
			accordance with CSA A23.2-1B. Half of the cubes shall be tested at 7 days and the remainder at 28 days.	[SBG Tunnel Construction Manager]
		Specification of Dewatering System Shafts. Method Statement for Dewatering Shafts.	Annular grouting shall be also 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. [SBG Engineers and Technicians On Site]	
12.4	**Concrete**	The concrete slab at the top of the shafts shall be made with a Class C-2 quality concrete according to Standard CSA A23.1. The concrete for the pump sump in tunnel shall be of the same quality and specification as the concrete for final lining (Section 8 of this document). Specification of Dewatering System Shafts dated 04/09/2007 Method Statement for Dewatering Shafts.	The same as Section 8 (Concrete Works, Final Lining) of this document. [SBG Engineers and Technicians On Site]	The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. [SBG Tunnel Construction Manager, Engineering Manager and Tunnel Design Engineer]
13. Intake Channel Excavation (Excavation of the Intake Channel at the NTFP)				
13	**Intake Channel Excavation**	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. Drawings: NAW 130-DOV-29700-0003, 0004, (0009 to 0011). NAW 130-DOV-20102-0015.	The Engineering/Construction Manager has overall responsibility for all aspects of this work. [Strabag surveyors] will spot-check the layout of the excavation on a random basis during the work to ensure conformance with the design. Survey of the completed work shall be carried out to certify	Inspection reports, certificates and material test reports shall be kept on file for all material requiring such information. Blasting reports shall be prepared and kept on file. The Quality Manager shall be responsible

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification / Record
			that the excavation has been executed to the design depth and dimensions. [SBG Engineers and Technicians On Site]	to keep records of this activity and include in the Weekly Construction Activity Report. [SBG Intake Construction Manager, Engineering Manager and Design Engineer]
14. Approach Wall and Accelerating Wall (Construction of the Approach Wall, Dock, and Accelerating Wall at the Intake for the NTFP)				
14.1	**Precast Elements**	General Notes in Drawings: NAW 130-DOV-20102-0014 and NAW 130-DOV-20102-0015 shall be examined. Compressive concrete strength: 50 MPa. Minimum compressive strength of unit prior to lifting shall be 37.5 MPa (according to drawing note NAW 130-DOV-20102-0014). Specifications contained in the manufacturer's design sheets: • Con Cast 1: Mix design: F5500 GUb 8SF 25S (Wet Cast Mix) • Con Cast 2: Mix design: F5500 HEb 8SF 25S (Wet Cast Mix) The tolerances shown in the following table shall be maintained: Approach/ Accelerating: Squareness: OD Tolerance: Wall Thickness 4500 mm x 4250 mm: ± 13 mm (1/2"): + 13 mm (1/2"): + 13 mm (1/2") 4000 mm x 6000 mm: ± 13 mm (1/2"): + 13 mm (1/2"): + 13 mm (1/2")	The manufacturer shall ensure that all dimensions are within the permissible range of tolerance according to drawings and specifications. The manufacturer shall execute its proposed QC to guarantee that precast box units comply with all requirements regarding dimensions, strength, and strength development. Manufacturer's QC Plan: • Contract review. • Receiving inspection and testing. • Process control: Quality of steel moulds and forms shall be verified. A test fit shall be carried out to demonstrate proper alignment and fit. All materials and methods of manufacture shall conform to CSA A23.1 and CSA A23.4. Reinforcing steel bars shall conform to CAN/CSA G30.18-M92 *Billet Steel Bars for Concrete Reinforcement Grade 400 weldable*. All welding is to conform to CAN/CSA W186M 1990 *Welding of Reinforcing Bars in Reinforced Concrete Construction.* • In-process inspection and testing: Pre-pour inspection, concrete batching, concrete placement, initial curing, formwork removal, post pour inspection and secondary curing. • Loading inspection.	The [Quality Manager] shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. [SBG Site Technicians] will check quality of each pre cast block element. [SBG Engineering/Construction Manager Intake] shall review the QC Report and all inspection and testing information submitted from the manufacturer.

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification / Record
		<table><tr><td>4000 mm x 6000 mm</td><td>± 13 mm (1/2")</td><td>+ 13 mm (1/2")</td><td>+ 13 mm (1/2")</td></tr></table> Standards: CSA A23.1, CSA A23.4/A251, CAN/CSA W186M 1990, CAN/CSA G30.18-M92. Drawings: Con Cast Pipe's Drawings, NAW 130-DOV-20102-(0014 to 0018), NAW 130-DOV-29300-(0005 to 0018), NAW 130-DOV-29300-(0031 to 0040)	• Handling, storage, packaging, preservation and delivery. • Receiving inspection and • Records. The manufacturer shall submit inspection and testing information to the Quality Manager on a regular basis. [Con Cast Pipe]	
14.2	**Work Execution**	General Notes in Drawings: NAW 130-DOV-20102-0014 and NAW 130-DOV-20102-0015 shall be examined. The location of the units shall conform to the specified design tolerances listed below: <table><tr><th>Design Specification</th><th>Tolerance</th></tr><tr><td>Variation in Top Elevation of Unit</td><td>± 6 mm</td></tr><tr><td>Gap Between Units</td><td>25 mm</td></tr><tr><td>Centerline Alignment of Wall</td><td>± 150 mm</td></tr><tr><td>Alignment of Units</td><td>± ¼°</td></tr></table> Requirements for Tremie Base Concrete (Mix Design): • Compressive strength: 25 MPa @ 28 days • Slump: 150 ± 30 mm • Air content: 3 % - 6 % • Nominal Maximum aggregate size: 19 mm	[McNally Construction] shall verify layout and installation of the units, as well as the final elevation of the tremie concrete inside the blocks after it is placed. [McNally Construction] will provide survey information to Strabag for review. [Monteith & Sutherland] will perform independent audits to verify the location and elevation of each base unit once it is in its final position, prior to placing final tremie. [SBG Site Technician] will perform the QA inspections of the work completed as detailed below: • Be present on site full time during the operations. • Familiarize himself with the construction requirements. • Monitor the survey by McNally, as well as audits by Strabag. • Check quality of precast elements after delivery (Form No. 1).	Slump, temperature and air content will be checked by [JEGEL Lab. Technician] once for each of the first two loads. If compliance is not obtained, additional loads will be tested for every 100 m^3. Compressive strength will be checked by [JEGEL Lab. Technician] every 100 m^3 or once a day, one cylinder will be obtained for 3 day and 7 day strength tests and two cylinders for 28-day strength test. The compaction testing of the granular "B" will be carried out by [JEGEL Lab Technician] in accordance with ASTM D 2922. [SBG Engineering Assistant] will plot the surveyed location of each unit in plan view and determine whether the location of the unit conforms to the specified design tolerances. [SBG Site Technician] will maintain

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification / Record
		Granular "B" layer: • Target Proctor Density: • Specified Minimum Compaction: 88 % • Optimum Moisture Content Standards: CSA A23.1, CSA A23.4/A251, CAN/CSA W186M 1990, CAN/CSA G30.18-M92. Drawings: Con Cast Pipe's Drawings, NAW 130-DOV-20102-(0014 to 0018), NAW 130-DOV-29300-(0005 to 0018), NAW 130-DOV-29300-(0031 to 0040)	• Monitor the placement of the precast elements (Form No. 2). • Monitor the placement of the tremie concrete (Form No. 3). • Monitor the placement of the rock in-fill and visually verify that gradation of the material is in compliance with Note 9.2 on Drawing NAW 130-DOV-20102-0014. • Monitor the placement of the rock in-fill behind the approach wall and visually verify that gradation of the material is in compliance with Note 10.6 on Drawing NAW 130-DOV-20102-0015. • Monitor the placement of the geotextile to verify it is placed as per design drawings and meets material specification. • Monitor the placement of the Granular B (see NAW 130-DOV-29300-0014) and ensure that material and compaction is tested.	records on a daily basis of the operation. The records will include the following information: • Labour and equipment used. • Location of each block placed. • Length of each block placed. • Amount of concrete placed in each block. • Disposal of material. All records shall be available to any outside inspection agency appointed by the owner and submitted to the owner. [The Quality Manager] will verify that: • The layout and final configuration of the wall is checked at random by Strabag. • The compaction is checked by qualified technicians. • Tracking sheets are used to monitor the quality and placement of the blocks, as well as the placement of tremie concrete and any required cast-in-place concrete (attached to this plan). • The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report.
14.3	**Concrete Cap**	Concrete requirements (Mix Design dated Oct. 29, 2006): • 30 MPa @ 28 days	*Concrete:* (sampling to CSA A23.2-1C). Fresh concrete tests have to be carried out according to these criteria:	Slump, temperature and air content will be checked by [JEGEL Lab. Technician] once for each of the first five loads. If conformance is obtained, then every 5th load will be tested. If a nonconformance

<table>
<tr><th>Item No.</th><th>Activity</th><th>Quality Requirement</th><th>Quality Control</th><th>QA / Verification / Record</th></tr>
<tr>
<td></td>
<td></td>
<td>

Slump 150 ± 30 mm
Nominal Maximum aggregate size: 20 mm
Air content: 5 – 8 %

Thickness:

Slab is 400 mm thick in general.
At the walls, thickness is 150 mm over the cross walls with the keys, elsewhere the minimum thickness is 250 mm.

Standards: Standards: CSA A23.1
Drawings: NAW 130-DOV-29300-(0009)
</td>
<td>
<table>
<tr><th>Test</th><th>Procedure</th><th>Frequency</th></tr>
<tr><td>Slump</td><td>Visual</td><td>Periodic</td></tr>
<tr><td>Air Content</td><td>CSA A23.2-4C</td><td>2 per day</td></tr>
<tr><td>Bulk Density</td><td>CSA A23.2-6C</td><td>2 per day</td></tr>
</table>
<u>Hardened concrete</u> have to be tested according to these criteria:
<table>
<tr><th>Testing Item</th><th>Testing Frequency</th><th>Testing Procedure</th><th>Age</th></tr>
<tr><td>Compressive strength (7)</td><td>One set of cylinders every 100 m^3</td><td>CSA A23.2-9C</td><td>After 7 days (compressive strength)</td></tr>
<tr><td>Compressive strength (28)</td><td>One set of cylinders every 100 m^3</td><td>CSA A23.2-9C</td><td>After 28 days (compressive strength)</td></tr>
<tr><td>Air Void System</td><td>Once per year</td><td>ASTM C 457</td><td>After 7 days</td></tr>
</table>
The steel supplier shall carry out and submit testing certificates prior to placing of the reinforcing.

[SBG Site Technician] shall fill out Form No. 4 “Concrete pre-pour inspection”..

[SBG Site Technician] will monitor the requirements for thickness.
</td>
<td>occurs, then testing will revert to every load until five loads again show conformity. Compressive strength will be checked by [JEGEL Lab. Technician] every 100 m^3 or once a day, one cylinder will be obtained for 3 day and 7 day strength tests and two cylinders for 28-day strength test.

The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report</td>
</tr>
</table>

<table>
<tr><th>Item No.</th><th>Activity</th><th>Quality Requirement</th><th>Quality Control</th><th>QA / Verification / Record</th></tr>
<tr>
<td>14.4</td>
<td>Pier 5 Extension</td>
<td>Concrete requirements (Tremie Mix Design dated Oct. 29, 2006):

• 25 MPa @ 28 days
• Slump 150 ± 30 mm
• Nominal Maximum aggregate size: 20 mm
• Air content: 5 – 8 %
• Temperature differential should be kept to within 30°C between surface and core.

Standards: Standards: CSA A23.1

Drawings: NAW130-D0V-29300-0040-07</td>
<td>Rebar: Mill Certificated shall be provided.

Concrete: (sampling to CSA A23.2-1C).

Fresh concrete tests have to be carried out according to these criteria:
<table>
<tr><th>Test</th><th>Procedure</th><th>Frequency</th></tr>
<tr><td>Slump</td><td>Visual</td><td>Periodic</td></tr>
<tr><td>Air Content</td><td>CSA A23.2-4C</td><td>2 per day</td></tr>
<tr><td>Bulk Density</td><td>CSA A23.2-6C</td><td>2 per day</td></tr>
</table>
Hardened concrete has to be tested according to these criteria:
<table>
<tr><th>Test</th><th>Frequency</th><th>Procedure</th><th>Age</th></tr>
<tr><td>Compressive strength (7)</td><td>One set of cylinders every 100 m^3</td><td>CSA A23.2-9C</td><td>After 7 days (compressive strength)</td></tr>
<tr><td>Compressive strength (28)</td><td>One set of cylinders every 100 m^3</td><td>CSA A23.2-9C</td><td>After 28 days (compressive strength)</td></tr>
<tr><td>Air Void System</td><td>Once per year</td><td>ASTM C 457</td><td>After 7 days</td></tr>
</table>
The steel supplier shall carry out and submit testing certificates prior to placing of the reinforcing.

[SBG Site Technician] will:
• Review construction requirements.
• Monitor the placement of steel and formwork.
• Ensure temperature of concrete is monitored during placement and curing.
• Ensure cold water is pumped as required to cool concrete during curing.</td>
<td>Slump, temperature and air content will be checked by [JEGEL Lab. Technician] once for each of the first 5 loads. If conformance is obtained, then every 5th load will be tested. If a nonconformance occurs, then testing will revert to every load until five consecutive loads again show conformity.

Compressive strength will be checked by [JEGEL Lab. Technician] every 100 m^3, one cylinder will be obtained for 3 day and 7 day strength tests and two cylinders for 28-day strength test.

Temperature of tremie concrete during curing will be monitored by [JEGEL Lab. Technician].

The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report</td>
</tr>
</table>

<table>
<tr><th>Item No.</th><th>Activity</th><th>Quality Requirement</th><th>Quality Control</th><th>QA / Verification / Record</th></tr>
<tr><td></td><td></td><td></td><td>• Ensure correct reinforcing grade, marking size, length and bending.
• Ensure that the completed work is verified by survey.
• Complete Prepour Inspection Form #4.

[SBG Site Technician] will monitor the requirements for thickness.</td><td></td></tr>
<tr><td>14.5</td><td>Pier 1 and 2 Extension</td><td>Concrete requirements (Mix Design dated Jun. 21, 2007):

• 35 MPa @ 28 days
• Slump 150 ± 30 mm
• Nominal Maximum aggregate size: 40 mm
• Air content: 53– 6 %

Standards: Standards: CSA A23.1
Drawings: NAW130-D0V-29300-(0019 to 0025)
Method Statement: RNAW130-29300-0018</td><td><u>Rebar</u>: Mill Certificated shall be provided.
<u>Concrete</u>: (sampling to CSA A23.2-1C).
<u>Fresh concrete</u> tests have to be carried out according to these criteria:
<table>
<tr><th>Test</th><th>Procedure</th><th>Frequency</th></tr>
<tr><td>Slump</td><td>Visual</td><td>Periodic</td></tr>
<tr><td>Air Content</td><td>CSA A23.2-4C</td><td>2 per day</td></tr>
<tr><td>Bulk Density</td><td>CSA A23.2-6C</td><td>2 per day</td></tr>
</table>
<u>Hardened concrete</u> has to be tested according to these criteria:
<table>
<tr><th>Test</th><th>Frequency</th><th>Procedure</th><th>Age</th></tr>
<tr><td>Compressive strength (7)</td><td>One set of cylinders every 100 m^3</td><td>CSA A23.2-9C</td><td>After 7 days (compressive strength)</td></tr>
<tr><td>Compressive strength (28)</td><td>One set of cylinders every 100 m^3</td><td>CSA A23.2-9C</td><td>After 28 days (compressive strength)</td></tr>
<tr><td>Air Void System</td><td>Once per year</td><td>ASTM C 457</td><td>After 7 days</td></tr>
</table>
The steel supplier shall carry out and submit testing certificates prior to placing of the reinforcing.</td><td>Slump, temperature and air content will be checked by [JEGEL Lab. Technician] once for each of the first 5 loads. If conformance is obtained, then every 5th load will be tested. If a nonconformance occurs, then testing will revert to every load until five consecutive loads again show conformity.

Compressive strength will be checked by [JEGEL Lab. Technician] every 100 m^3, one cylinder will be obtained for 3 day and 7 day strength tests and two cylinders for 28-day strength test.

The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report</td></tr>
</table>

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification / Record
			[SBG Site Technician] will: • Review construction requirements. • Monitor the placement of steel and formwork. • Ensure correct reinforcing grade, marking size, length and bending. • Ensure that the completed work is verified by survey. [SBG Site Technician] will monitor the requirements for thickness.	
15. Cofferdam				
15	**Cofferdam**	Structural steel to be sound according to CSA G40.21. Welding has to be in accordance with CSA W 59. 150 mm minus crushed rock with passing sieve 0.5 mm between 5% and 10 %. No fractions passing 0.1 mm sieve. Drawings: NAW-DOV-26500-0001, 0002-007.	The correct construction in accordance with drawings, specifications and method statements shall be checked by visual inspection. Testing is not required for this operation. [SBG Engineers and Technicians On Site]	Record and document the contractor's operation including equipment and labor forces shall be kept in the Weekly Construction Activity Report. [SBG Engineering/Construction Manager Intake and Outside Works Design Engineer]
16. Other Concrete Works				
16.1	**Concrete Plant Foundations**	The following requirements shall be met: • Compressive strength of concrete: 25 MPa @ 28 days. • Maximum aggregate size: 20 mm. • Slump range: 80 mm ± 30 mm • Air content range: 5.5 % - 8.5 % • Verify all dimensions and specifications	[Dufferin] will be responsible for all day-to-day activities and will keep the Tunnel Construction Manager informed. Cylinders for concrete strength testing will be taken every 60 m^3 as per CSA 23.1 for 28 days testing. • Ensure that concrete mix designs have been reviewed and submitted • Ensure all inspections and testing arrangements are in	Record and document the contractor's operation including equipment and labor forces, keep on file and include in the Weekly Construction Activity Report. The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report.

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification / Record
		contained in drawings (S 100). Standards: CSA – A23.1 Drawings: S 100 Appendix PR-00-5013.	place • Present on site full time during the operations • Monitor the placement of steel and formwork • Perform a pre-placement inspection as specified • Monitor placement of concrete • Monitor the curing operations • Sub-grade inspection, acceptance, proper cleaning, proper preparation and control of water • Reinforcing splicing, cover, approved rebar and supports, adequate tying as per specifications and codes • Location/length of splices as detailed • Formwork secured [Dufferin]	[SBG Tunnel Construction Manager, Engineering Manager and Tunnel Design Engineer]
16.2	**Conveyor Belt Footings Below Ground**	Dimensions and specifications contained in drawings (NAW 130 DOV-88200-0004-00, NAW 130 DOV-88200-0005-00, NAW 130 DOV-88200-0012-00) Requirements on drawings: • Compressive strength of foundation concrete: 35 MPa @ 28 days. • Steel bar Grade: 400 MPa • Rock Anchor capacity: more than 350 KN. Standards: CSA – A23.1 Drawings: NAW 130 DOV-88200-0004-00, NAW 130 DOV-88200-0005-00, NAW 130 DOV-88200-0012-00 Appendix PR-00-5013.	The Tunnel Construction Manager is responsible for all day-to-day activities and will keep the Technical Project Manager informed. Cylinder for concrete strength testing will be taken every 60 m^3 as per CSA 23.1 for 28 days testing • Ensure that concrete mix designs have been reviewed and submitted • Ensure all inspections and testing arrangements are in place • Present on site full time during the operations • Monitor the placement of steel and formwork • Perform a pre-placement inspection as specified • Monitor placement of concrete • Monitor the curing operations (temp and moisture) • Sub-grade inspection, acceptance, proper cleaning, proper preparation and control of water	Record and document the contractor's operation including equipment and labor forces, keep on file and include in the Weekly Construction Activity Report. [SBG Tunnel Construction Manager, Engineering Manager and Tunnel Design Engineer]

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification / Record
			• Reinforcing splicing, cover, approved rebar and supports, adequate tying as per specifications and codes • Location/length of splices as detailed • Formwork [SBG Engineers and Technicians On Site]	
16.3	**Overland Conveyor Foundations**	• Dimensions and specifications contained in Drawings (NAW 130 DOV-88200-0002-00, NAW 130 DOV-88200-0003) • Ensure that concrete mix designs have been reviewed and submitted. Requirements in drawings: • Compressive strength of foundation concrete: 35 MPa @ 28 days. • Maximum aggregate size: 20 mm. • Maximum w/c ratio: 040. • Slump range: 100 mm ± 30 mm • Air content range: 5.5 % - 8.5 % • Steel bars grade: 400 MPa • Compressive strength of concrete fill: 35 MPa @ 28 days. Standards: CSA – A23.1 Drawings: NAW 130 DOV-88200-0002, NAW 130 DOV-88200-0003.	Cylinders for concrete strength testing will be taken every 60 m^3 as per CSA 23.1 for 28 days testing • Ensure all inspections and testing arrangements are in place • Present on site full time during the operations • Monitor the placement of steel and formwork • Perform a pre-placement inspection as specified • Monitor placement of concrete • Monitor the curing operations • Subgrade inspection, acceptance, proper cleaning, proper preparation and control of water • Reinforcing splicing, cover, approved rebar and supports, adequate tying as per specifications and codes • Location/length of splices as detailed • Formwork [SBG Engineers and Technicians On Site]	Record and document the contractor's operation including equipment and labor forces shall be kept in the Weekly Construction Activity Report. [SBG Tunnel Construction Manager, Engineering Manager and Tunnel Design Engineer]
17. **Spiling**				
17.1	**Spiling**	Dimensions and specifications contained in Drawings NAW130-DOV-29230-0047 and Method Statement for Spiling.	In accordance with Sections 1, 2 and 3 of this document. The correct construction in accordance with drawings, specifications and method statements shall be checked by visual inspection. Inspections shall be recorded on Form No. 9 [Strabag Tunnel Technician] .	The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. [SBG Construction Manager, Engineering Manager and Tunnel Design Engineer]

<table>
<tr><th>Item No.</th><th>Activity</th><th>Quality Requirement</th><th>Quality Control</th><th>QA / Verification / Record</th></tr>
<tr><td colspan="5">18. Grout Tunnel</td></tr>
<tr><td>18.1</td><td>Rock Support Types</td><td>A combination of support elements consisting of steel wire mesh in the crown, rock dowels and shotcrete is installed in various Rock Support Types. In zones with substantial inflow dimple membrane strips are used to collect and drain the ground water, before the grouting works are finished.

Details of the rock mass support are shown on drawings NAW130-D0V-29230-0040 and

0041, Grout Tunnel Rock Support Types 3G and 4G.
<table><tr><td></td><td colspan="3">Rock Dowels</td><td>Shotcrete</td></tr><tr><td>Support Type</td><td>Length [m]</td><td>C/e [m]</td><td>Capacity [KN]</td><td>Thickness [mm]</td></tr><tr><td>3G</td><td>3.0</td><td>1.5/1.2</td><td>100</td><td>100</td></tr><tr><td>4G</td><td>3.0</td><td>1.5/0.9</td><td>240</td><td>130</td></tr></table></td><td>In accordance with Sections 2, 3 and 4 of this document.

[Strabag Tunnel Technician].</td><td>The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report.

[SBG Tunnel Construction Manager, Engineering Manager and Tunnel Design Engineer]</td></tr>
<tr><td>18.2</td><td>Steel Wire Mesh</td><td>Steel wire mesh 150/150/6/6 mm (European designation) 152 x 152 – MW28.9 x MW28.9

(Canadian designation) is placed to prevent rock falls due to rock loosening or spalling.

Steel wire mesh is placed in the crown of the tunnel only.

The wire mesh acts as personnel protection measure and is not taken into account for the design analysis of the initial lining.

R-NAW130-29230-0010-03 (26/02/2008).

Drawings: NAW130-D0V-29230- (0039-0047)

CSA A23.1-04</td><td>In accordance with Section 2 of this document.

[SBG Tunnel Technician]</td><td>The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report.

[SBG Tunnel Construction Manager, Engineering Manager and Tunnel Design Engineer]</td></tr>
<tr><td>18.3</td><td>Rock Dowels</td><td>Rock dowels are installed mainly to contribute to the support against rock loosening, and slabbing.</td><td>In accordance with Section 3 of this document.</td><td>The Quality Manager shall be responsible to keep records of this activity and include</td></tr>
</table>

Item No.	Activity	Quality Requirement	Quality Control	QA / Verification / Record
		Rock dowels have a length of L = 3.0 m and are installed at various centres (longitudinal x circumference direction), 6 pieces are placed in each row. Rock dowels are Swellex with a breaking load of 100 kN (Type 1) to 240 kN (Type 2) or equivalent fast acting grouted dowels. R-NAW130-29230-0010-03 (26/02/2008). Drawings: NAW130-D0V-29230-(0039-0047) CSA A23.1-04	[SBG Tunnel Technician]	in the Weekly Construction Activity Report. [SBG Tunnel Construction Manager, Engineering Manager and Tunnel Design Engineer]
18.4	**Shotcrete**	The shotcrete lining thickness for each Rock Support Type is presented in table 2. Its characteristic compressive strength for analysis is taken fc´= 25 N/mm². Shotcrete: acc. to Section 4 of this document R-NAW130-29230-0010-03 (26/02/2008). Drawings: NAW130-D0V-29230-(0039-0047) CSA A23.1-04	In accordance with Section 4 of this document. [SBG Tunnel Technician]	The Quality Manager shall be responsible to keep records of this activity and include in the Weekly Construction Activity Report. [SBG Tunnel Construction Manager, Engineering Manager and Tunnel Design Engineer]

General Requirements:

- Review of specifications and construction statements.
- Confirm that drawings in use are current and issued for construction.
- Determine what additional drawings, details, take-offs of information sheets are inquired.
- Monitor the work completes and ensure that the work is verified by survey.
- Ensure all QA/QC plan, means and method statements, and concrete mix designs are submitted and approved.
- All concrete plants shall have a current “Certificate of Ready Mixed Concrete Production Facility” issued by the Ready Mixed Concrete Association of Ontario.
- ILF and MH Design Engineer (Tunnel – Outside Works) will be permanently informed about checking results including QC testing results.

General Drawings:

- NAW 130-DOV-20102-(0001 to 0013): Diversion Tunnel – Plan and Longitudinal Section.
- NAW 130-DOV-29230-0016: Diversion Tunnel – Geotechnical Longitudinal Section.

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Form 1 Precast Block Quality Checklist

Niagara Tunnel Facility Project

Date Block Received: _____

Date Block Placed: _____

Approach Wall Block Number	
Accelerating Wall Block Number	

Con Cast Block Number: _____

Design Placement Location: _____

Elements Checked:	**Meets Requirements**		
	YES	**NO**	**N/A**
Chips or Spalls?			
Cracking greater than 0.3 mm?			
Cracking Greater than 0.3 mm reviewed by the Designer			
Lift point damaged?			
Jacks Bent or damaged?			

Comments/ Remedial Measures:

Inspection by: _____ _____

Print Signature

Date _____

Form 2 Precast Placement Checklist

STRABAG

Niagara Tunnel Facility Project

Date of Placement: _____

Element Number/ Location of Placement: _____

Elements Checked:

	YES	NO	N/A
Placement Area Clear of Debris?			
Surface Preparation / Condition is Acceptable?			
Bottom Sealed with Sandbags			
Bottom Sealed with Form			
Bottom Sealed with Other Materials(specify)			
Jacking problems, if yes identify			

Comments:

_____

_____

_____

_____

Inspection by: _____ _____

Print Sign

Date: _____

Form 3 Permission to Place Tremie Concrete

Niagara Tunnel Facility Project

Date / Start Time of Concrete Placement: _____

Element Number / Location of Placement: _____

Concrete Amount (m3): _____ **& Duration (hrs)** _____

Elements Checked:

	YES	NO	N/A
Mix Design No._____submitted and accepted?			
Proper placement of Unit verified?			
Tester on site			
Confirmation divers: units and forms are placed to tolerances?			
Survey confirmation received?			

Comments:

Inspection by: _____ _____

Print Sign

NIAGARA TUNNEL PROJECT

STRABAG

Form 4

Concrete Placement Checklist

Tracking No.
F4 ☐☐☐

Date & Time		Ambient Temperature	
Location / Pour No.		Weather Conditions	
		Estimated Quantity (m3)	

Mix Design Requirements	No.	Strength	Slump
Reference Drawings			

Element Checked	Yes	No	N/A	Notes
Pre-placement				
Foundation checked for suitability by GE (if required)				
Surface prepared and clean (specify requirement for surface prep)				
Dimensions and position of formwork checked				
Installation of formwork checked				
Placement of reinforcing steel verified				
Placement of embedded anchors checked				
Waterstops installed				
Thermocouples installed (if required)				
Placing equipment checked				
Concrete testing staff informed				
Preparations for curing in place (specify method)				
Post Placement				
Curing method implemented (specify date)				

Comments:

Reported By:

Company	Name	Signature
DUFFERIN		
STRABAG		

NIAGARA TUNNEL PROJECT

STRABAG

Form 6A
Anchor Pull Test - Tunnel Support

Tracking No.
F6A

Date: _____

Support Type

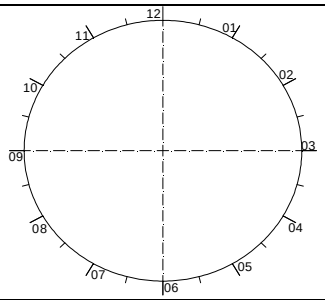
1	2	3	4R	4Q	5	6	4S	Other_____

Type of Anchor:
- ☐ Swellex Mn12
- ☐ Swellex Mn24
- ☐ IBO 40/20
- ☐ Other (Specify)_____

Length:
- ☐ 4.0m
- ☐ 6.0m
- ☐ Other (Specify)_____
- ☐ Other (Specify)_____

Anchor Test No.	Chainage [m]	Position [see below]	Load [kN]	Displacement [mm]	Duration [min]	Remarks

Notes: _____



Name: _____ Signature: _____

NIAGARA TUNNEL PROJECT

STRABAG

Form 6B

Anchor Pull Test - Duorail

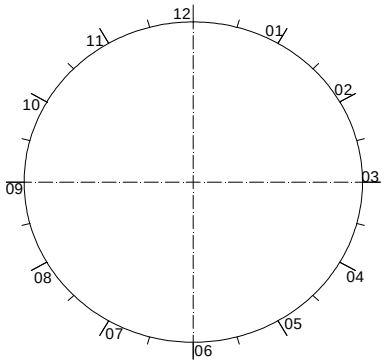
Tracking No. F6B

Date: _____

Type: Swellex Mn24H

Length: 3.0 m

Anchor Test No.	Chainage [m]	Position [see below]	Load [kN]	Displacement [mm]	Duration [min]	Remark



Name: _____ Signature: _____

NIAGARA TUNNEL PROJECT

STRABAG

Form 7

Daily Record of Rock Support Installation

Tracking No. F7 /

Section A: Support Installation

DATE	TBM CHAINAGE	SUPPORT TYPE
	From: To:	1 2 3 4 4Q 5 6 4S 4R ___

ROCK ANCHORS		WIRE MESH	SHOTCRETE	Consolidation Grout
TYPE	LENGTH	SIZE & INSTALLATION	INSTALLATION	INSTALLATION
☐ SWMN24	☐ 4.0 m	Grid Dim. ____ mm	**L1** Location ____ eg. (10-2)	Grouting ? Yes No
	☐ 6.0 m	Diameter ____ mm	Thickness ____ mm	Chainage From: ____ To:
	☐ ____	Radial Overlap (min 200mm) YES NO	**L2** Indicators installed? YES NO	
☐ Other	☐ ____	Longitud. Overlap (min 150mm) YES NO	Length (sides) ____ mm	Average W/C Ratio ____
	☐ ____		Indicators Covered YES NO	
			Invert Clean and No Standing Water? YES NO	Average Injection Pressure ____ Bar

STEEL RIBS

PRODUCT		INSTALLATION			
☐ Channel	Width: ____	Connections adequate?	Yes	No	N/A
☐ Full Ring	Depth: ____	Connections fully embedded in shotcrete?	Yes	No	N/A

	Steel Rib Number	Rib Spacing (mm)	4.0 m Anchors per Rib (ea.)	6.0 m Anchors per Rib (ea.)	Field Anchors	Length of Field Anchors	Extra Channel Length (mm)	Estimated Overbreak (mm)	Remarks
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									

Notes:

Inspection By: _____ Strabag Tunnel Technician _____ Signature _____ Date

Section B: Geotechnical Review

OBSERVATION OF ROCK MASS

ROCK MASS DESCRIPTION			GROUNDWATER SEEPAGE	
☐ Sidewall Spalling	☐ Jointing	☐ Shear zones	☐ Gushing patches	☐ Wet patches
☐ Invert Heave	☐ Rock Pressure > Rock Mass Strength	☐ Clay Seams	☐ Flowing patches	☐ Damp patches
☐ Slabbing	☐ Overbreak due to stress	☐ Other____	☐ Dripping patches	☐ Dry
☐ Blocky	☐ Overbreak due to discontinuities	☐ Other____		

VALIDATION OF ROCK SUPPORT

SHOTCRETE OBSERVATIONS						SETTLEMENT / CONVERGENCE			POTENTIAL VOIDS		
L1 Shotcrete	YES	NO	**L2 Shotcrete**	YES	NO	Settlement / Convergence below				YES	NO
Cracking	☐	☐	Cracking	☐	☐	trigger level?	YES	NO	Between rock mass and rock support ?	☐	☐
Spalling	☐	☐	Spalling	☐	☐		☐	☐	Void in Rock Mass ?	☐	☐
									Grouting Required ?	☐	☐

Notes

Inspection By: _____ Strabag Geotechnical Enginner _____ Signature _____ Date

Section C: Reporting

_____ Construction Manager _____ Signature _____ Date

This Form shall be submitted to Senior or Tunnel Construction Managers daily.

STRABAG

NIAGARA TUNNEL FACILITY PROJECT

Form 9

Spiling Record

Tracking No. F9 ☐☐☐

UMBRELLA No. _____ START DATE: _____ FINAL DATE: _____

TBM CHAINAGE: _____ UMBRELLA CHAINAGE: _____ FORM ORIGINATOR: _____ FORM CLOSED BY: _____

Date	Chainage @ Placement	No. of Boreholes Drilled	Spiling Records								Grout[1] (Kgs)	Tunnel Technican	Signature
			IBO				Swellex		Steel Pipe				
			Quantity	Type	Length	Angle	Quantity	Length	Quantity	Length			

IBO TESTED AND IN COMPLIANCE: YES ☐ NO ☐ NOT REQUIRED ☐

Notes:

by: _____ Date: _____

by: _____ Date: _____

by: _____ Date: _____

Final Verification: _____

Construction Manager

Date: _____

Notes:

1. **Total grout amount** to be recorded for each combination of IBO or Steel Pipe type and length.

Only **completed** work will be reported in the corresponding shift. This Form shall be submitted to Senior or Tunnel Construction Managers daily.

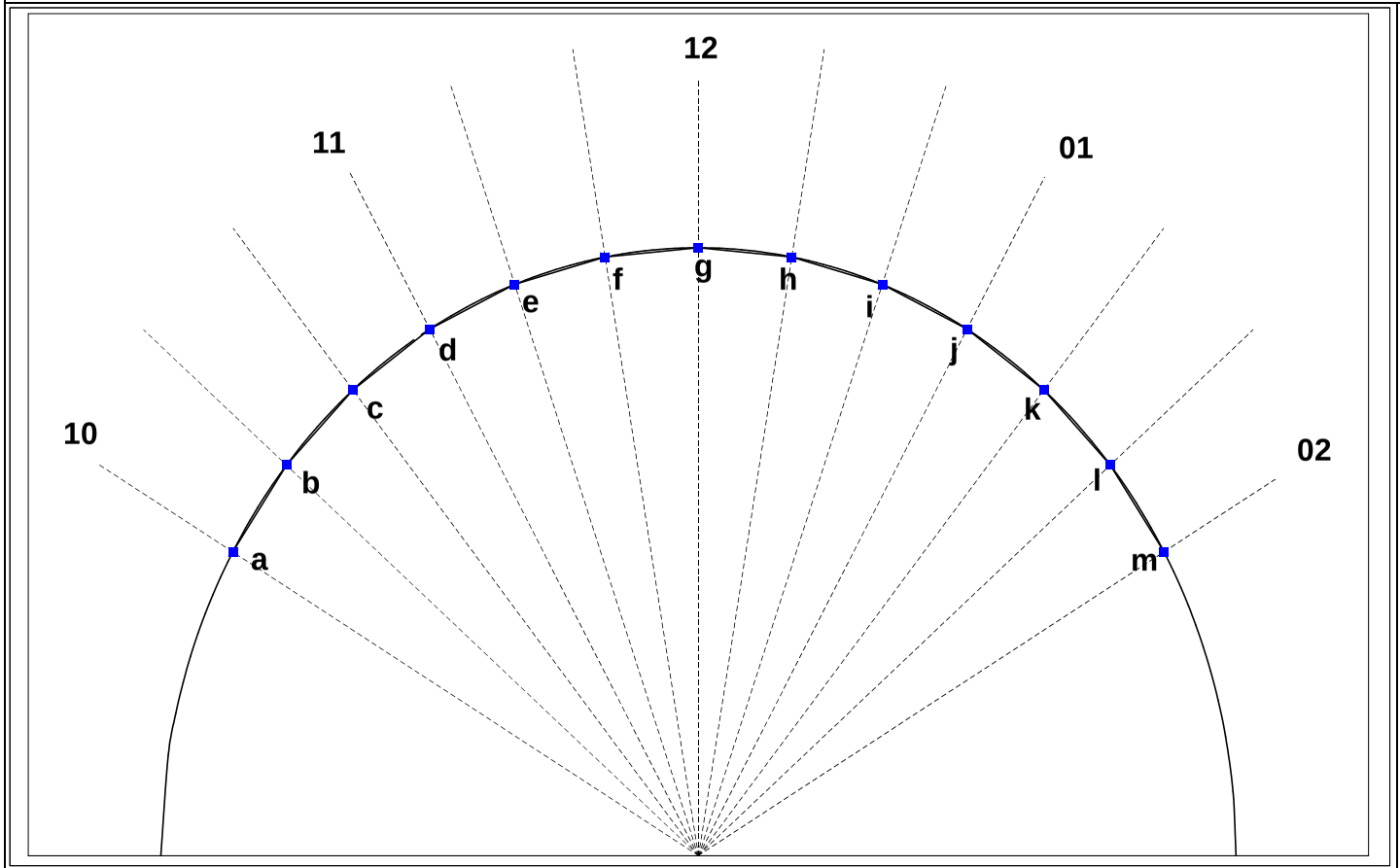
NIAGARA TUNNEL FACILITY PROJECT

STRABAG

FORM 10A: OVERBREAK - CROWN

CHAINAGE @ OVERBREAK: _____ **DATE:** mm-dd-yy **SUPPORT TYPE:** _____

Tracking No. F10 | 0 | 0 | | |



Overbreak Measurements

Please enter information in **centimeters**

10_a: _____

b: _____

c: _____

11_d: _____

e: _____

f: _____

12_g: _____

h: _____

i: _____

01_j: _____

k: _____

l: _____

02_m: _____

Area: 0.00 m^2

Report by:

Tunnel Technician - *Name*	Tunnel Technician - *Signature*	Strabag Construction Manager
Owner's Respresentative - *Name*	Owner's Respresentative - *Signature*	Date (by OR)

Note:

This Form shall be submitted to Senior or Tunnel Construction Managers on a daily basis.

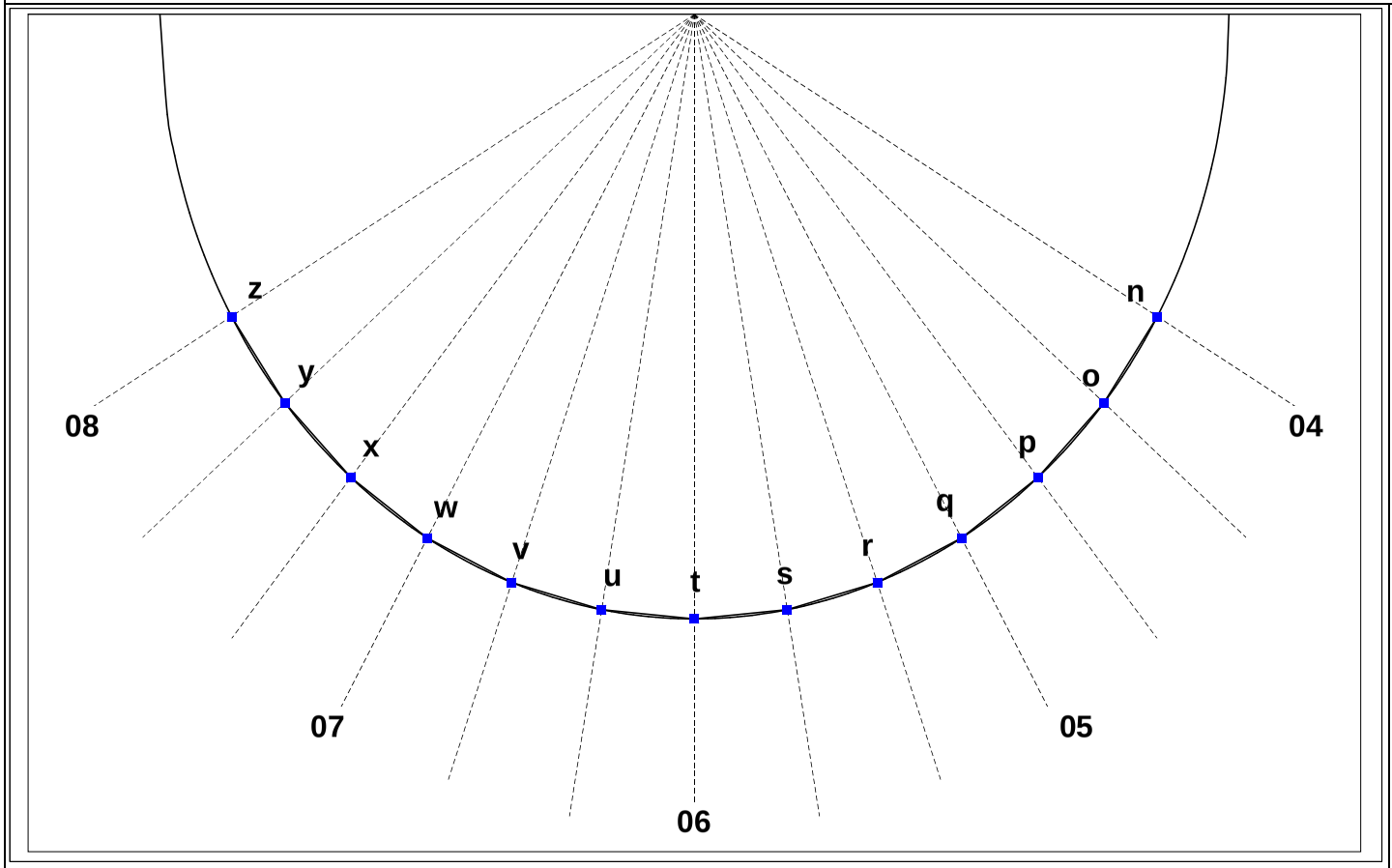
NIAGARA TUNNEL FACILITY PROJECT

STRABAG

FORM 10B: OVERBREAK - INVERT

CHAINAGE @ OVERBREAK: _____ **DATE:** mm-dd-yy **SUPPORT TYPE:** _____

Tracking No. F10 0 0



Overbreak Measurements

Please enter information in **centimeters**

04_n: _____

o: _____

p: _____

05_q: _____

r: _____

s: _____

06_t: _____

u: _____

v: _____

07_w: _____

x: _____

y: _____

08_z: _____

Area: 0.00 m^2

Report by:

Tunnel Technician - *Name*	Tunnel Technician - *Signature*	Strabag Construction Manager
Owner's Representative - *Name*	Owner's Representative - *Signature*	Date (by OR)

Note:
This Form shall be submitted to Senior or Tunnel Construction Managers on a daily basis.

NIAGARA TUNNEL FACILITY PROJECT

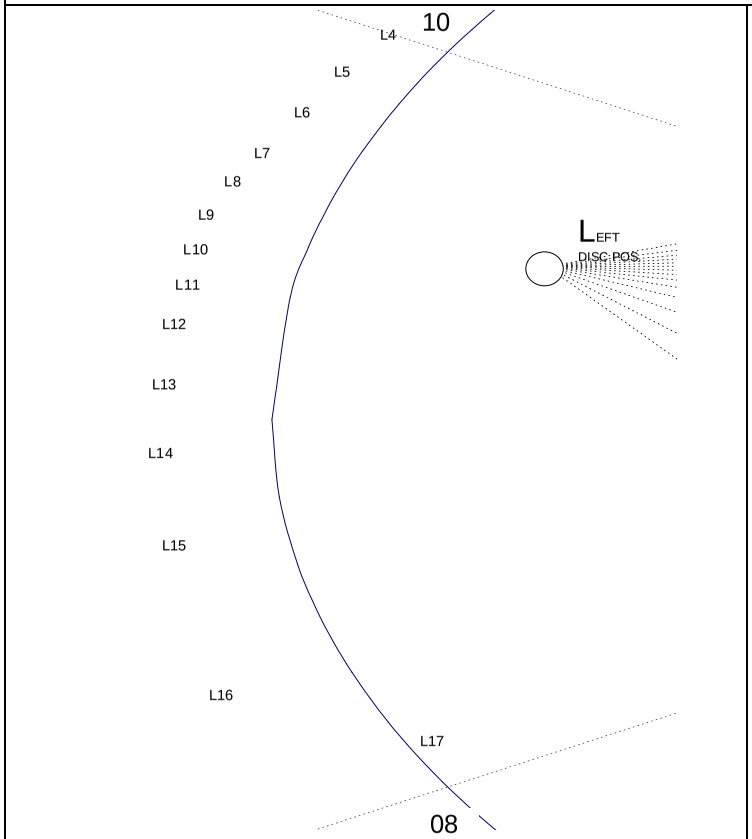
STRABAG

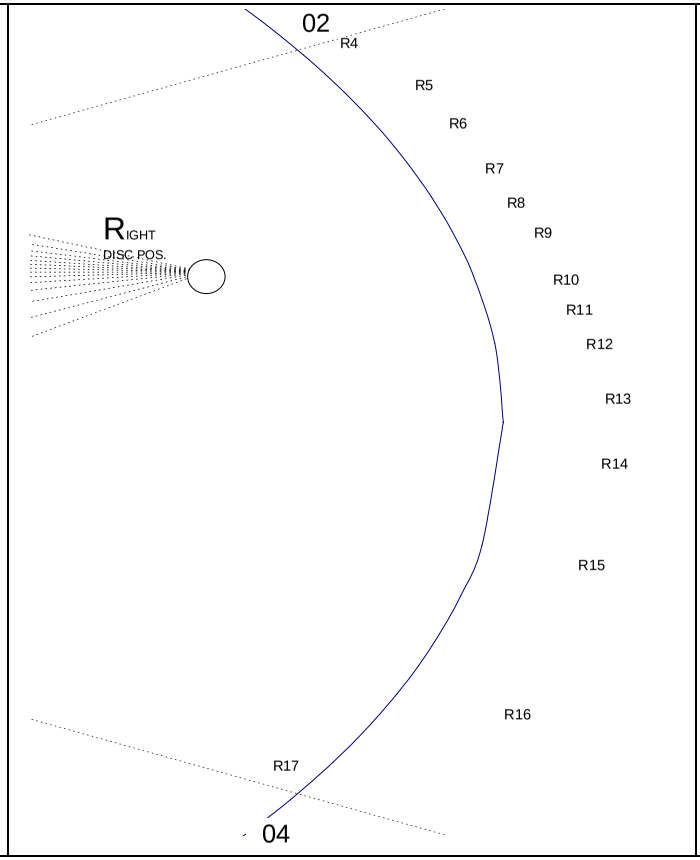
FORM 10C: OVERBREAK - SIDEWALLS (L+R)

CHAINAGE @ OVERBREAK: _____ **DATE:** _____ **SUPPORT TYPE:** _____

Tracking No. 0 0 _ _

F10





Overbreak Measurements

Please enter information in **centimeters**

L4		**R4**	
L5		**R5**	
L6		**R6**	
L7		**R7**	
L8		**R8**	
L9		**R9**	
L10		**R10**	
L11		**R11**	
L12		**R12**	
L13		**R13**	
L14		**R14**	
L15		**R15**	
L16		**R16**	
L17		**R17**	

Area: _____ m^2

Report by:

_____ **Tunnel Technician - *Name***

_____ **Tunnel Technician - *Signature***

_____ **Strabag Construction Manager**

_____ **Date**

Note:

This Form shall be submitted to Senior or Tunnel Construction Managers on a daily basis.

NIAGARA TUNNEL PROJECT

STRABAG

Form 11

Inspection of Dewatering Shaft Pipe Joints

Tracking No. F11 ☐☐☐

Date		Shaft No./Joint No.		Air Temp.	
Welding Procedure	**SM-B-2-2GPJP**	Pipe No.	Top: Bottom:	Rel. Humidity	

	Element Checked	Yes	No	Notes
	Alignment and Welding			
1	Entire pipe visually inspected for damage to coating prior to lowering into shaft (identify if repair was required)			
2	Alignment suitable for welding			
3	Surface prepared according to approved welding procedure			
4	Welding carried out in accordance with the approved welding procedure			
5	Weld is free from cracking or craters			
6	Lack of fusion between weld metal and base metal			
7	Weld profile in accordance with W59			
8	Undercut is no more than 0.25 mm (0.01) inch deep			
	Welded By_____ Signature_____			
	Coating			
1	Surface free from dirt, mil scale, rust, oxides, paint			
2	Surface roughened to required profile			
3	Edges of existing coating roughened 25 mm (1" wide)			
4	Surface temperature between 10 ^{o}C and 85 ^{o}C (specify if surface requires heating)			
5	Surface free of condensation prior to coating			
6	Wet film thickness measurements performed (min. 4, specify measurements)			
7	Finished coating generally smooth and free of protrudences			
8	Holiday test performed (specify results)			
	Coating Applied By_____ Signature_____			

Comments: _____

Inspection By: _____ (Strabag Site Technician) _____ (Signature)

Reported To: _____ (Construction Manager) _____ (Signature)

This Form shall be submitted to Senior or Tunnel Construction Managers.

Appendix 2.12(c)(4)
Non-Conformance Notice

Appendix 2.12(c)(4) - Non-Conformance Notice

QUALITY ASSURANCE NON-CONFORMANCE NOTICE

To: Ontario Power Generation Inc. ("OPG")	Contract: Amended Design/Build Agreement (the "**Agreement**") dated as of December 1, 2008 between Strabag Inc. (the "**Contractor**") and OPG 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 INC.

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)
Non-Compliance Notice

Appendix 2.13(f) - Non-Compliance Notice

NON-COMPLIANCE NOTICE

To: Ontario Power Generation Inc. ("OPG")	Contract: Amended Design/Build Agreement between OPG and Strabag Inc. (the "**Contractor**") dated as of December 1 , 2008 (the "**Agreement**") Non-Compliance Notice No.: ■
Attn: ■ Fax: ■	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 INC.

By:_____
Name:
Title:

(3)	OPG consents to the Contractor's proposal on the terms set out in Appendix B; or	■
(4)	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)
INTENTIONALLY DELETED

Appendix 2.14(c) - INTENTIONALLY DELETED

Appendix 2.14(e)
Labour Obligations

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

STRABAG AG

(Name of Proponent)

(hereinafter call the "Proponent") acknowledges and agrees that, should its Proposal with respect to

DESIGN/BUILD OF THE NIAGARA TUNNEL FACILITY PROJECT

(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 3rd day of June 2009

_____

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)
INTENTIONALLY DELETED

Appendix 2.14(f) - INTENTIONALLY DELETED

Appendix 2.18
Conflict of Interest Declaration

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

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)
Preliminary INCW Part Project Specific Safety, Security, Public Safety and Emergency Response Plan

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:

2. the safety hazard analysis described in Section 2.20(d);

3. the Preliminary Project Specific Site Safety, Security, Public Safety and Emergency Response Plan attached at Appendix 2.4(d);

4. the OPG policies and procedures identified below (copies of which have been provided to the Contractor) (the "OPG Policies"); and

5. 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)
Designated Substances Present at INCW Part Project Area

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)
INTENTIONALLY DELETED

Appendix 4.1(a) - INTENTIONALLY DELETED

Appendix 4.1(b)
INTENTIONALLY DELETED

Appendix 4.1(b) - INTENTIONALLY DELETED

Appendix 4.1(d)
Letter of Credit

Appendix 4.1(d) - Letter of Credit

Amendment to the Letter of Credit
incl. Copy of Original "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: . . ., 2009
.
Amendment to Irrevocable standby letter of credit No: P338960T09591 dated August 31, 2005
.
Amount: Not exceeding CAD 70,000,000
.
Applicant: STRABAG AG, Donau-City-Strasse 9, A-1120 Vienna on behalf of STRABAG Inc.(its wholly owned Canadian subsidiary)
.
At the request of STRABAG Inc. (the 'Customer'), we hereby amend our irrevocable standby letter of credit No: P338960T09591 dated August 31, 2005 as follows:

We insert the following:

"This Standby Letter of Credit is issued pursuant to Section 4.1 (d) of the Amended Design/Build Agreement between Ontario Power Generation Inc. and STRABAG Inc.

Under the paragraph:

"This letter of credit is available against presentation
of the following documents delivered to us at . . . :"

item (c) is amended and it is to be read as follows:

Quote
.
(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 Amended Design/Build Agreement between Ontario Power Generation Inc. and STRABAG Inc., as such agreement may be amended from time to time.

Unquote

This amendment enters into force

- upon our receipt of your consent to this amendment signed by your Chief Financial Officer, Treasurer or Secretary

All other terms and conditions remain unchanged.

.

.

(Name of Canadian chartered Bank)
By:
Name:
Title

.

By:
Name:
Title:

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

RBC Royal Bank

ORIGINAL

INT'L TRADE CENTRE - ONTARIO
180 WELLINGTON ST WEST
9TH FLOOR
TORONTO, ONTARIO, M5J 1J1
CANADA

DATE OF ISSUE: AUGUST 31, 2005

OUR REFERENCE NUMBER:
P338960T09591

DATE OF EXPIRY: SEPTEMBER 1, 2006
PLACE OF EXPIRY: TORONTO, ONTARIO

BENEFICIARY:
ONTARIO POWER GENERATION INC.
700 UNIVERSITY AVENUE
TORONTO, ONTARIO
M5G 1X6

APPLICANT:
STRABAG AG
DONAU-CITY-STRASSE 9
A-1120 VIENNA
AUSTRIA

AMOUNT: CAD 70,000,000.00
SEVENTY MILLION AND 00/100'S CANADIAN DOLLARS

ATTENTION: DIRECTOR , CREDIT

IRREVOCABLE STANDBY LETTER OF CREDIT NO. P338960T09591

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.70,000,000.00 (SEVENTY MILLION AND 00/100'S CANADIAN DOLLARS).

THIS LETTER OF CREDIT IS AVAILABLE AGAINST PRESENTATION OF THE FOLLOWING DOCUMENTS DELIVERED TO US AT ROYAL BANK OF CANADA, INTERNATIONAL TRADE CENTRE-ONTARIO, 180 WELLINGTON STREET WEST, 9TH FLOOR, TORONTO, ONTARIO, M5J 1J1.

RBC Royal Bank

ORIGINAL

(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, AND

(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 18TH AUGUST, 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 OR COURIER 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. P338960T09591".

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.

RBC Royal Bank

ORIGINAL

P338960T09591 PAGE: 3

ROYAL BANK OF CANADA

AUTHORIZED SIGNATURE

P.Y. WARNER

OTHER SIGNATURE

R. GERGES

THIS DOCUMENT CONSISTS OF 3 PAGE(S).

Appendix 4.1(e)
Indemnity Agreement

Appendix 4.1(e) - Indemnity Agreement

CONFIRMATION OF INDEMNITY AGREEMENT

TO: ONTARIO POWER GENERATION INC. ("**OPG**")

FROM: STRABAG SE ("**Parent**")

RE: Confirmation of Indemnity Agreement

The Parent entered into an indemnity agreement with OPG and Strabag Inc. ("**Inc.**") dated April 28, 2006 and effective on and as of August 15, 2005 (the "**Indemnity Agreement**") to secure the obligations of Strabag AG ("**AG**") and Inc. in respect of the design/build agreement dated August 18, 2005 in connection with the Niagara Tunnel Facility Project, as amended (the "**DBA**"), a copy of which Indemnity Agreement is attached as Schedule "A" hereto. OPG and Inc., with AG as primary obligor and not as guarantor, have executed on the date hereof an Amended Design/Build Agreement for the Niagara Tunnel Facility Project (the "**ADBA**") effective as of December 1, 2008. Capitalized terms used in this Confirmation, and not otherwise defined herein, have the meanings attributed to such terms in the Indemnity Agreement.

The Parent has agreed to execute this Confirmation in favour of OPG to confirm the continuing obligations of the Parent to OPG under the Indemnity Agreement with respect to the ADBA.

Accordingly, for good and valuable consideration (the receipt and sufficiency of which are hereby acknowledged), the Parent hereby:

1. Confirms that all references to the Underlying Agreement in the Indemnity Agreement shall be read as references to the ADBA, as such ADBA may be amended, restated and supplemented from time to time.

2. Confirms and agrees that the obligations expressed to be binding on the Parent in the Indemnity Agreement continue in full force and effect and continue notwithstanding the amendment of the DBA and the entering into of the ADBA.

3. Confirms that this Confirmation is effective as of December 1, 2008 irrespective of the date of its execution.

This Confirmation shall be governed by, and construed and interpreted in accordance with, the laws of the Province of Ontario, including the federal laws of Canada applicable therein.

EXECUTED this _____ of May, 2009.

STRABAG SE

By: _____
Name:
Title:

SCHEDULE "A"

Indemnity Agreement

INDEMNITY AGREEMENT

This Agreement is made this 28th day of April, 2006 between

ONTARIO POWER GENERATION INC., a corporation existing under the laws of Ontario ("**OPG**"),

and

STRABAG INC., a corporation existing under the laws of Ontario ("Inc."),

and

STRABAG SE, a corporation existing under the laws of Austria ("**Parent**").

RECITALS

(A) Strabag AG ("**AG**"), a corporation existing under the laws of Austria, and OPG have entered into a design/build agreement dated August 18, 2005 in connection with the Niagara Tunnel Facility Project (the "**Original Agreement**").

(B) AG has assigned the Original Agreement to its wholly-owned subsidiary, Inc., on and subject to the condition that, notwithstanding the assignment, AG is not released from its obligations thereunder, and AG provided prior notice of the assignment to OPG.

(C) OPG and Inc. have entered into Amendment Agreement Number 1 dated March 15, 2006 (together with the Original Agreement, the "**Underlying Agreement**").

(D) It is a requirement of the Underlying Agreement that Parent and the Contractor (as defined in the Underlying Agreement) execute this Agreement.

(E) Parent wished to assist AG and Inc. to obtain the Underlying Agreement. Accordingly, Parent has agreed to provide OPG with the indemnifications and other rights contained in this Agreement.

(F) Parent has recently changed its name from "Bauholding Strabag SE" to "Strabag SE".

For value received, the parties agree as follows.

Obligation to Perform. If neither Inc. nor AG performs 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 Inc. or AG 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 both Inc. and AG have failed to satisfy in a timely manner, regardless of whether or not OPG has attempted to enforce any of the Subsidiary Obligations against Inc. or AG. 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, Inc. and AG.

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 Inc. or AG 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 Inc. or AG under the Underlying Agreement, except that Parent will not be relieved of any of its obligations under this Agreement due to any relief of Inc. or AG 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, Inc., AG or any other entity in respect of the Subsidiary Obligations or any of the obligations of Parent.

Acknowledgement of Assignment. The parties acknowledge the assignment of the Underlying Agreement from AG to Inc. and confirm that, notwithstanding the assignment, AG is not released from the Subsidiary Obligations. Parent acknowledges and confirms that the assignment does not affect its obligations and agreements contained in this Agreement, including, without limitation, those set forth under "Obligation to Perform" and "Other Obligations" above.

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 Inc. and AG 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 Inc. and AG have satisfied all of their 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 Inc., AG 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 Inc. or AG in respect of any liability of Inc. or AG to the Parent, claim or prove in the bankruptcy or insolvency of Inc. or AG 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 Inc. and AG have 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 Inc. or AG (whether voluntary or involuntary) or in the event that Inc. or AG make an arrangement or composition with their creditors, OPG shall have the right to rank for its full claims and to receive all dividends or other payments in respect thereof until its 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 Inc. and AG 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 Inc. and AG. This assignment and postponement is independent of the guarantee and indemnity contained in this Agreement. Any claim of the Parent against Inc. or AG 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 Inc.	if to Parent,
Ontario Power Generation Inc. 700 University Avenue, Toronto, Ontario, M5G 1X6 Attention: Director, Credit Fax: (416) 592-8335	Strabag Inc. 2520 Stanley Avenue RR1 Niagara Falls, Ontario, L2E 6W4 Attention: Ernst Gschnitzer Fax: (905) 353-0636	Strabag SE Donau-City-Str. 9 1220 Wien (Vienna) Austria Attention: Dr. Hans Peter Haselsteiner Fax: +43 1 22422 1001

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. No party will oppose the enforcement against it in any other jurisdiction of any judgment or order obtained from an Ontario court arising out of or made in connection with any arbitration conducted pursuant to the provisions under "ICC Arbitration" below. 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 Inc. 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 Inc. or AG 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.

ICC Arbitration. All unresolved disputes arising out of or in connection with this Agreement shall be finally settled under the Rules of Arbitration of the International Chamber of Commerce by three arbitrators appointed in accordance with said Rules. The

arbitrators will apply the laws of the Province of Ontario and the federal laws of Canada to decide any dispute. The place of arbitration will be Toronto, Ontario, Canada and arbitrations will be conducted in the English language. All matters relating to an arbitration will be kept confidential to the fullest extent permitted by the Rules of Arbitration of the International Chamber of Commerce.

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 Inc. 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. Inc. 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.

Effective Date. Notwithstanding the date on which the parties seal and execute this Agreement, it shall be, and be deemed to be, effective for all purposes on and as of August 18, 2005. The Indemnity Agreement dated August 18, 2005 between OPG, AG and Parent is hereby terminated and shall be of no further force and effect.

Parent and Inc. have duly sealed and the parties have duly executed this Agreement.

ONTARIO POWER GENERATION INC.

VP Hydroelectric Development

President & CEO

STRABAG INC.

Ernst Gschwitzer

Authorized Signatory

GERALD ZANGI

Vienna, 28th April, 2006

STRABAG SE

Authorized Signatory

Gebühr in Höhe von € 13,00 entrichtet.
Dr. Elisabeth Neuwirth, öff. Notarin,
Wien-Neubau III

B.R.Zl.: 829/2006

Ich bestätige die Echtheit der Firmazeichnungen ----------

a) des Herrn Doktor Thomas **BIRTEL**, geboren am 03.06.1954 (dritten Juni neunzehnhundertvierundfünfzig), in seiner Eigenschaft als kollektivzeichnungsberechtigtes Vorstandsmitglied, und ----------

b) des Herrn Diplomingenieur Nematollah **FARROKHNIA**, geboren am 08.08.1946 (achten August neunzehnhundertsechsundvierzig), in seiner Eigenschaft als kollektivzeichnungsberechtigtes Vorstandsmitglied, ----------

je der **STRABAG SE** mit dem Sitz in Villach und der Geschäftsanschrift 9500 Villach, Triglavstraße 9. ----------

Gleichzeitig bestätige ich gemäß § 89a (Paragraph neunundachtzig a) der Notariatsordnung auf Grund der heute im elektronischen Weg vorgenommenen Einsicht in das Firmenbuch, dass Herr Doktor Thomas Birtel und Herr Diplomingenieur Nematollah Farrokhnia berechtigt sind, die unter FN 88983h eingetragene STRABAG SE gemeinsam rechtsverbindlich zu zeichnen. ----------

Wien, am 28.4.2006 (achtundzwanzigsten April zweitausendsechs). ----------

Dr. Elisabeth Neuwirth
Öffentliche Notarin
Wien

CONFIRMATION OF INDEMNITY AGREEMENT

TO: ONTARIO POWER GENERATION INC. ("**OPG**")

FROM: STRABAG SE ("**Parent**")

RE: Confirmation of Indemnity Agreement

The Parent entered into an indemnity agreement with OPG and Strabag Inc. ("**Inc.**") dated April 28, 2006 and effective on and as of August 15, 2005 (the "**Indemnity Agreement**") to secure the obligations of Strabag AG ("**AG**") and Inc. in respect of the design/build agreement dated August 18, 2005 in connection with the Niagara Tunnel Facility Project, as amended (the "**DBA**"). OPG and Inc., with AG as primary obligor and not as guarantor, have executed on the date hereof an Amended Design/Build Agreement for the Niagara Tunnel Facility Project (the "**ADBA**") effective as of December 1, 2008. Capitalized terms used in this Confirmation, and not otherwise defined herein, have the meanings attributed to such terms in the Indemnity Agreement.

The Parent has agreed to execute this Confirmation in favour of OPG to confirm the continuing obligations of the Parent to OPG under the Indemnity Agreement with respect to the ADBA.

Accordingly, for good and valuable consideration (the receipt and sufficiency of which are hereby acknowledged), the Parent hereby:

1. Confirms that all references to the Underlying Agreement in the Indemnity Agreement shall be read as references to the ADBA, as such ADBA may be amended, restated and supplemented from time to time.

2. Confirms and agrees that the obligations expressed to be binding on the Parent in the Indemnity Agreement continue in full force and effect and continue notwithstanding the amendment of the DBA and the entering into of the ADBA.

3. Confirms that this Confirmation is effective as of December 1st, 2008 irrespective of the date of its execution.

This Confirmation shall be governed by, and construed and interpreted in accordance with, the laws of the Province of Ontario, including the federal laws of Canada applicable therein.

STRABAG SE

Date: 29.5.2009

By: _____
Name: Mag. Hannes Truntschnig
Title:

Date: 29.5.2009

By: _____
Name: Dr. Thomas Birtel
Title:

Appendix 4.1(f)
Maintenance Bond

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), 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), 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(a) 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), 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
Notice of Change in Applicable Laws

Appendix 5.3 - Notice of Change in Applicable Law

NOTICE OF CHANGE IN LAW

To: Ontario Power Generation Inc. ("OPG")

Contract: Amended Design/Build Agreement (the "**Agreement**") dated as of December 1, 2008 between Strabag Inc. (the "**Contractor**") and OPG

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 INC.

By: _____

Name:

Title:

Appendix 5.3B
Notice of Force Majeure Event

Appendix 5.3B - Notice of Force Majeure Event

NOTICE OF FORCE MAJEURE EVENT

To: Ontario Power Generation Inc. ("OPG")

Contract: Amended Design/Build Agreement (the "**Agreement**") dated as of December 1, 2008 between Strabag Inc. (the "**Contractor**") and OPG

Force Majeure Notice No. •

Date: •

Defined terms used in this Notice have the same meanings given to those terms in the Agreement. In accordance with Section 5.3B of the Agreement, the Contractor hereby gives OPG notice of a Force Majeure Event.

Description of Force Majeure Event:

Anticipated duration of the excused delay:

Anticipated impact on Contract Schedule (in days):

Anticipated impact on Target Cost (in Canadian dollars):

STRABAG INC.

By: _____

Name:

Title:

Appendix 5.3C
Major Risk Table

Appendix 5.3C - Major Risk Table

[See attached]

Appendix 5.3 C

Major Risk Table

Risk Label	Cause	Description	Agreed Contract Schedule/Target Cost Impact.			Comments
			Days	Time Cost	Material Cost	
TBM main bearing failure -Scenario A	Mixed face conditions, other adverse ground conditions, faulty design or other causes except wilfull misconduct or the failure to meet the standard of care in the Amended Design Build Agreement (ADBA) Section 1.1(O)(1)(ii)	Assuming arch concrete lining operations not under way	105	$21,000,000	$3,000,000	Material cost includes cost of replacement bearing
TBM main bearing failure - Scenario B	Mixed face conditions, other adverse ground conditions, faulty design or other causes except wilfull misconduct or the failure to meet the standard of care in ADBA Section 1.1(O)(1)(ii)	Assuming arch concrete lining operations under way	175	$37,000,000	$5,000,000	Material cost includes cost of replacement bearing
Major damage to main tunnel conveyor	Conveyor belt cut by rock or other causes except wilfull misconduct or the failure to meet the standard of care in ADBA Section 1.1(O)(1)(ii)	Extensive damage to conveyor requiring replacement in excess of 1km of conveyor belt	see comment	As per ADBA Section 5	As per ADBA Section 5	For calculation of schedule impact, actual days impact will be prorated on the basis that damage to 10km of conveyor belt will result in a 30day schedule impact
Gas	Gas concentration above OHSA limit	Based on days of downtime to TBM mining	as incurred on critical path	As per ADBA Section 5	As per ADBA Section 5	
Water	Excessive water inflow into tunnel during mining up to but not beyond STA 9+750	For inflows above 150l/sec	as incurred on critical path	As per ADBA Section 5	As per ADBA Section 5	
BTEX	BTEX levels higher than MOE threshold requiring additional lined pad for storage	Cost for construction of additional BTEX storage	0	As per ADBA Section 5	As per ADBA Section 5	
Unexpected subsurface geotechnical condition - TBM tunnel	Subsurface geotechnical conditions not known prior to the Effective Date or not adequately described in the ADBA	Cost and schedule adjustment where unexpected subsurface geotechnical conditions have a material impact on the cost or progress of the TBM mining work. Where an adjustment is warranted under this risk label, a multiplication factor of 0.375 will be applied to the impact on TBM mining schedule to determine impact on the Contract Schedule. An unexpected subsurface geotechnical condition under this risk label will only be deemed to apply if not attributable to any of the causes associated with any of the other risks in this table. Changes or variations in penetration rates will not constitute an unexpected subsurface geotechnical condition.	as incurred on critical path	As per ADBA Section 5	As per ADBA Section 5	
Unexpected subsurface geotechnical condition - surface and open cut work	Subsurface geotechnical conditions not known prior to the Effective Date or not adequately described in the ADBA	Cost and schedule adjustment where unexpected subsurface geotechnical conditions have a material impact on the cost or progress of the work	as incurred on critical path	As per ADBA Section 5	As per ADBA Section 5	
Crown Overbreak	Crown overbreak exceeds the target overbreak amount	Measured overbreak beyond STA 3+199 exceeds target overbreak	As determined in Table 1 attached	As determined in Table 1 attached	As determined in Table 1 attached	An unexpected subsurface geotechnical condition event as defined above, for the TBM tunnel, supercedes and replaces the application of a crown overbreak calculation at that location
Marine construction at INCW	Critical marine work at Intake Area affected by marine operational constraints at the INCW as defined in ADBA Apppendix 1.1(sss) Summary of Work - Section 3	Based on days lost on related non-mining activities at the Intake area	as incurred on critical path	As per ADBA Section 5	As per ADBA Section 5	
Unknown Subcontractor Claims	Subcontractor claims for work that is to be carried out after the Effective Date and not known to Strabag prior to the Effective Date	Cost and Schedule adjustment for subcontractor claims in excess of the amounts included in the original Target Cost or Contract Schedule	As per ADBA Section 5	As per ADBA Section 5	As per ADBA Section 5	

Table 1 of Appendix 5.3C - Major Risk Table

This table will be used to calculate any change to be made to the Target Cost and Contract Schedule due to variations in encountered crown overbreak from that baselined in the tunnel beyond chainage 3+199.

The calculation will be completed within one month after TBM Completion Date.

					BASELINE						**ACTUALS**		
					Baseline Conditions					**Encountered crown overbreak conditions**			
a)	**Crown Overbreak Baseline**				**Mining**		**Crown Overbreak Infilling**						
	Crown Overbreak Depth Ranges [1] m			**Target m of tunnel with crown overbreak within ranges [2]**	**Mining Rate m/d**	**Total Mining Duration days**	**Volume m^3/m**	**Total Baseline Volume m^3**		**Encountered m of tunnel with crown overbreak within ranges [2]**	**Calculated Mining Duration days**	**Calculated Crown Overbreak Volume m^3/m**	
	0	to	0.3	4,715	11.4	414	0	0		*Enter Aggregate*	*=K16/F16*	*=ROUND(H16*K16,0)*	
	0.3	to	0.5	321	9.6	33	2.5	803		*Enter Aggregate*	*=K17/F17*	*=ROUND(H17*K17,0)*	
	0.5	to	1.5	304	8.0	38	6.5	1,976		*Enter Aggregate*	*=K18/F18*	*=ROUND(H18*K18,0)*	
	1.5	to	2.5	958	5.8	165	12.5	11,975		*Enter Aggregate*	*=K19/F19*	*=ROUND(H19*K19,0)*	
	2.5	to	3.0	399	5.6	71	17.0	6,783		*Enter Aggregate*	*=K20/F20*	*=ROUND(H20*K20,0)*	
	3.0	to	4.5	261	5.5	48	25.0	6,525		*Enter Aggregate*	*=K21/F21*	*=ROUND(H21*K21,0)*	
	requiring spiling 4S			0	3.0	0	6.5	0		*Enter Aggregate*	*=K22/F22*	*=ROUND(H22*K22,0)*	
	Totals			**6,958**		**769**		**28,062**		***=SUM(K16:K22)***	**=SUM(L16:L22)**	***=SUM(M16:M22)***	
											Additional Overbreak	**=M23-I23**	m^3
b)	**Crown Overbreak Formwork Baseline**												
				Tunnel length requiring formwork for infill of overbreak of 2m depth or greater								**Encountered tunnel length requiring formwork for infill of overbreak of 2m depth or greater**	
				2,515	m							*Enter Actual Length*	m
											Additional Length of formwork	**=M31-E31**	m
c)	**Basis of adjustments**												
	Target schedule and cost adjusted at the ratio of					0.375	of Delay in TBM Mining						
	Adjustment to Target Cost for TBM delay less than 177 days									$171,763 (CAD)	/day		
	Adjustment to Target Cost for TBM delay greater than 177 days									$340,084 (CAD)	/day		
	Adjustment to calculated crown overbreak in excess of target volume not requiring forming									$715 (CAD)	$/m^3$		
	Adjustment to calculated crown overbreak in excess of target volume requiring forming									Note 4	m		
e)	**Calculation of adjustment to Contract Schedule and Target Cost**												
	Delay in TBM Mining						*=ROUND(L23-G23,0)*	days					
	Adjustment to Substantial Completion Date												
	TBM delay less than 177 days						*=IF(H45<177,H45,177)*	days	X	*=G37*		*=ROUND(K48*H48,0)*	days
	TBM delay greater than 177 days						*=IF(H45>177,H45-177,0)*	days	X	*1*		*=ROUND(K49*H49,0)*	days
								Total Adjustment to Substantial Completion Date				***=M48+M49***	days
	Adjustments to Target Cost												
	TBM delay less than 177 days						*=H48*	days	X	*=K38*	/day =	*=K53*H53*	(CAD)
	TBM delay greater than 177 days						*=H49*	days	X	*=K39*	/day =	*=K54*H54*	(CAD)
	Crown overbreak volume adjustment						*=M25*	m^3	X	*=K40*	$/m^3$ =	*=K55*H55*	(CAD)
	Crown overbreak form adjustment						*=M33*	m	X	*=K41*	/m =	*=K56*H56*	(CAD)
								Total Adjustment on Target Cost				***=SUM(M53:M56)***	(CAD)

1) Crown overbreak depth to be the average of the three greatest mutually agreed measurements of crown overbreak measured in accordance with the method outlined in DS-0241-R04 entitled "Method Statement for Overbreak Measurements" dated January 17th 2008

2) Crown overbreak is rock removed from the crown and subsequently filled to restore the excavation to a circular profile within the required tolerances applicable to the tunnel shotcrete lining.

3) Cells K38, K39, K40, K41 are negotiated target adjustment values

4) Cell K41 is the **Revised Formwork Cost** per metre of tunnel for the overbreak infill formwork system. This cost is to be determined in accordance with Appendix 1.1 (UUU) - Table 4

5) Cell H45, M48 and M49 are rounded to the nearest day

Appendix 5.4
Geotechnical Report

Appendix 5.4 - Geotechnical Report

[See attached]

Appendix 5.4 – Geotechnical 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 is being constructed following the Design/Build delivery method.

2 The Design Build Agreement (DBA) for the design and construction of the Niagara Tunnel Facility Project is being amended from a lump sum contract to a Target Cost contract with incentives and disincentives (the Agreement).

3 This Geotechnical Report (GR) summarizes information contained in the Geotechnical Data Report (GDR). This GR also contains data obtained during construction of the Niagara Tunnel Facility Project in the period prior to execution of the Agreement. The Contractor will make its own assessment of the relevance and validity of such information.

4 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

5 This GR along with the Agreement serves as a reference with respect to geotechnical subsurface conditions.

2 PROJECT DESCRIPTION

1 The Niagara Tunnel Facility Project comprises the design and construction of an approximately 10.2-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 005 deg joint set which parallels the general trend of the Niagara River, particularly in the area of the tunnel outlet

(b) a 045 deg joint set which approximately parallels the Niagara River, downstream from the Whirlpool

(c) a 085 deg joint set which approximately parallels the Niagara Escarpment

(d) a 135 deg joint set which approximately parallels the buried St. Davids Gorge.

3 Gypsum and calcite, and dolomite mineralization occur along joint sets of 085 deg and 135 deg 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 rough and fresh to slightly weathered and slickensided in some instances.

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 Figure 4.3 indicates the interpreted top of bedrock at the St. Davids gorge and 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.

3 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 shown in Figure 4.3. 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 GR 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 Expected soil thickness in the following areas are:

(a) Intake Excavation—minimal river bottom sediments are variable in thickness
(b) Outlet 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 would be expected.

(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 rock mass condition 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 wider 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.

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

$$\sigma_1 = \sigma_3 + (m\sigma_c\sigma_3 + s\sigma_c^2)^{½}$$

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 can 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 uniaxial compressive strength (UCS) and m_i values of the rock and estimated RMR of the rock mass are given in Table 6.9. RMR values were adjusted for the purpose of rock mass strength estimates as per Hoek (1988) and m_i values. were estimated on the basis of the average values recommended by Hoek (1988) for the various rock types.

6.4.3 Rock Mass Strength of Queenston Formation

The uniaxial compressive strength (UCS) and m_i values of the rock and estimated RMR of the rock mass are given in Table 6.10. RMR values were adjusted for the purpose of rock mass strength estimates as per Hoek (1988) with m_i from triaxial testing and RMR values. Results of laboratory triaxial strength testing were used to estimate the intact rock strength (UCS) as previously discussed

1 The RMR and m_i values noted in Table 6.8 were similarly grouped into simplified 'generic' classes in Tables 6.9 and 6.10 to provide approximate values for specific areas. .

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 intake due to reduced overburden pressure. Stress conditions at the outlet are expected to be affected by close proximity of the Niagara Gorge and St. Davids Gorge.

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 effective stress values in this section of the tunnel alignment are dependent on elevation (up to 19 and 23 MPa) as shown inFigure 6.16. 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 effective stress values are plotted against elevation as shown in Figure 6.17. The maximum and minimum horizontal effective 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 effective stresses in the Queenston formation near the St Davids Gorge and at the elevation of the tunnel alignment as shown on the Concept Drawings is about 24 and 14 MPa, respectively. No stress measurements were undertaken in the upper units or at higher Queenston Formation elevations near the outlet.

(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 tunnel central and upstream areas 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 The vertical stresses are 30% higher than stresses calculated on the basis of overburden pressure.

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 The 'rock squeeze' is 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 'rock 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 approximately 70 mm.

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 at a limited number of sections. 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.

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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 and is blocky in many places, 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.

* 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	1.9	2.62	70.0	62.5	(125)	12.7	0.37	na	6.3-19.1
	Limestone	1.2	2.65	63.0	67.0	(151)	11.4			(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 shown in brackets

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	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_i) Parameter and Compressive Strength Intercept

BH	Depth		Elevation		Confining Stresses (MPa)	Linear Regression			Simplex Technique	
	From (m)	To (m)	From (m)	To (m)		m_i	σc (MPa)	Regression Coefficient	m_i	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*	Unconfined Compressive Strength (MPa)	m_i
Lockport Dolostone				
- Eramosa	69	79	151	7.0
- Goat Island	69	79		7.0
- Gasport	72	82		7.0
DeCew Dolostone	69	79	128	7.0
Rochester Shale	64	77	42	10.0
Irondequoit Limestone	72	82	106	7.0
Reynales Dolostone	67	77	95	7.0
Neahga Shale	56	66	14	10.0
Thorold Sandstone	78	83	163	15.0
Grimsby Sandstone	70	75	155	10.0
Shale			33	
Power Glen				
• Sandstone/Shale	61	66	172	10.0
• Shale	65	70	24	10.0
Whirlpool Sandstone	85	87	216	15.0

* Adjusted RMR values are equivalent to GSI.

Table 6.10
Rock Mass Strength Parameters of Queenston Formation

Area	RMR	Unconfined Compressive Strength (MPa)	m_i
Inlet area	66	33	6.5
Tunnel alignment (general)			
Q10	55	33	6.5
Q8,9	65	33	6.5
Q6,7	71	33	6.5
Q4,5	67	46	14.5
Q1,2,3	82	46	14.5
Tunnel Alignment in area of St. Davids			
Gorge	67	33	6.5
Q6	67	46	14.5
Q5	73	46	14.5
Q3,4	76	46	14.5
Q1,2			
Outlet Area			
Q7-10	57	33	6.5
Q5-6	77	46	14.5

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)	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. Some slickensides.	$<1 \times 10^{-7}$ 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	

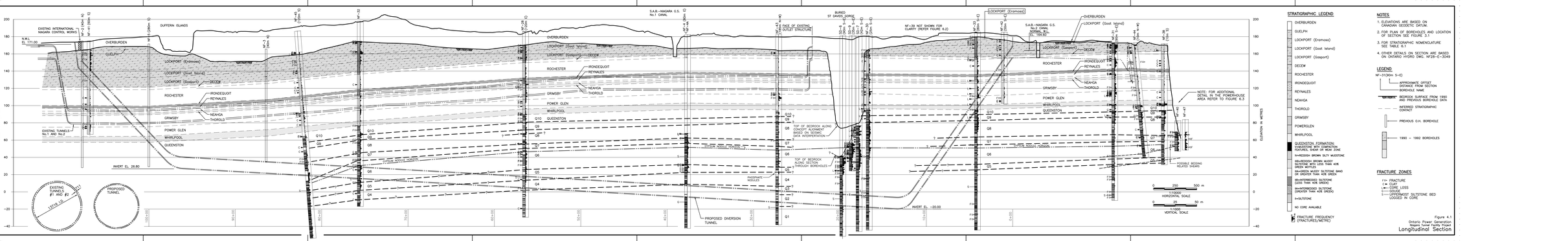


Figure 4.1
Ontario Power Generation
Niagara Tunnel Facility Project
Longitudinal Section

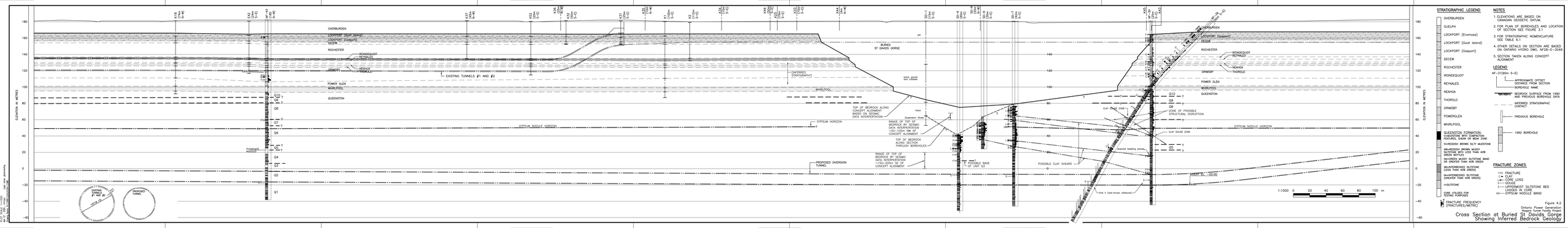


Figure 4.2

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 GR Section 4.4.4 for details on top of bedrock baseline assumptions.

Legend

- 56.4 — Interpreted bedrock elevations (metres) based on Seismic interpretation
- K–41 161.0 — Borehole location and interpreted bedrock elevation (metres)

Approximate Rim of Gorge at EL. 160 m

Rim of Gorge at EL. 160 m

Concept Tunnel Alignment

H.E.P.C. CANAL

C.N RAIL

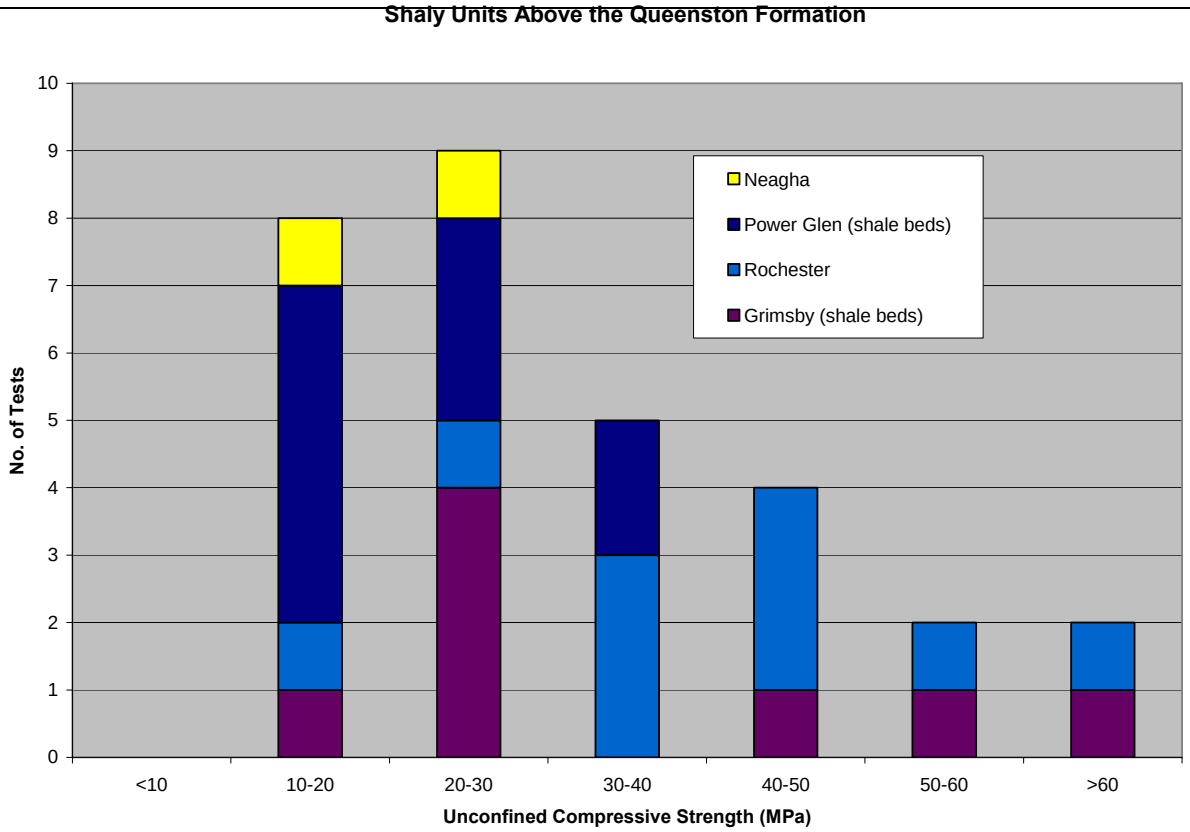
WHIRLPOOL ROAD

0 60 120 180 240 300 Metres

Scale 1:3000

Figure 4.3
Ontario Power Generation
Niagara Tunnel Facility Project
Buried St. Davids Gorge - Interpreted Elevations for Bottom of Gorge

Jun 03 , 2009 , 11:05am Login name: hugh150300
Drawing Name: Q:\Project\Drawings\St Davids Gorge\Fig4.3 June 4, 2009.dwg



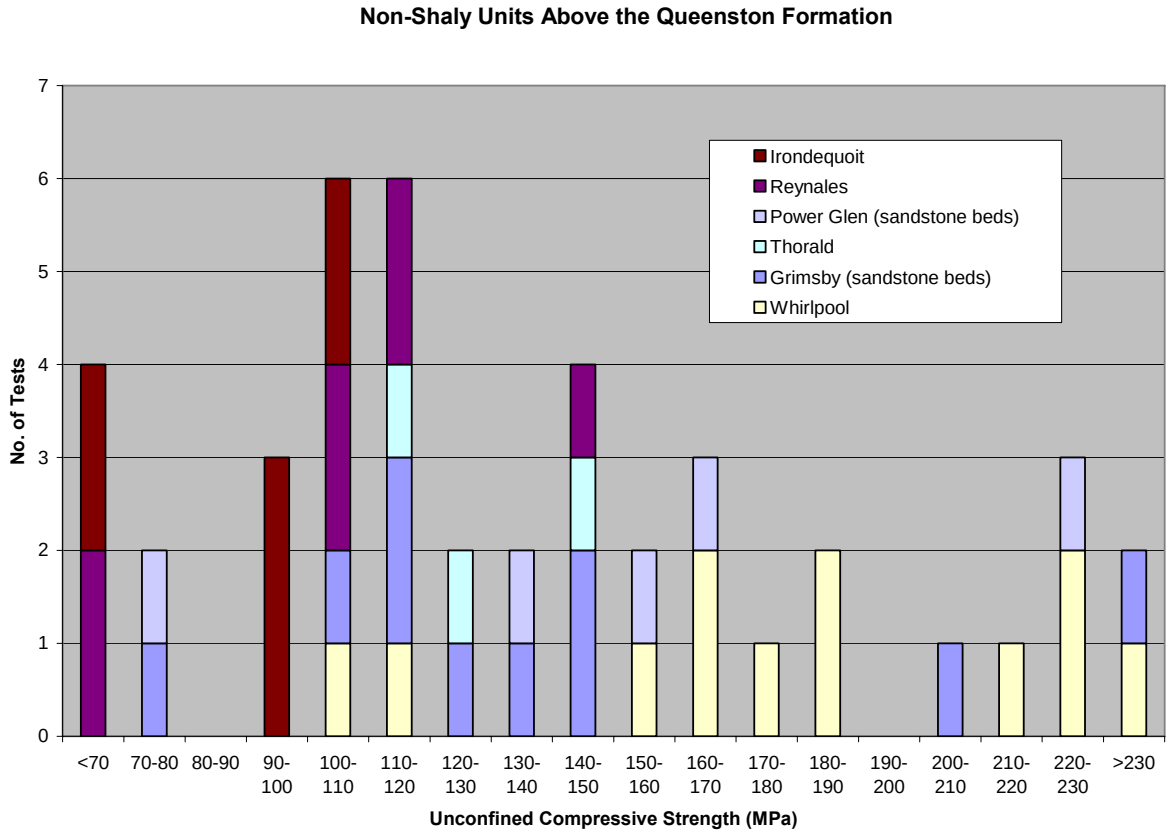
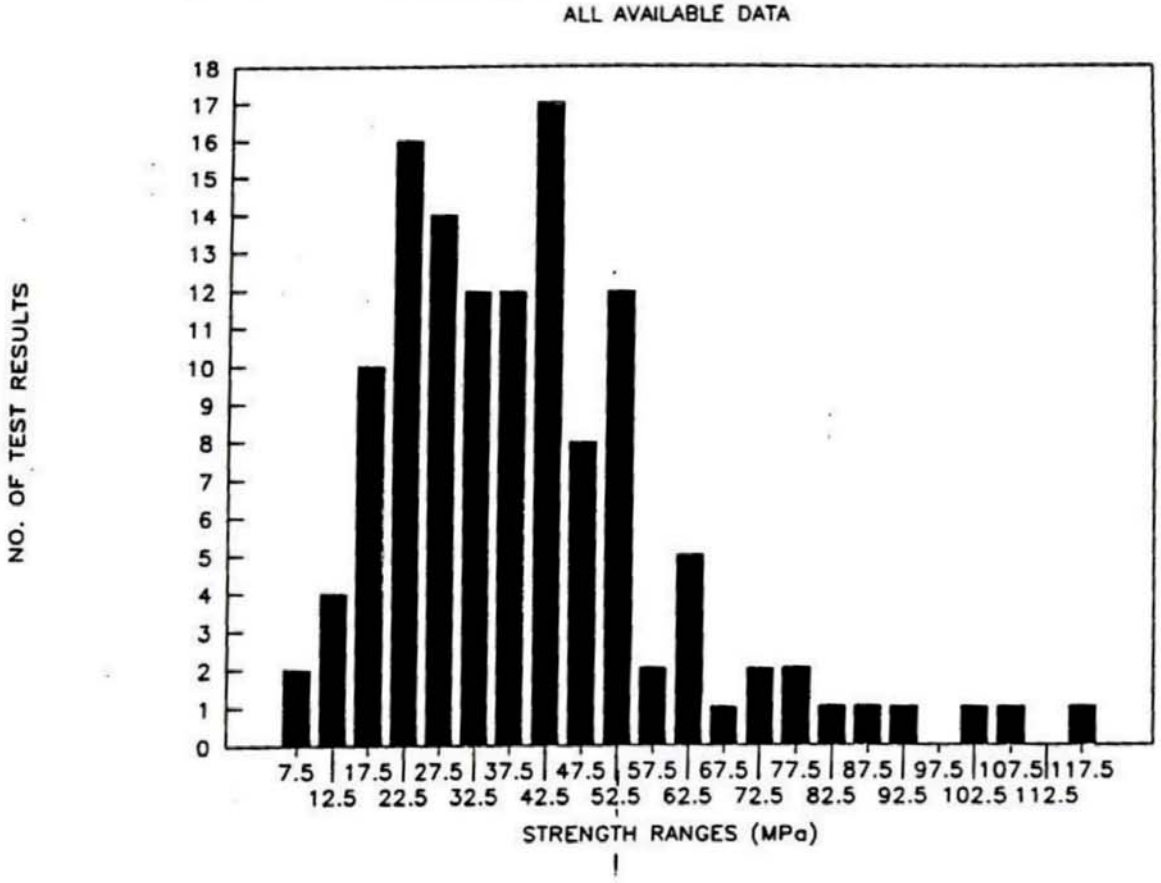


Figure 6.1

Ontario Power Generation

Niagara Tunnel Facility Project

Uniaxial Compressive Strengths of Rocks above the Queenston



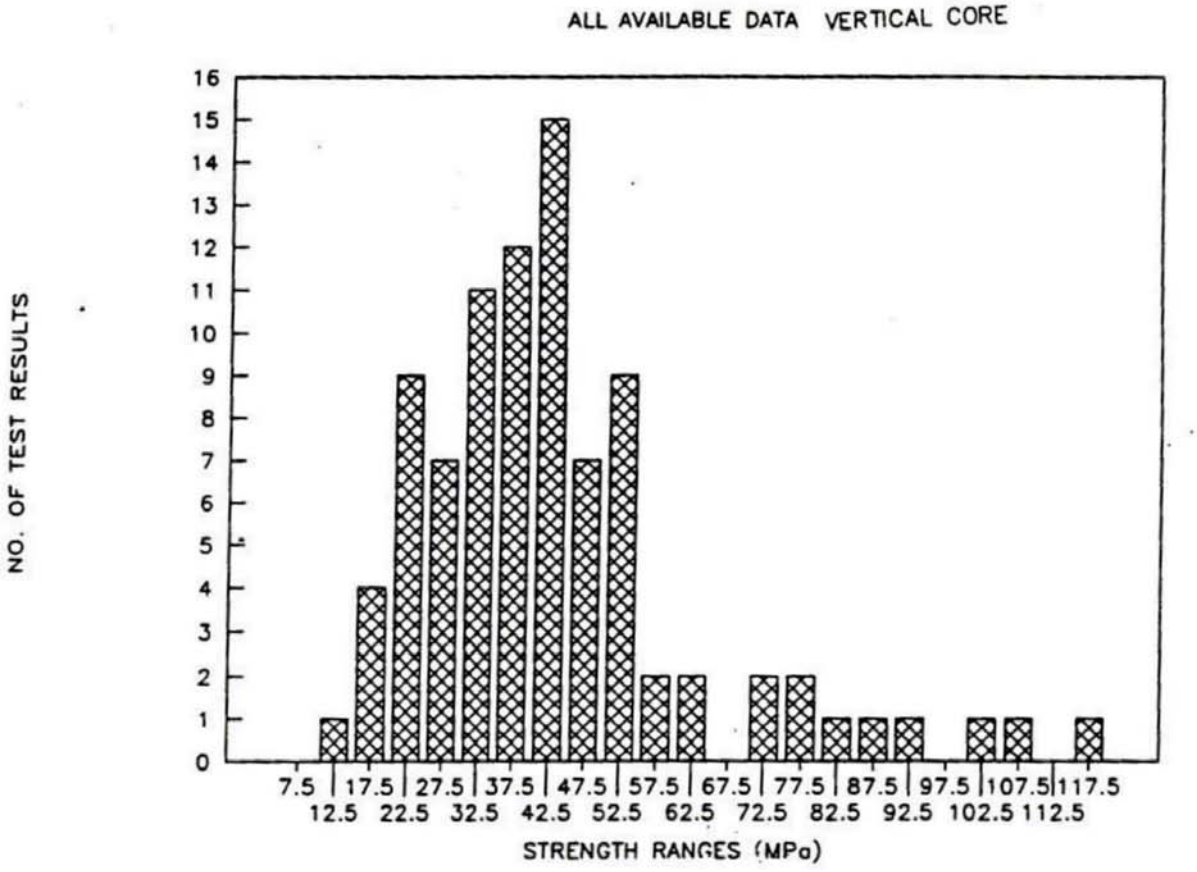
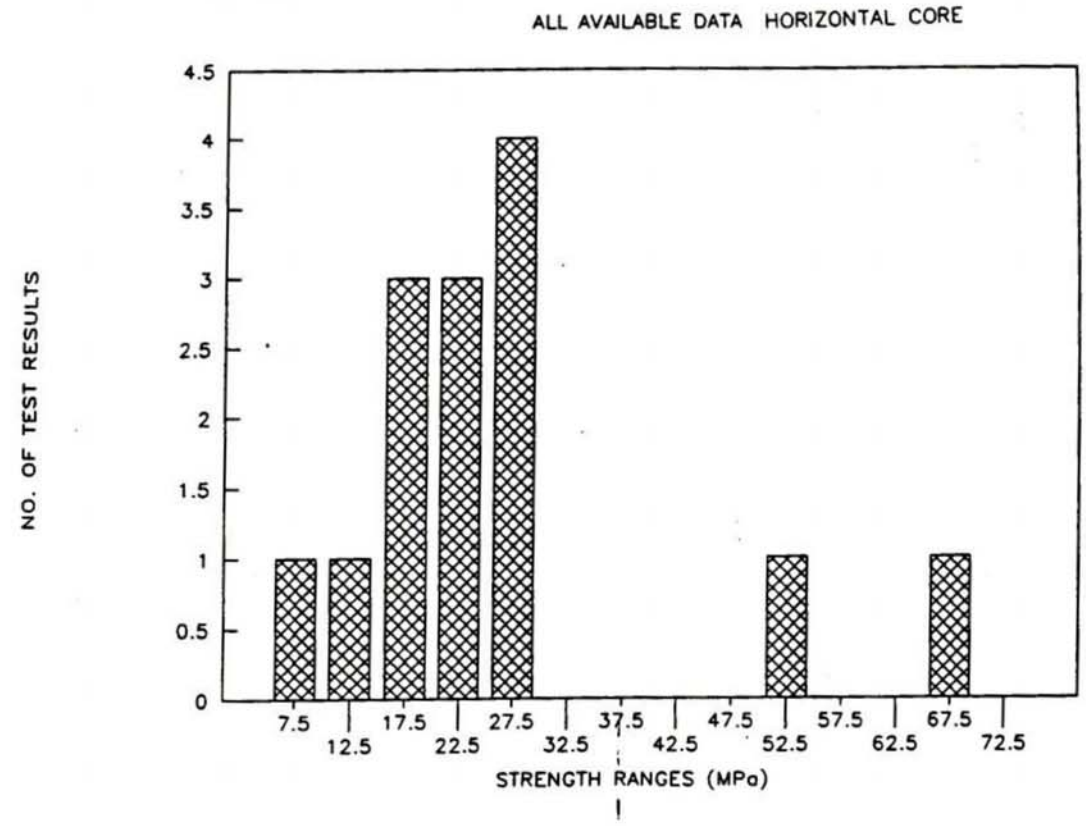


Figure 6.2

Ontario Power Generation

Niagara Tunnel Facility Project

Queenston Uniaxial Strength – All Data



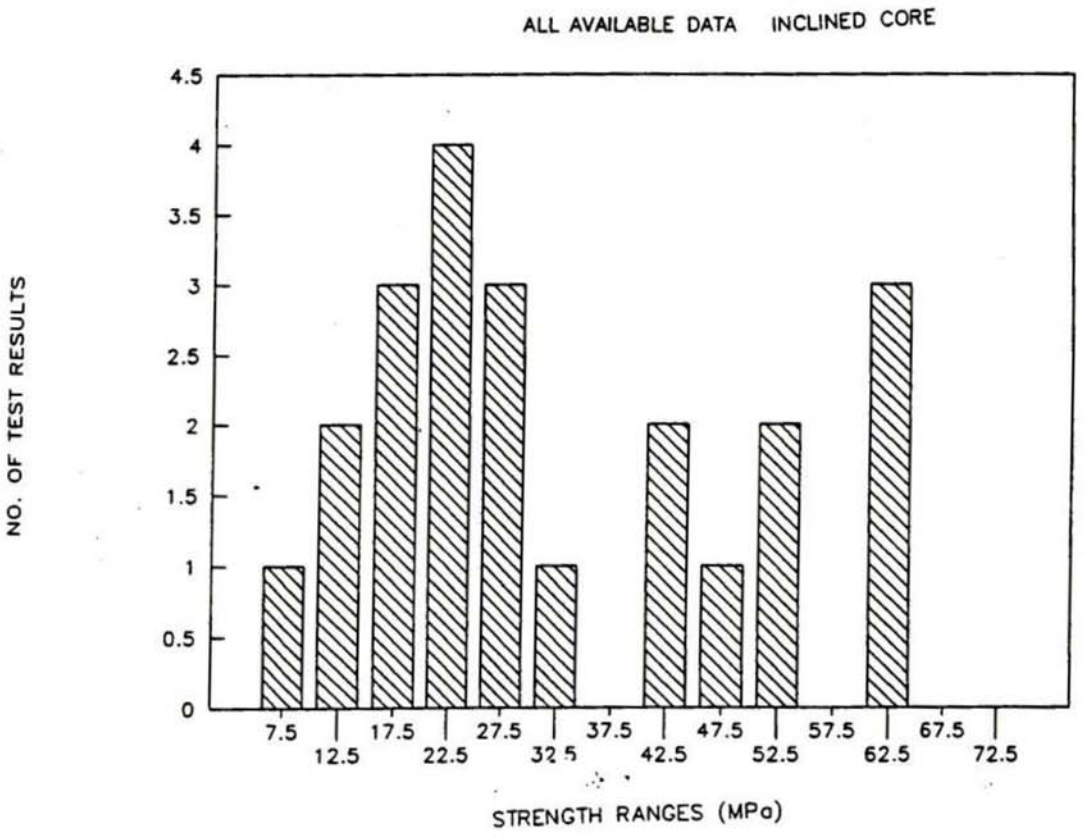
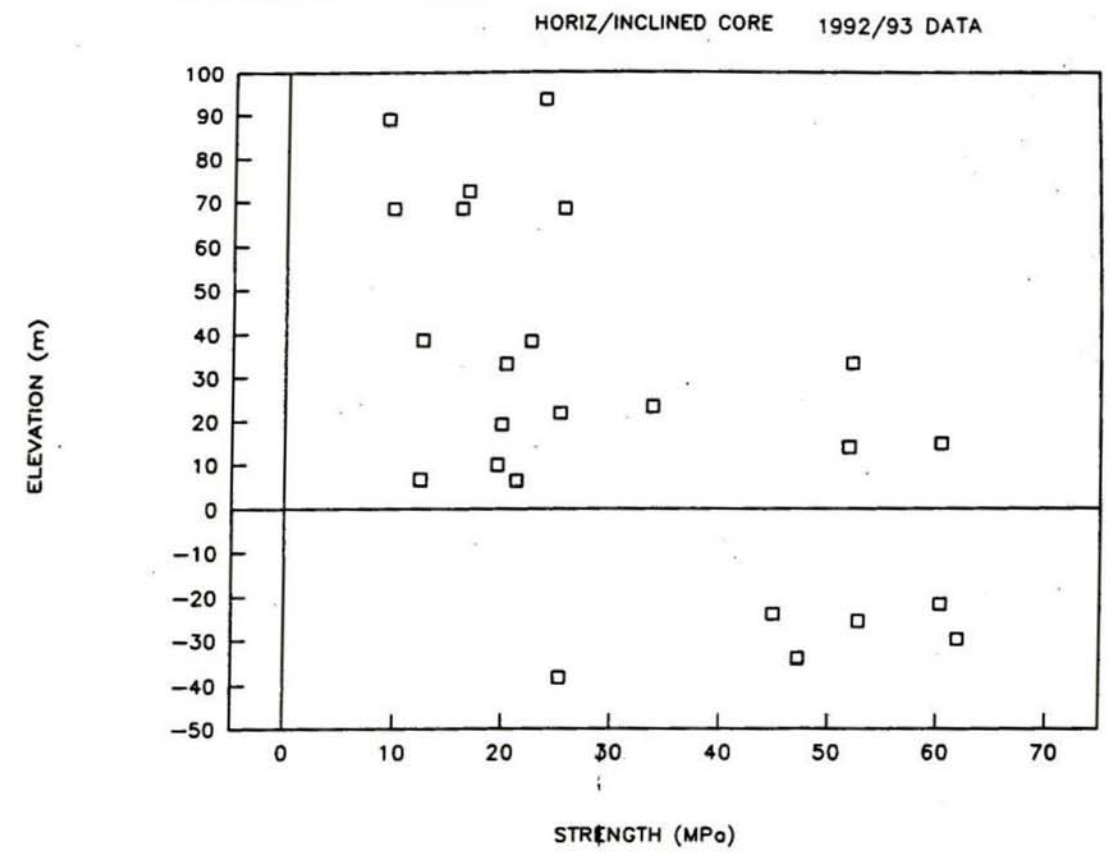


Figure 6.3

Ontario Power Generation

Niagara Tunnel Facility Project

Queenston Uniaxial Strength – All Data for Horizontal and Inclined Core



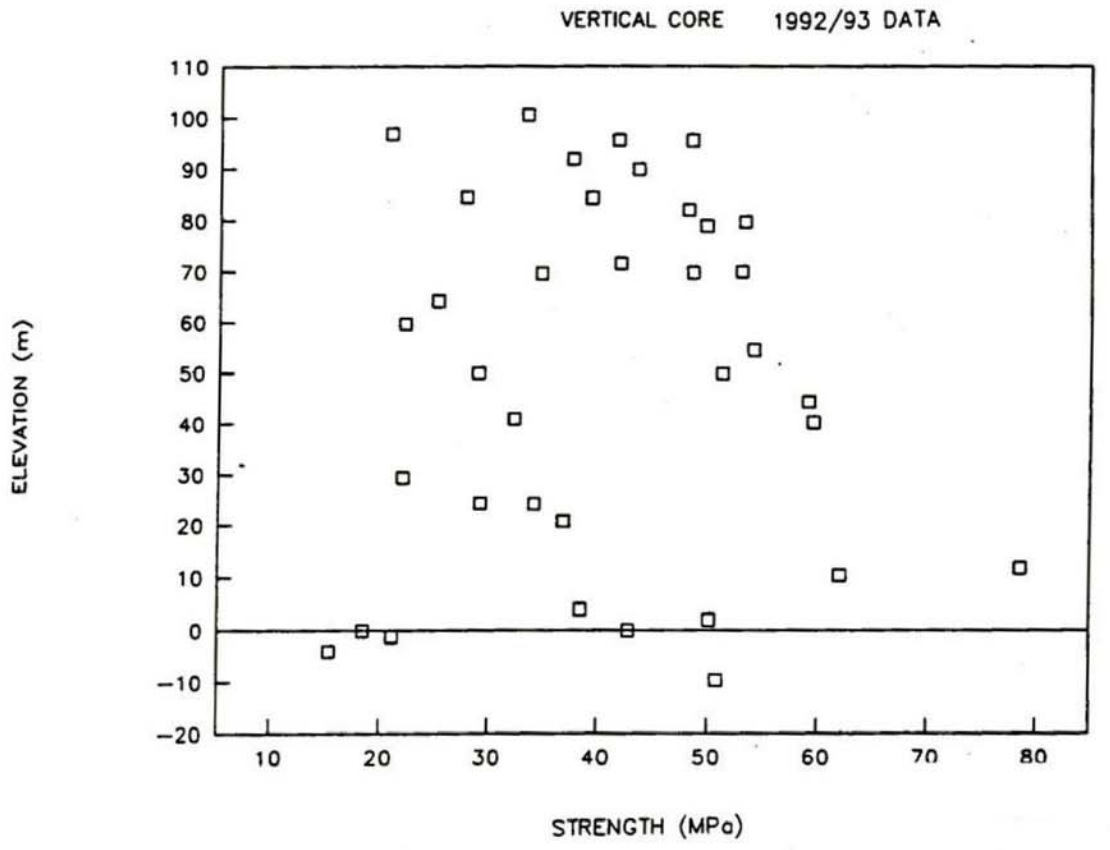
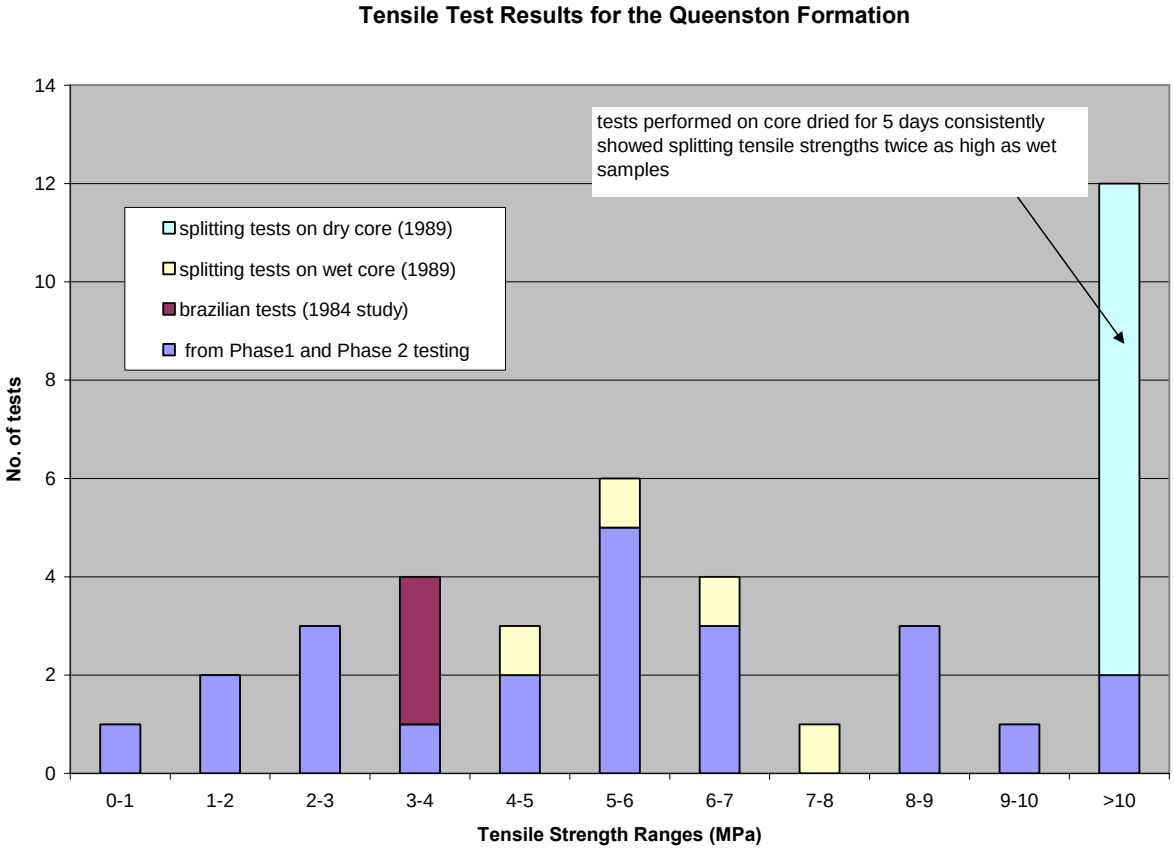


Figure 6.4

Ontario Power Generation

Niagara Tunnel Facility Project

Queenston Uniaxial Strength – by Core Orientation



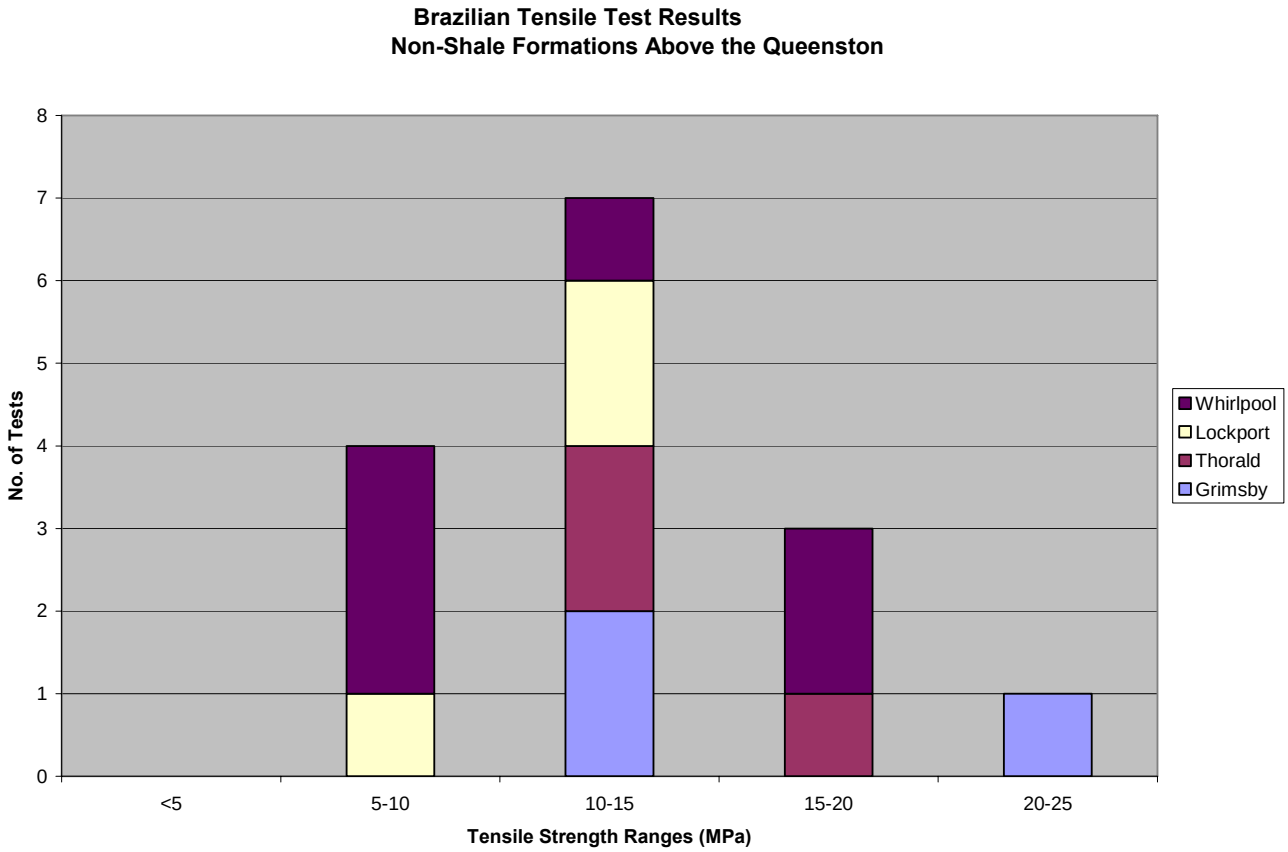


Figure 6.5
Ontario Power Generation
Niagara Tunnel Facility Project
Tensile Strengths

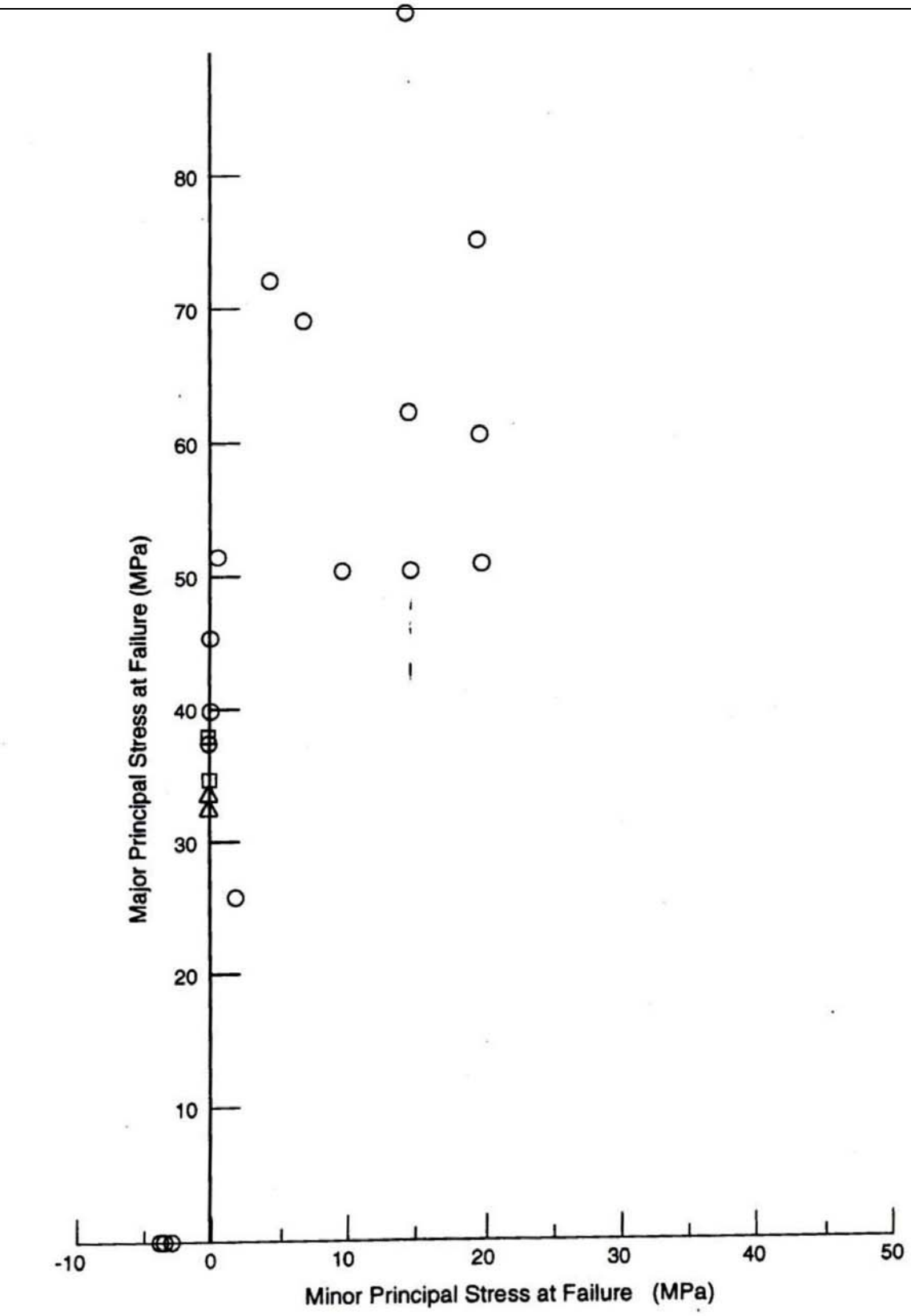


Figure 6.6

Ontario Power Generation

Niagara Tunnel Facility Project

Compressive Strength of Queenston Shale – Diversion Tunnels

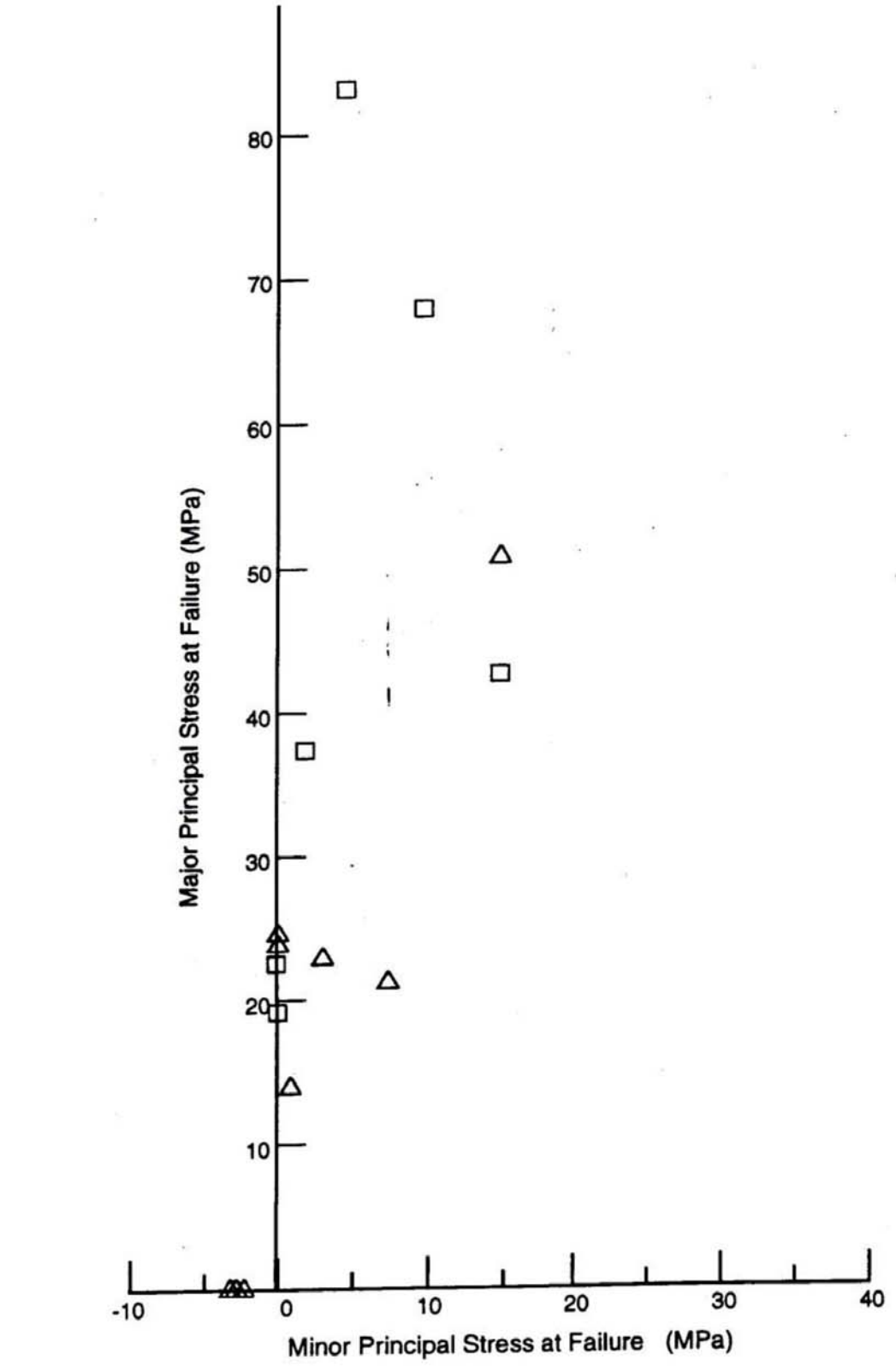
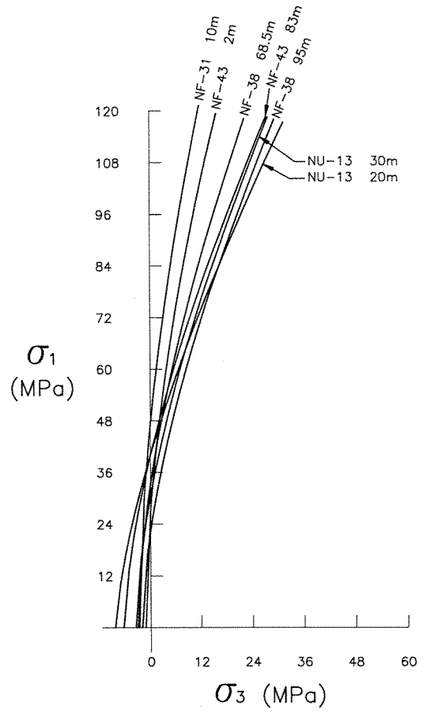


Figure 6.7

Ontario Power Generation

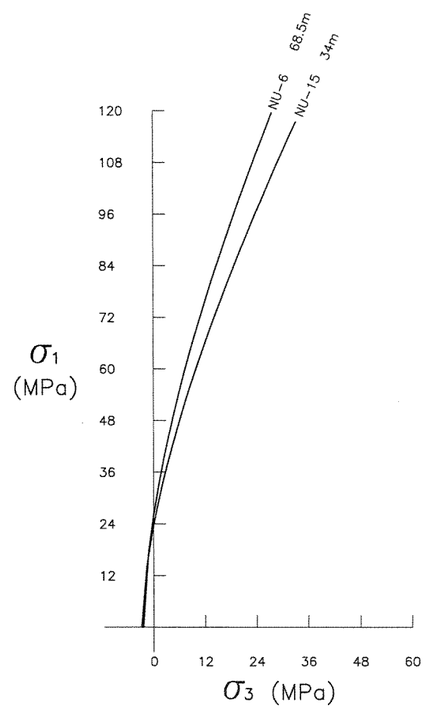
Niagara Tunnel Facility Project

Compressive Strength of Queenston Shale – Powerhouse



VERTICAL SAMPLES

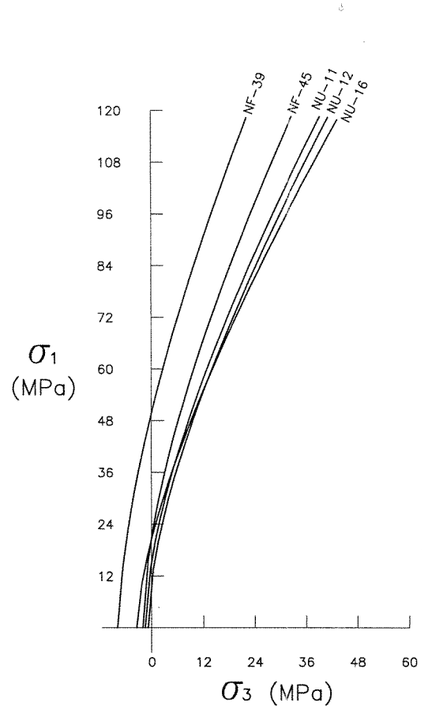
BOREHOLE	ELEVATION	m*	σc (MPa)
NF-31	10m	17.63	47.22
NF-43	2m	23.60	27.15
NF-38	68.5m	11.00	33.23
NF-43	83m	6.21	39.87
NU-13	30m	8.67	30.47
NF-38	95m	11.31	22.37
NU-13	20m	4.64	39.95



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

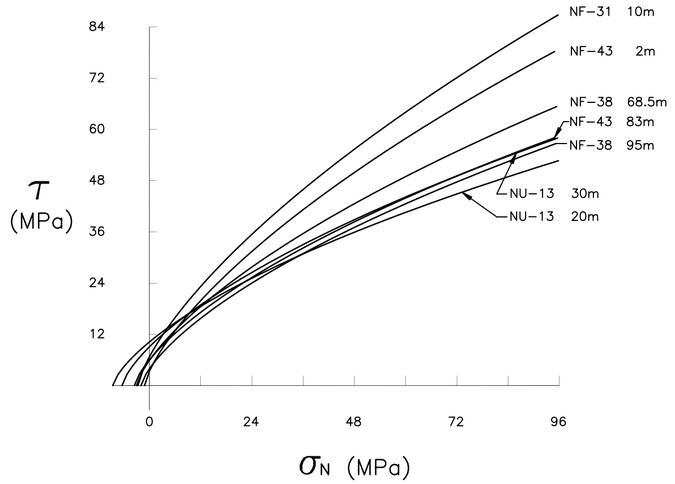


INCLINED SAMPLES

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

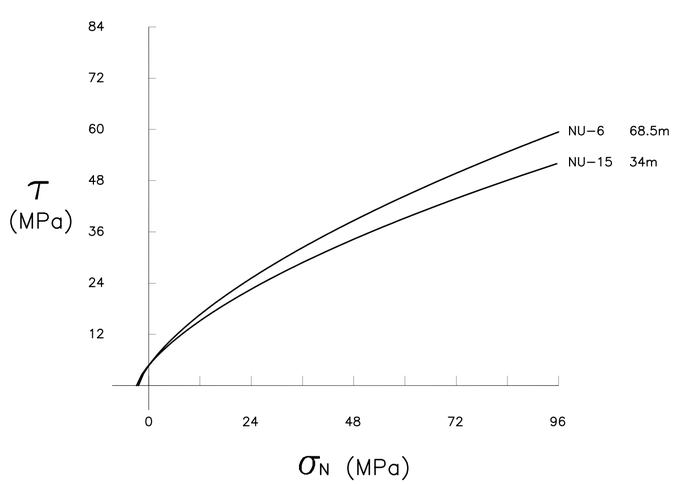
Figure 6.8
Ontario Power Generation
Niagara Tunnel Facility Project
Summary of Rock Strength Testing 1

1:\59811\Civil\V1\GI\6-8.DWG, Layout1, 12/08/2005 2:32:19 PM, Park110733, PostScript Level 2 [EPS].pc3, 1:1.34



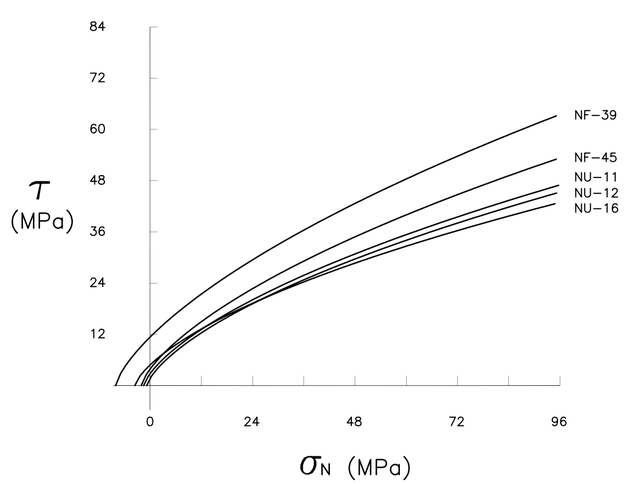
VERTICAL SAMPLES

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



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

* HOEK–BROWN FAILURE CRITERION

Figure 6.9
Ontario Power Generation
Niagara Tunnel Facility Project
Summary of Rock Strength Testing 2

R:\15981\CIVI\V1GI6–9.DWG
PLOT SCALE 1=1
Plot Date: NOV 17, 2004 – 14:58:39
15981\CIVI\V1GI6-8.DWG, Model, 11/17/2004 2:58:55 PM, MNealund, PostScript Level 2 [EPS].pc3, 1:1

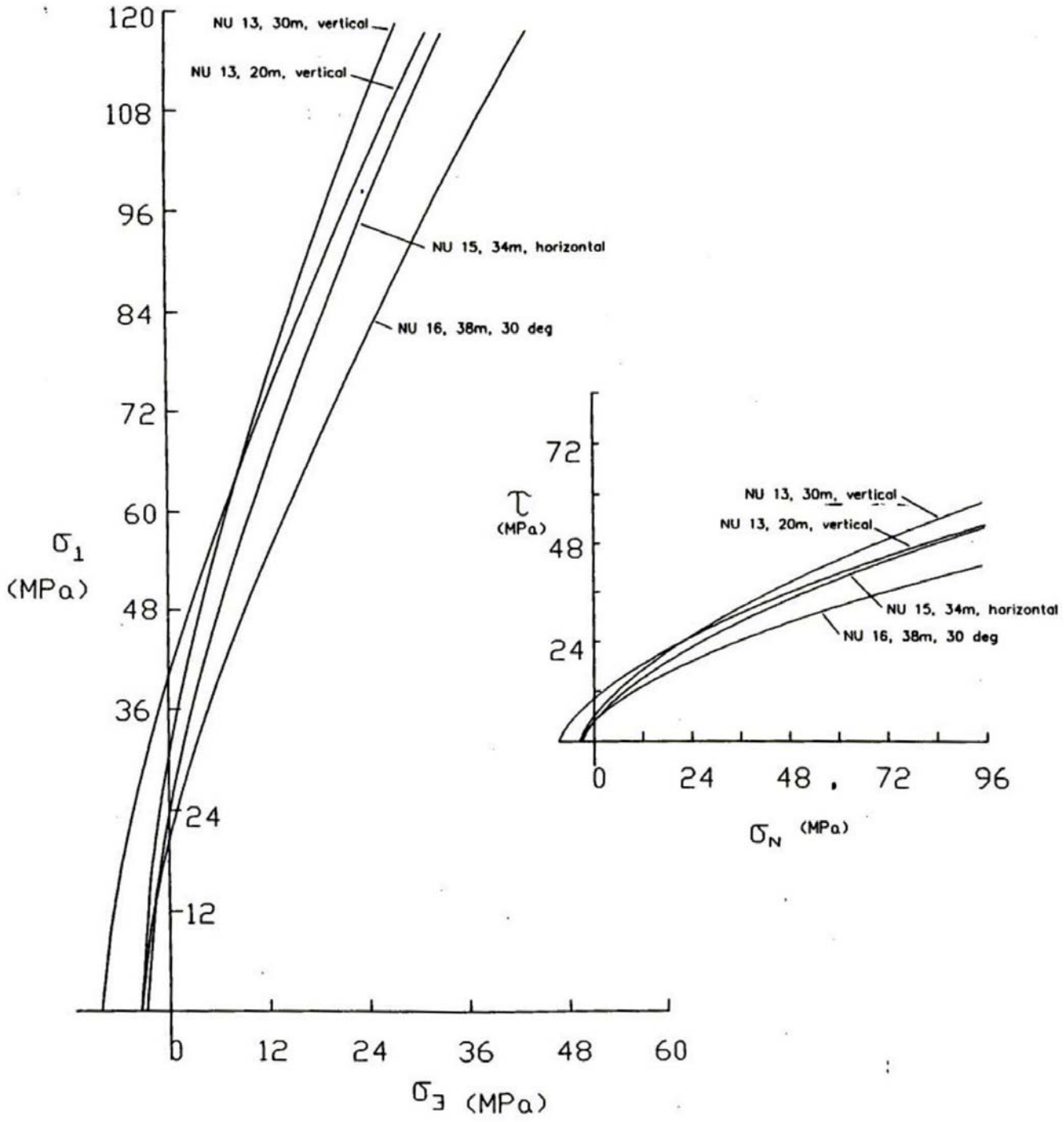


Figure 6.10
Ontario Power Generation
Niagara Tunnel Facility Project
Strength Envelopes – Trial Enlargement Area

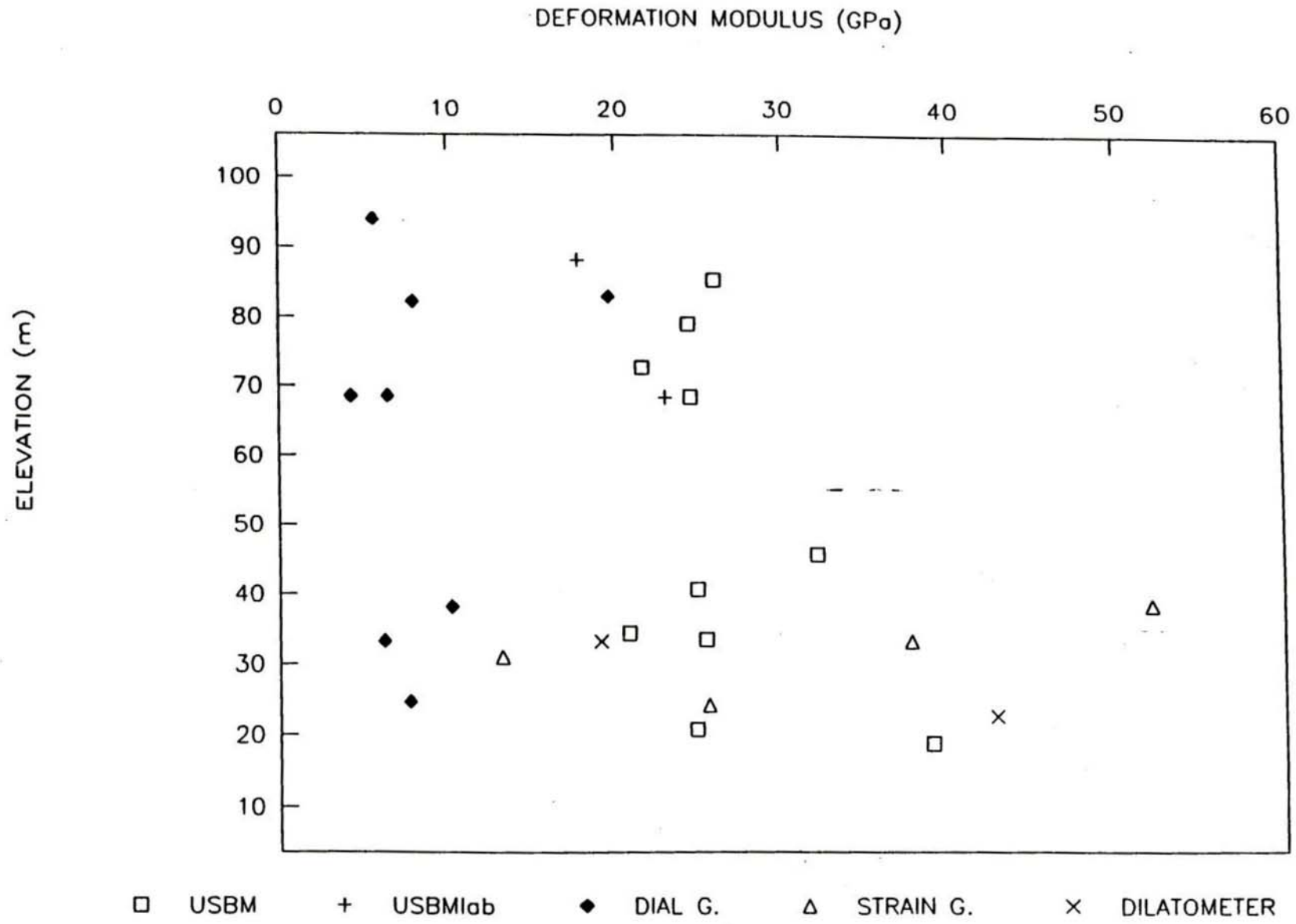


Figure 6.11
Ontario Power Generation
Niagara Tunnel Facility Project
Deformation Moduli Values – All Data

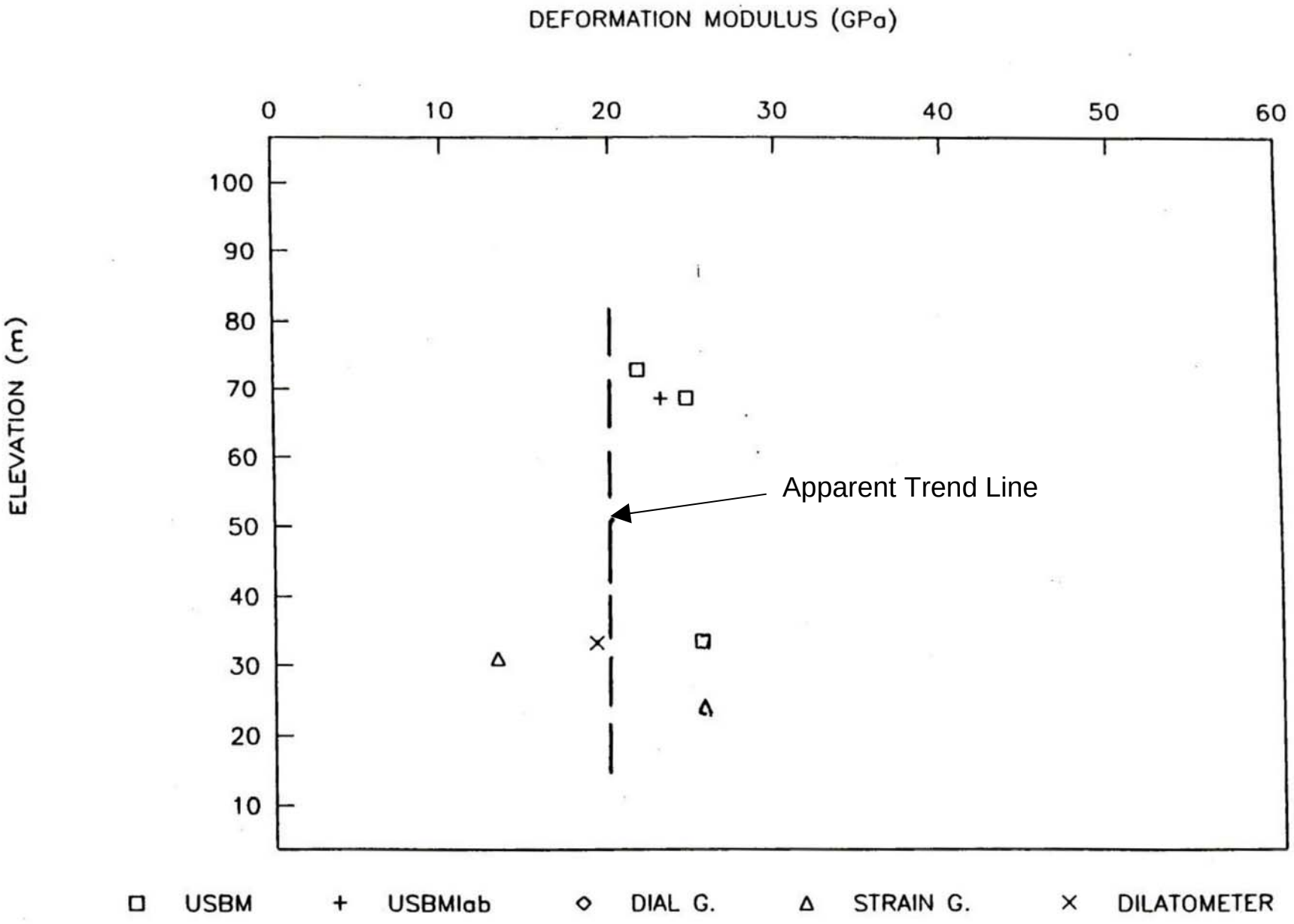


Figure 6.12
Ontario Power Generation
Niagara Tunnel Facility Project
Deformation Moduli Values – Vertical Plane

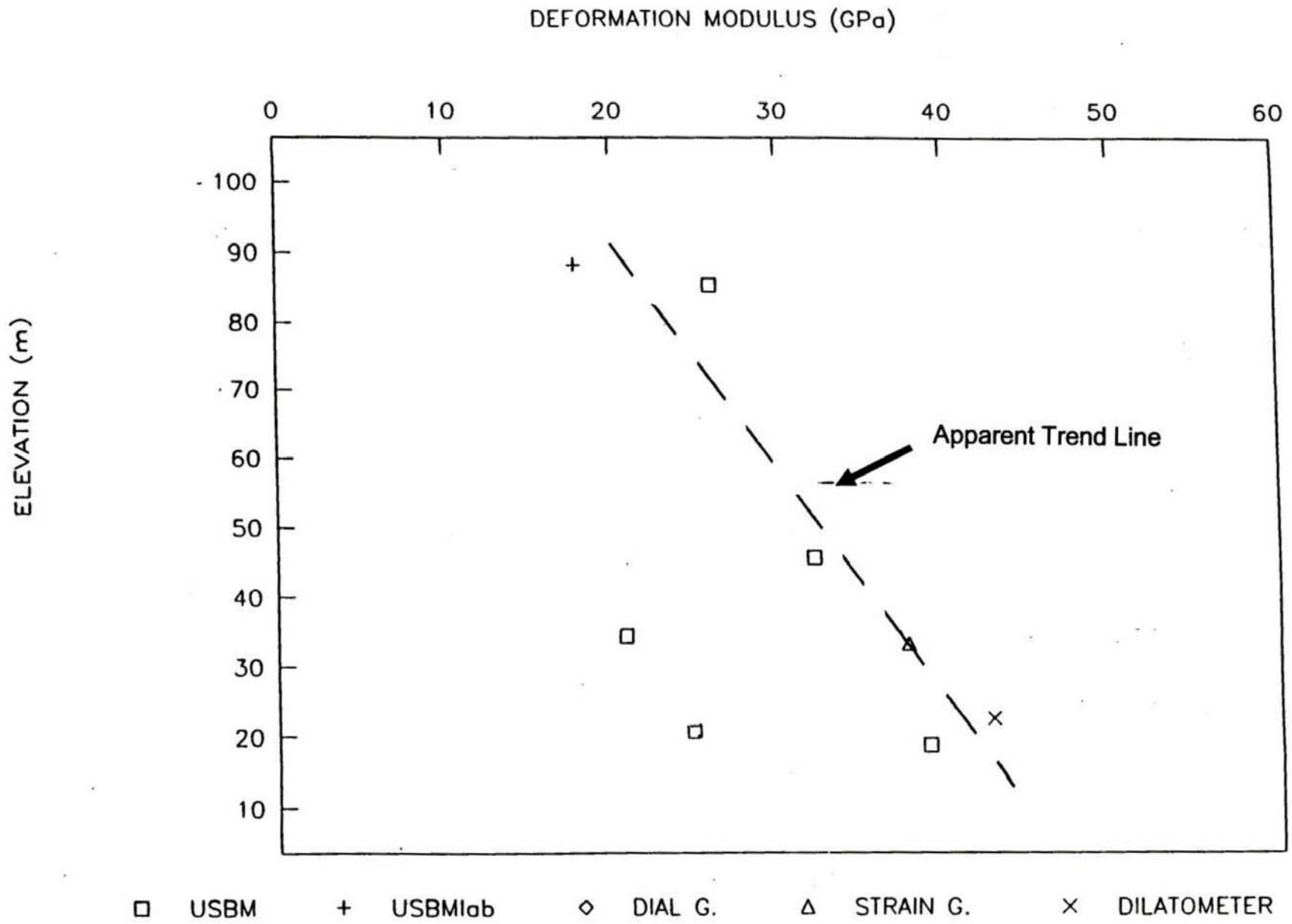


Figure 6.13

Ontario Power Generation

Niagara Tunnel Facility Project

Deformation Moduli Values – Horizontal Plane

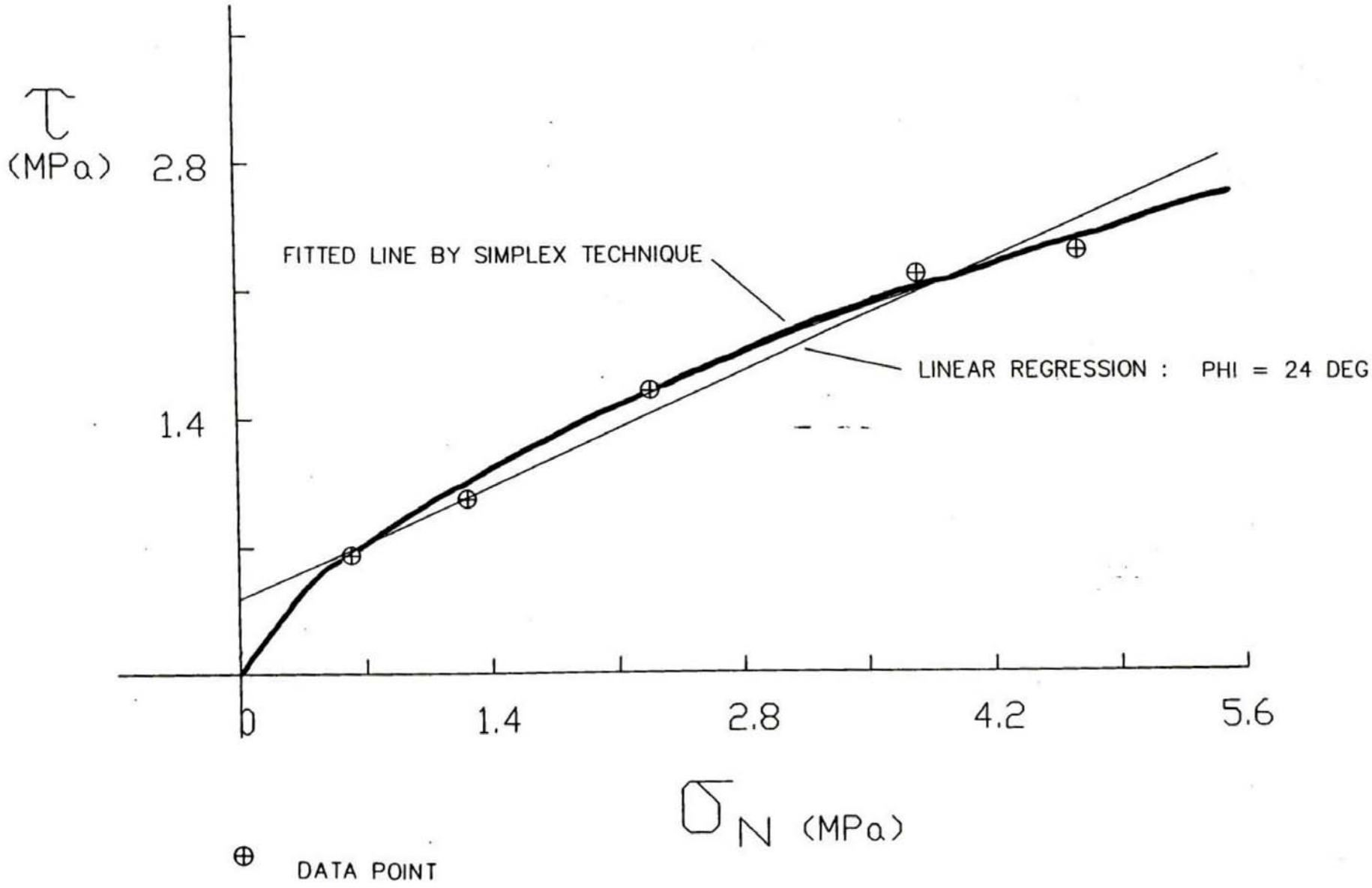


Figure 6.14
Ontario Power Generation
Niagara Tunnel Facility Project
Direct Shear – Bedding Plane BP8

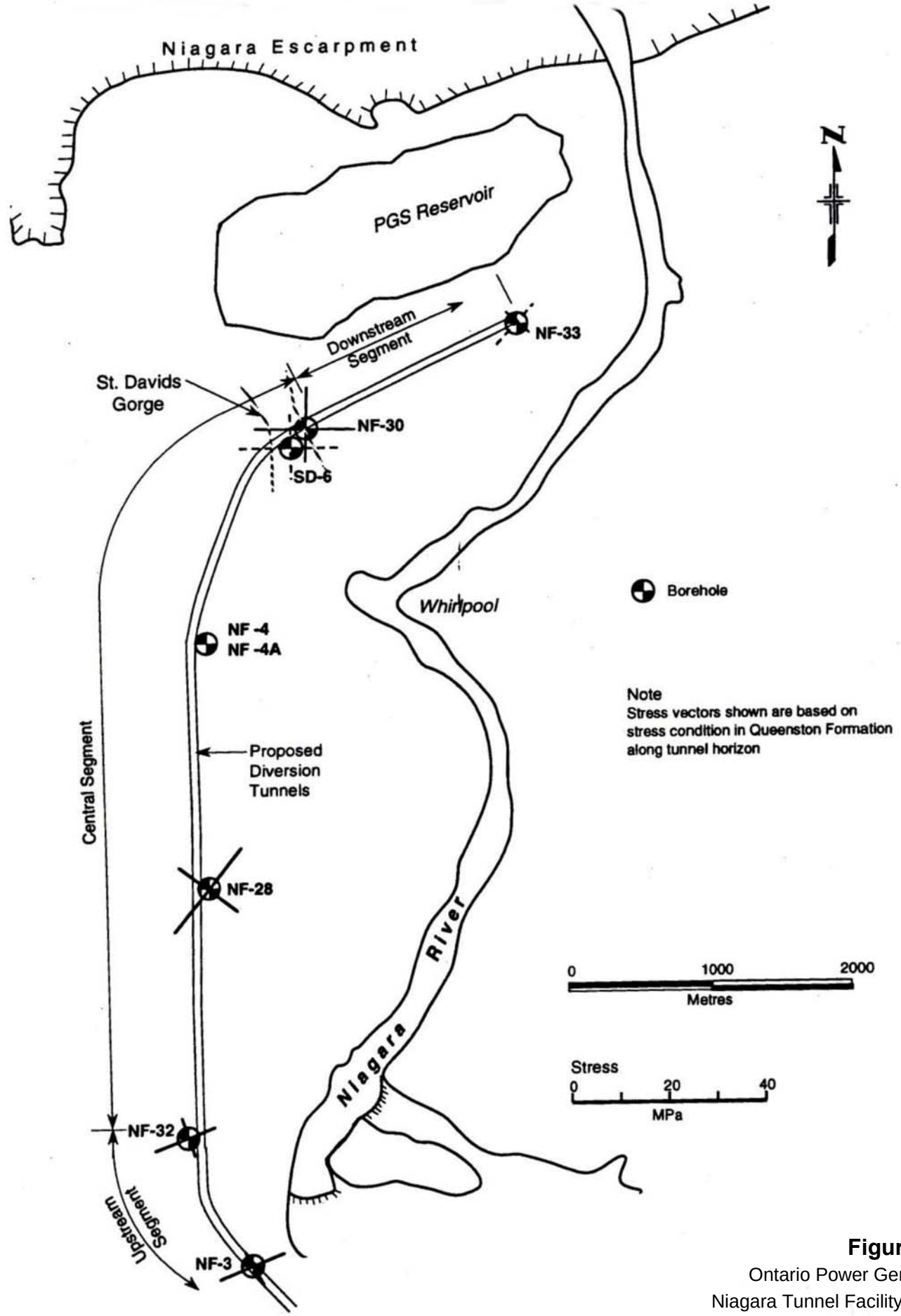
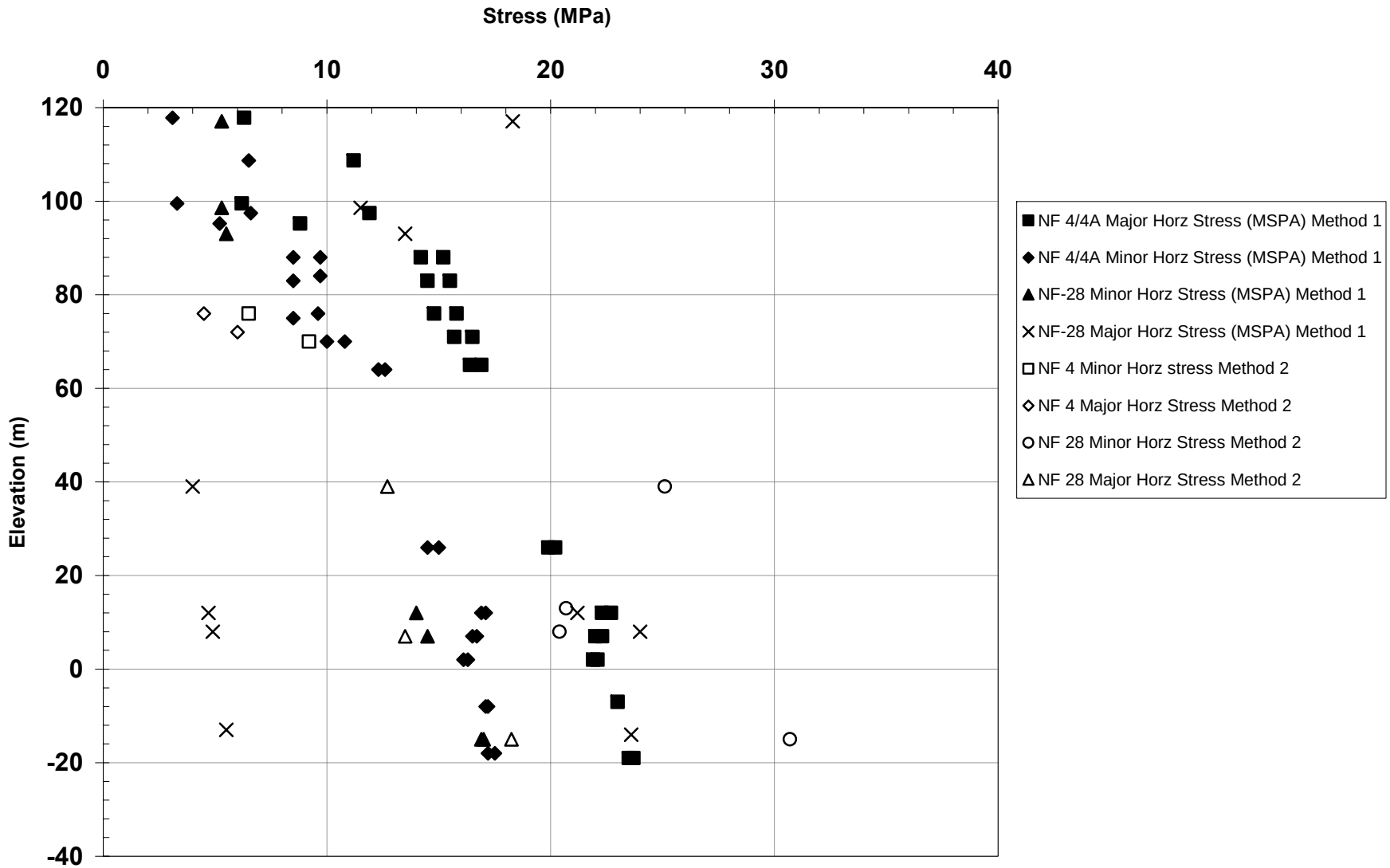


Figure 6.15

Ontario Power Generation

Niagara Tunnel Facility Project

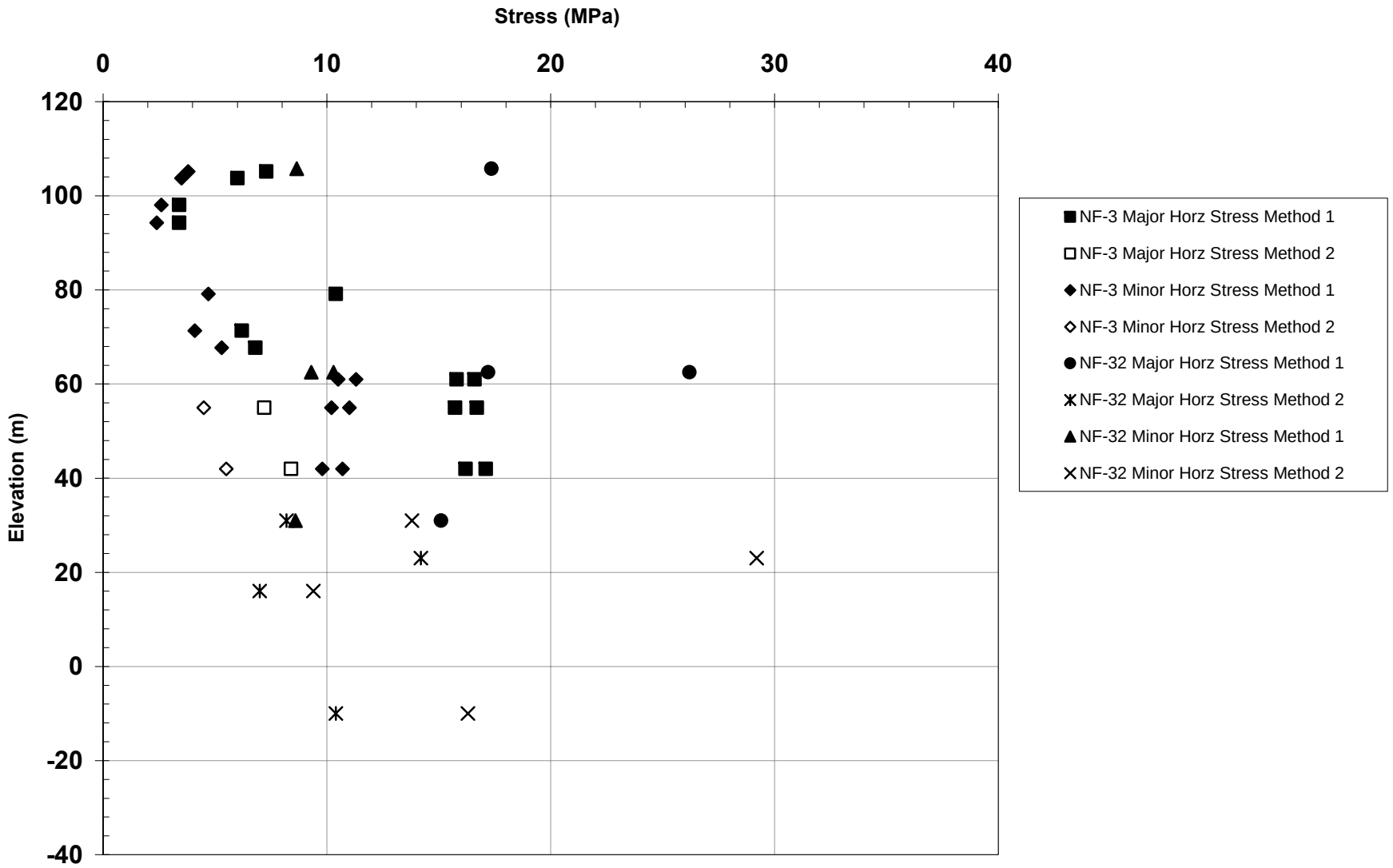
Stress Orientations in Queenston Formation



Method of Analysis:

1. Modified Stress Path Analysis (MSPA) (Hefney and Lo, 1992)
2. Conventional stress analysis on vertical fractures only.

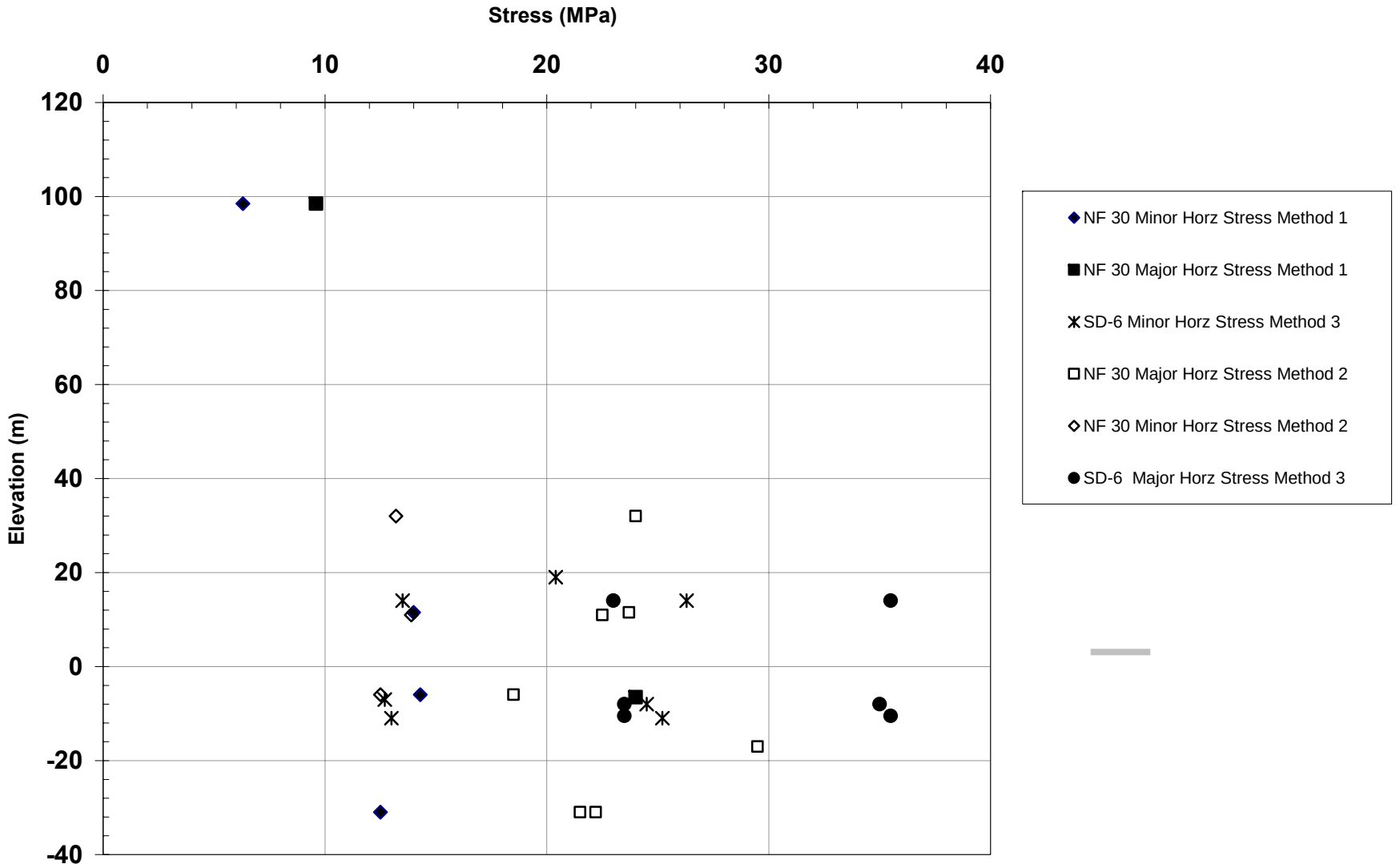
Figure 6.16
Ontario Power Generation
Niagara Tunnel Facility Project
Sta 2+000 to 7+600



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



Method of Analysis:

1. Modified Stress Path Analysis (MSPA) (Hefney and Lo, 1992)
2. Conventional stress analysis on vertical fractures only.
3. Ljungguen and Anadei (1989) based on horizontal fracture data.

Figure 6.18
Ontario Power Generation
Niagara Tunnel Facility Project
Sta 0+000 to 2+000

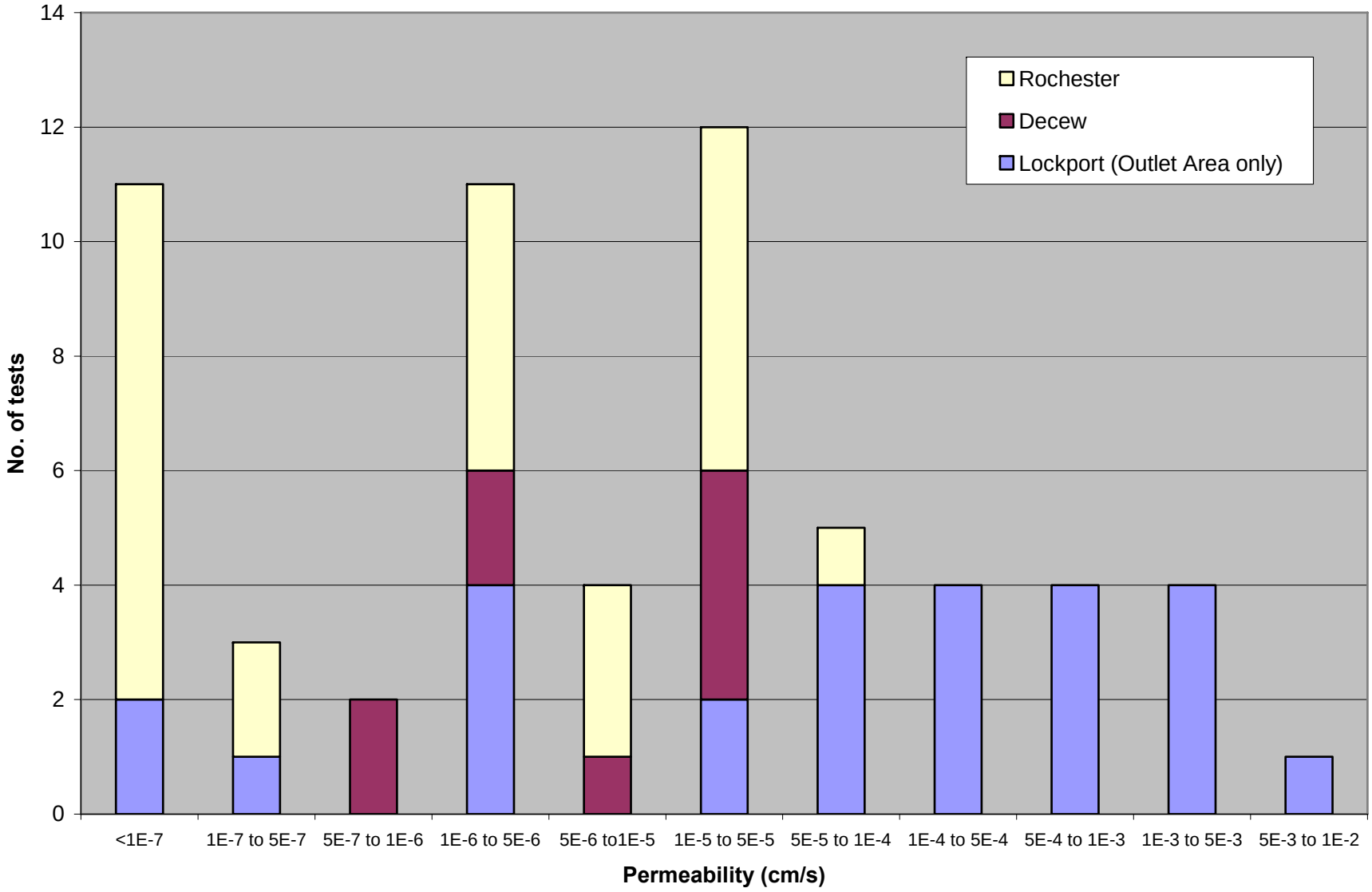


Figure 6.19

Ontario Power Generation

Niagara Tunnel Facility Project

Permeability of the Lockport (Outlet Area), Decew and Rochester Formations

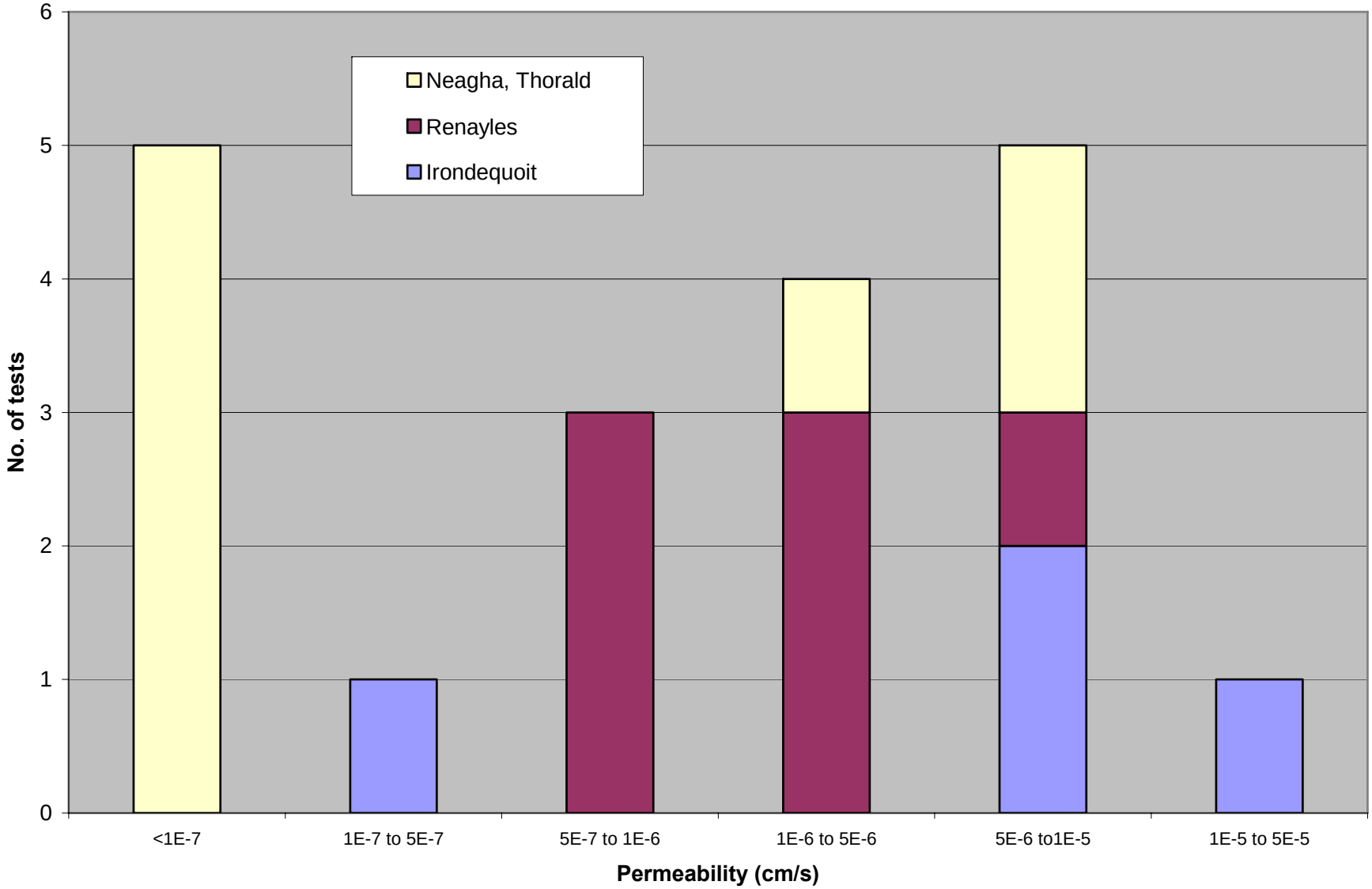


Figure 6.20

Ontario Power Generation

Niagara Tunnel Facility Project

Permeability of the Irondequoit, Renayles, Neagha, Thorold

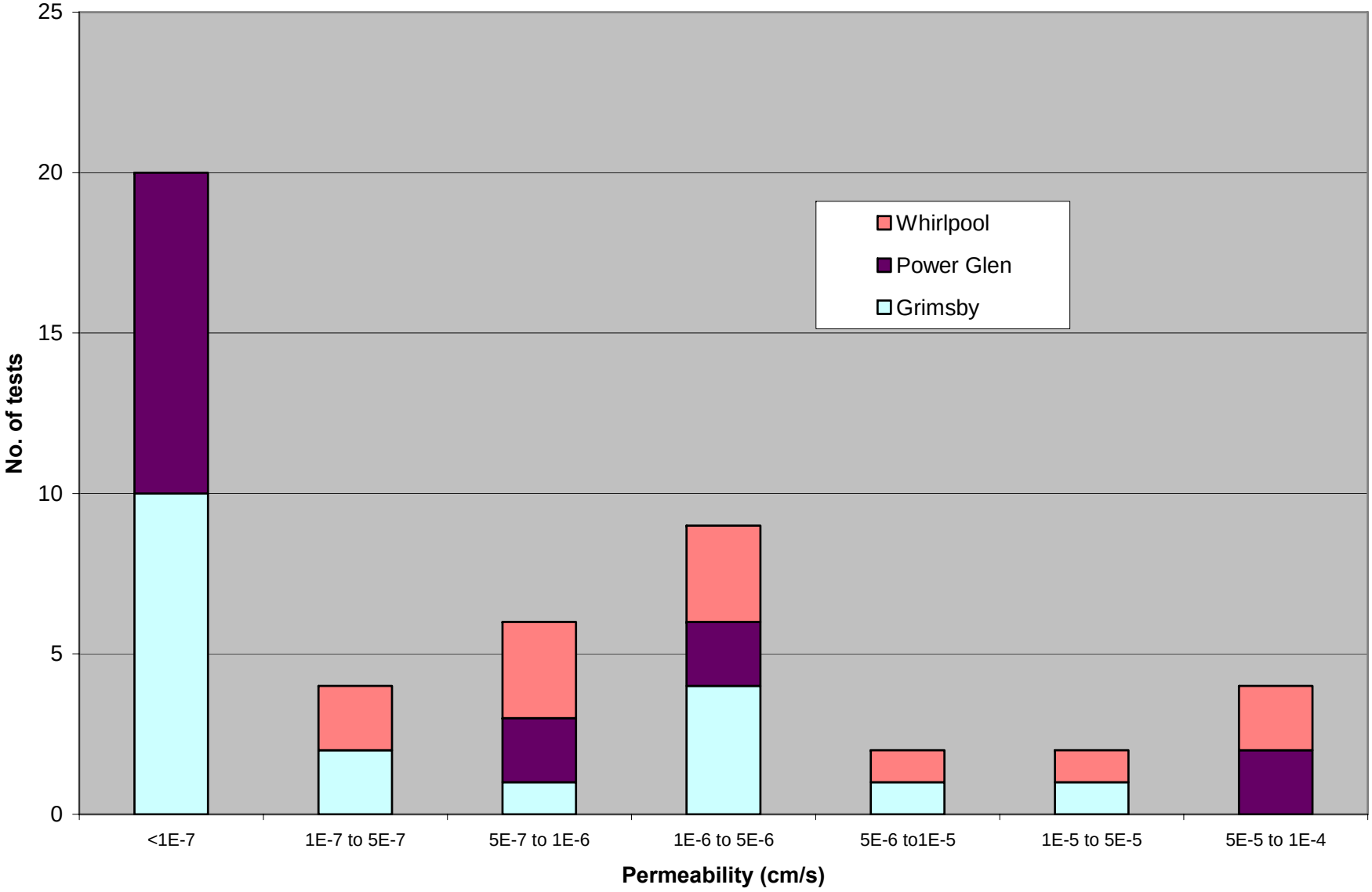


Figure 6.21

Ontario Power Generation

Niagara Tunnel Facility Project

Permeability of the Grimsby, Power Glen and Whirlpool

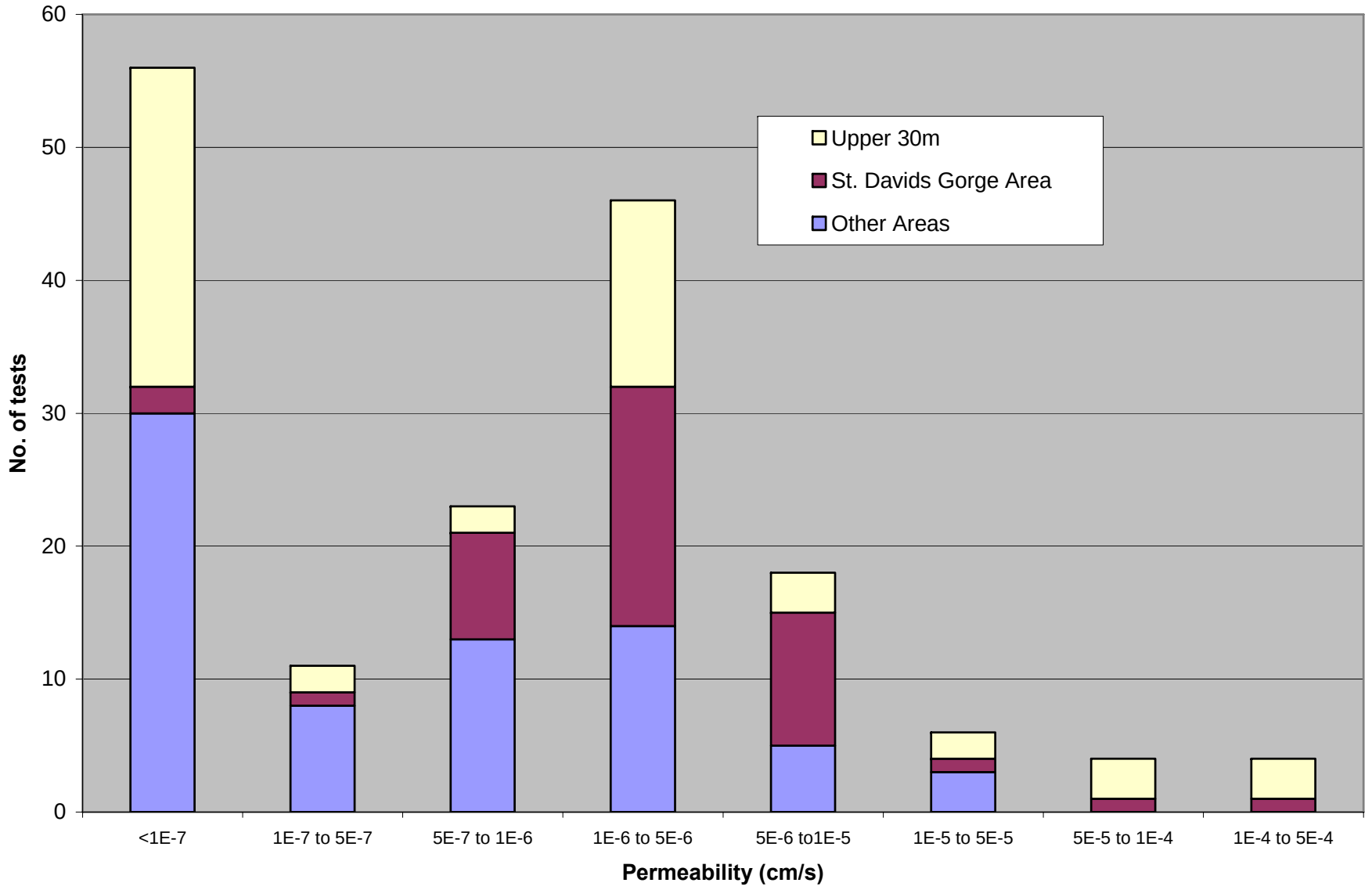


Figure 6.22

Ontario Power Generation

Niagara Tunnel Facility Project

Permeability of the Queenston Formation

Appendix 5.9(a)
Dispute Notice

Appendix 5.9(a) - Dispute Notice

INTENT TO RESOLVE DISPUTE NOTICE

To: •

Contract: Amended Design/build Agreement (the "**Agreement**") dated as of December 1, 2008 between Ontario Power Generation Inc. and Strabag Inc. (the "**Contractor**")

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 5.9(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 5.9 of the Agreement:

• ***[Describe disputed matter]***

■

By: _____

Name:

Title:

Appendix 7.1
INTENTIONALLY DELETED

Appendix 7.1 - INTENTIONALLY DELETED

Appendix 7.2
INTENTIONALLY DELETED

Appendix 7.2 - INTENTIONALLY DELETED

Appendix 7.3(a)
INTENTIONALLY DELETED

Appendix 7.3(a) - INTENTIONALLY DELETED

Appendix 7.3(b)
Retail Sales Tax Exemption

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.

.../3

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)
Notice of Ready for Use

Appendix 7.9(a) - Notice of Ready for Use

NOTICE OF READY FOR USE

To: Ontario Power Generation Inc. ("OPG")	Contract: Amended Design/Build Agreement (the "**Agreement**") dated as of December 1, 2008 between Strabag Inc. (the "Contractor") and OPG 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 INC.

By: _____

Name:

Title:

Appendix 7.9(a)(8)
Affidavit of Design Professional

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 Amended Design/Build Agreement between Ontario Power Generation Inc. and Strabag Inc. (the "Contractor") dated as of December 1, 2008 (the "Amended 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 Amended Design/Build Agreement. A copy of the Amended 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 Amended 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 Amended 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)
Substantial Completion Confirmation Form

Appendix 7.9(b) - Substantial Completion Confirmation Form

CONFIRMATION OF SUBSTANTIAL COMPLETION

To: **STRABAG Inc.** (the "Contractor")	Contract: Amended Design/Build Agreement (the "**Agreement**") dated as of December 1, 2008 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
Final Completion Form

Appendix 7.10 - Final Completion Form

CONFIRMATION OF FINAL COMPLETION

To: STRABAG Inc**.** (the "Contractor")	Contract: Amended Design/Build Agreement (the "**Agreement**") dated as of December 1, 2008 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 7.13(b)
INTENTIONALLY DELETED

Appendix 7.13(b) - INTENTIONALLY DELETED

Appendix 7.14(a)
Final Payment Related Documents

Appendix 7.14(a) - Final Payment Related Documents

Certificate - Application for Final Payment

TO: Ontario Power Generation Inc. ("OPG")

RE: Amended Design/Build Agreement (the "Agreement") between OPG and Strabag Inc. (the "Contractor"), dated as of December 1, 2008 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:

(b) as built drawings;

(c) maintenance and operating instructions;

(d) security documents;

(e) certificates of insurance;

(f) certificates of insurance;

(g) certificates of inspection;

(h) all documents required to be maintained at the Site in accordance with Section 2.15(a) of the Agreement; and

(i) 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 7.14 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 7.14(a) 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 7.14 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:

(j) 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

(k) 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 INC.

By: _____

Name:

Title:

Release - Application for Final Payment

TO: Ontario Power Generation Inc. ("OPG")

RE: Amended Design/Build Agreement (the "Agreement") between OPG and Strabag Inc. (the "Contractor"), dated as of December 1, 2008 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 7.14 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:

(l) any member of the OPG Group; or

(m) 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:

(n) 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

(o) 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 INC.

By: _____

Name:

Title:

[Modify as required for signature by a Subcontractor]

Statutory Declaration - Application for Final Payment

CANADA	)	IN THE MATTER OF THE AMENDED DESIGN/BUILD
	)	AGREEMENT BETWEEN ONTARIO POWER
	)	GENERATION INC. AND STRABAG INC.
PROVINCE OF ONTARIO	)	DATED AS OF DECEMBER 1, 2008 FOR
	)	THE NIAGARA TUNNEL FACILITY
	)	PROJECT (the "Agreement")

I, **[•]**, of the **[City]** of **[•]**, Ontario, do solemnly declare that:

I am the **[title]** of Strabag Inc. 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

(p) payments due to Subcontractors;

(q) wages and benefit payments due to any of the Contractor's Personnel; and

(r) 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.

(s) 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

(t) 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 7.14(b)
Final Payment Form

Appendix 7.14(b) - Final Payment Form

APPROVAL of APPLICATION for FINAL PAYMENT

To: **Strabag Inc. [Insert Contractor address]** Attn: ■ Fax: ■	Contract: Amended Design/Build Agreement between Ontario Power Generation Inc. and Strabag AG dated as of December 1, 2008 (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(d) 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 9.4(a)
Work Not to be Covered Without Prior Consent of OPG

Appendix 9.4(a) - Work Not To Be Covered Without Prior Written Consent Of OPG

Pursuant to Section 9.4 – Uncovering Project, the following is a list of work that is not to be covered without prior written consent of OPG:

1. concrete rebar and waterstop;
2. tunnel waterproof membrane;
3. mechanically compacted soil and granular material;
4. watermain pipe;
5. infill to approach wall precast units;
6. any item required by Applicable Law or Approval not to be covered without permission.

Appendix 10.7
Breach Form

Appendix 10.7 - Breach Form

NOTICE OF BREACH BY ONTARIO POWER GENERATION INC.

To: Ontario Power Generation Inc. ("OPG")

Contract: Amended Design/Build Agreement (the "**Agreement**") dated as of December 1, 2008 between Strabag Inc. (the "**Contractor**") and OPG

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 INC.

By: _____

Name:

Title:

Appendix 11.1(a)
INTENTIONALLY DELETED

Appendix 11.1(a) - INTENTIONALLY DELETED

Appendix 11.1(b)
Notice of Informal Resolution

Appendix 11.1(b) - Notice of Informal Resolution

INTENT TO COMMENCE INFORMAL RESOLUTION

To: •

Contract: Amended Design/build Agreement (the "**Agreement**") dated as of December 1, 2008 between Ontario Power Generation Inc. and Strabag Inc. (the "**Contractor**")

Resolution Notice No. •

Date: •

Defined terms used in this Notice have the same meanings given to those terms in the Agreement. In accordance with Section 11.1(b) 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 by the Steering Committee in accordance with Section 11.1 of the Agreement.

• ***[Describe disputed matter]***

■

By: _____

Name:

Title: