PROJECT TITLE: BIG BAY WHARF #404 REHABILITATION
BIG BAY, ONTARIO

PROJECT NUMBER: F2930-180037


LICENSED PROFESSIONAL ENGINEER
M. NEUMANN
04/01/2019
PROVINCE OF ONTARIO


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04/01/2019
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Part 1 General

1.1 MINIMUM STANDARDS

.1 Execute work to meet or exceed:

.1 National Building Code of Canada 2010, Canadian Highway Bridge Design Code, National Fire Code of Canada 2010, Ontario Building Code 2012 and any other code of provincial or local application, including all amendments up to project date, provided that in any case of conflict or discrepancy, the more stringent requirements shall apply.

.2 Rules and regulations of authorities having jurisdiction.

.3 Federal Fire Commissioner, No. 301, Standard for Construction Operations, and No. 302, Standard for Welding and Cutting, June 1982.

.4 Observe and enforce construction safety measures required by National Building Code 2010, Part 8 Safety Measures at Construction and Demolition Sites, Occupational Health and Safety Act and Regulations for Construction Projects, Revised Statutes of Ontario 1990, Chapter O.1 as amended, O. Reg. 213/91 as amended by O. Reg. 631/94, O. Reg. 143/99, O. Reg. 571/99, O. Reg. 145/00, O. Reg. 527/00, R.R.O. 1990, Reg. 834, O. Reg. 278/05 (Asbestos), Workplace Safety and Insurance Board and municipal statutes and authorities.

.5 Environmental Protection Act, O. Reg. 102/94 and O. Reg. 103/94.

1.2 TAXES

.1 Pay applicable Federal, Provincial and Municipal taxes.

1.3 FEES, PERMITS, AND CERTIFICATES

.1 Provide authorities having jurisdiction with information requested.

.2 Pay fees and obtain certificates and permits.

.3 Furnish certificates and permits.

1.4 SITE EXAMINATION

.1 Before submission bid, examines existing conditions and determine conditions affecting work.

.2 Obtain all information which may be necessary for proper execution of Contract.

1.5 SITE

.1 Confine work, including temporary structures, plant, equipment and materials to established limits of site. Insure that Work avoids encroachment into areas required for future work.

.2 Locate temporary buildings, roads, walks, drainage facilities, and services as directed and maintain in clean and orderly manner.

1.6 CONSTRUCTION AND STORAGE AREA

.1 The limits of Construction and Storage Area will be designated by the Departmental Representative prior to commencement of work unless otherwise shown on the Drawings.

1.7 DOCUMENTS

.1 Keep one copy of contract documents and reviewed shop drawings on the site.

.2 Most stringent specifications shall govern over Drawings

1.8 CONTRACTORS AS-BUILT DRAWINGS AND SPECIFICATIONS

.1 As work progresses, neatly record significant deviations from the Contract drawings and specifications using fine, red marker on full size white prints and specifications. Make the same changes on the electronic files. Include general dimensions of existing timber crib substructures, concrete parapets, sheet piling walls, and tie backs exposed during construction.

.2 Neatly print lettering and numbers in size to match original. Lines may be drawn free-hand but shall be neat and accurate. Add at each title block note: "AS BUILT".

.3 Record following significant deviations

- .1 Depths of various elements and foundations.
- .2 Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvement.
- .3 Location of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of structure.
- .4 Field changes of dimension.
- .5 Other significant deviations which are concealed in construction and can not be identified by visual inspection.
- .6 Alternative materials and systems installed replacing original materials and systems specified by trade name.

.4 Turn one set, paper copy and electronic copy, of As-Built Record Drawings and specifications over to Departmental Representative on completion of work.

.5 If project is completed without significant deviations from Contract drawings, declare this in writing and submit to Departmental Representative in lieu of As-Built Record Drawings.

1.9 ADDITIONAL DRAWINGS

.1 Department Representative may furnish additional drawings to clarify work.

.2 Such drawings become part of Contract Documents.

1.10 LAYOUT OF WORK

.1 Immediately upon entering site for purpose of beginning work on this project, locate all general reference points and take proper action necessary to prevent their disturbance.

.2 Supply stakes and other survey markers required for this work. Employ competent personnel to lay out work in accordance with lines and grades provided.

.3 Maintain all reference points and markers for duration of Contract.

1.11 MEASUREMENT AND PAYMENT

.1 Items measured for payment are in metric (SI) units.

.2 Submit requests for payment in metric units corresponding with items on the Unit Price Table.

.3 Submit supporting documents in metric units. Perform all necessary conversions required.

1.12 CONTRACT METHOD

.1 Construct Work under a combined price contract. All costs for work not specifically identified as a unit price item shall be included in the lump sum arrangement.

1.13 CONSTRUCTION PHOTOGRAPHS

.1 Submit electronic copy of colour digital photography in JPG format, standard resolution.

.2 Identification: name and number of project and date of exposure indicated.

.3 Locations: location of viewpoints determined by Departmental Representative.

.4 Frequency: at regular intervals or milestones during construction, and at completion of work as directed by Departmental Representative.

1.14 EXISTING SERVICES

.1 Establish location, protect and maintain existing utility lines.

.2 Maintain existing services in occupied areas.

.3 Connect to existing utilities with minimum disturbance to pedestrian and vehicular traffic.

1.15 TEMPORARY FACILITIES AND SERVICES

.1 Provide and maintain temporary facilities and services required to carry out work.

.2 Remove temporary facilities and services on completion of work

1.16 MATERIAL AND EQUIPMENT

.1 Use new products unless otherwise specified.

.2 Deliver and store material and equipment to manufacturer's instructions with manufacturer's labels and seals intact.

.3 When material or equipment is specified by standard or performance specifications, upon request of Departmental Representative, obtain from manufacturer an independent testing laboratory report, stating that material or equipment meets or exceeds specified requirements.

1.17 COORDINATION AND COOPERATION

.1 Execute work with minimum disturbance to occupants, public and normal use of site and work area. Make arrangements with Departmental Representative and Town of Big Bay to facilitate execution of work.

.2 Maintain access and exits.

.3 Provide necessary barriers, warning lights and signs. Protect work from damage. Replace damaged existing work with material and finish to match original.

1.18 INSPECTION AND TESTING

.1 Departmental Representative may employ an Inspection and Testing company to ensure work conforms with Contract Documents. Testing to be paid by Owner.

.2 When initial tests and inspections reveal work not to contract requirements, pay for tests and inspections required by Departmental Representative on corrected work.

.3 Submit timely inspection and test reports to the Departmental Representative.

1.19 SCHEDULING OF WORK

.1 On award of contract submit bar chart construction schedule for work, indicating anticipated progress stages within time of completion.

.2 When schedule has been reviewed by the Departmental Representative takes necessary measures to complete work within scheduled time. Do not change schedule without notifying Departmental Representative.

.3 Contract extension requires formal submission and execution of change order in conformance with Departmental Representative's criteria

1.20 CLEANING

.1 Maintain project free of accumulated waste and rubbish.

1.21 FIRES AND TEMPORARY HEATERS

.1 Burning of rubbish on site not permitted.

.2 Only fires for temporary heaters are permitted on site.

.3 Maintain temperature required to prevent frost damage to work.

1.22 DATUM

.1 Elevations and soundings shown on Drawings are expressed in metres relative to chart datum.

.2 Chart datum for Lake Huron is 176.0 metres I.G.L.D. (1985).

.3 Water Level Chart for Lake Huron is included in the contract drawings.

Part 2 Products

2.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Shop drawings and product data.

.2 Certificates and transcripts.

1.2 ADMINISTRATIVE

.1 Submit all documents as required to Departmental Representative. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

.2 Do not proceed with Work affected by submittal until review is complete.

.3 Present shop drawings, product data, samples and mock-ups in SI Metric units.

.4 Where items or information is not produced in SI Metric units converted values are acceptable.

.5 Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.

.6 Notify Departmental Representative in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.7 Verify field measurements and affected adjacent Work are co-ordinated.

.8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.

.9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.

.10 Keep one reviewed copy of each submission on site.

1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.

.2 Submit drawings stamped and signed by professional engineer registered or licensed in Ontario.

.3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach, or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

.4 Allow 5 days for Departmental Representative review of each submission.

.5 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

.6 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.

.7 Accompany submissions with transmittal letter, containing:

.1 Date.

.2 Project title and number.

.3 Contractor's name and address.

.4 Identification and quantity of each shop drawing, product data and sample.

.5 Other pertinent data.

.8 Submissions include:

.1 Date and revision dates.

.2 Project title and number.

.3 Name and address of:

.1 Subcontractor.
.2 Supplier.
.3 Manufacturer.

.4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.

.5 Details of appropriate portions of Work as applicable:

.1 Fabrication.
.2 Layout, showing dimensions, including identified field dimensions, and clearances.
.3 Setting or erection details.
.4 Capacities.
.5 Performance characteristics.
.6 Standards.
.7 Operating weight.
.8 Wiring diagrams.
.9 Single line and schematic diagrams.
.10 Relationship to adjacent work.

.9 After Departmental Representative review, distribute copies.

.10 Submit 1 print and 1 electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.

.11 Submit 1 print and 1 electronic copy of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.

.12 Submit 1 print and 1 electronic copy of test reports for requirements requested in specification Sections and as requested by Departmental Representative.

.1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.

.2 Testing must have been within 3 years of date of contract award for project.

.13 Submit 1 print and 1 electronic copy of certificates for requirements requested in specification Sections and as requested by Departmental Representative.

.1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.

.2 Certificates must be dated after award of project contract complete with project name.

.14 Submit 1 print and 1 electronic copy of manufacturers instructions for requirements requested in specification Sections and as requested by Departmental Representative.

.1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

.15 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.

.16 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, [copies] will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

.17 The review of shop drawings by Departmental Representatives is for the sole purpose of ascertaining conformance with general concept.

.1 The review of shop drawings shall not mean that the Departmental Representative approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility or of responsibility for meeting requirements of construction and Contract Documents.

.2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or to technique of construction and installation for co-ordination of Work of sub-trades.

1.4 SAMPLES

.1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.

.2 Deliver samples prepaid to Departmental Representative site office.

.3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.

.4 Where colour, pattern or texture is criterion, submit full range of samples.

.5 Adjustments made on samples by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

.6 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.

.7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.5 PHOTOGRAPHIC DOCUMENTATION

.1 Submit 1 print and 1 electronic copy of digital photography in jpg format, standard resolution monthly with progress statement as directed by Departmental Representative.

.2 Project identification: name and number of project and date of exposure indicated.

.3 Number of viewpoints: 2 locations.

.1 Viewpoints and their location as determined by Departmental Representative.

.4 Frequency of photographic documentation (minimum):

.1 At all major milestones, including excavations revealing existing underground structural components, and installation of sheet piling;

.2 Weekly; or

.3 As directed by Departmental Representative.

1.6 CERTIFICATES AND TRANSCRIPTS

.1 Immediately after award of Contract, submit Workers' Compensation Board status.

.2 Submit transcription of insurance immediately after award of Contract.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA):

.1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.

.2 National Building Code 2010 (NBC):

.1 NBC 2010, Division B, Part 8 Safety Measures at Construction and Demolition Sites.

.3 National Fire Code 2010 (NFC):

.1 NFC 2010, Division B, Part 2 Emergency Planning, subsection 2.8.2 Fire Safety Plan.

.4 Province of Ontario:

.1 Occupational Health and Safety Act Revised Statutes of Ontario 1990, Chapter O.1 as amended, and Regulations for Construction Project s, O. Reg. 213/91 as amended, Diving Operations, O. Reg. 629 /94, as amended.

.2 Ontario Ministry of Labour, Guideline - Lead on Construction Projects.

.3 Ontario Ministry of Labour, Guideline - Silica on Construction Projects.

.4 Workplace Safety and Insurance Act, 1997.

.5 Municipal statutes and authorities.

.5 Fire Commissioner of Canada (FCC):

.1 FC-301 Standard for Construction Operations, June 1982.

.2 FC-302 Standard for Welding and Cutting, June 1982.

1.2 SUBMITTALS

.1 Make submittals in accordance with Section 01 33 00.

.2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:

.1 Results of site specific safety hazard assessment.

.2 Results of safety and health risk or hazard analysis for site tasks and operations found in work plan.

.3 Measures and controls to be implemented to address identified safety hazards and risks.

.4 Provide a Fire Safety Plan, specific to the work location.

.5 Contractor's and Sub-contractors' Safety Communication Plan.

.6 Contingency and Emergency Response Plan addressing standard operating procedures specific to the project site to be implemented during emergency situations.

.3 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 7 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 3 days after receipt of comments from Departmental Representative.

.4 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

.5 Submit records of Contractor's Health and Safety meetings when requested.

.6 Submit 1 copy of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative, weekly.

.7 Submit copies of orders, directions or reports issued by health and safety inspectors having jurisdiction.

.8 Submit copies of incident and accident reports.

.9 Submit Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00.

.10 Submit names of personnel and alternates responsible for site safety and health.

.11 On-site Contingency and Emergency Response Plan shall address standard operating procedures to be implemented during emergency situations.

1.3 FILING OF NOTICE

.1 File Notice of Project with Provincial authorities prior to commencement of Work.

1.4 SAFETY ASSESSMENT

.1 Perform site specific safety hazard assessment related to project.

1.5 MEETINGS

.1 Schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of Work.

1.6 REGULATORY REQUIREMENTS

.1 Comply with the Acts and regulations of the Province of Ontario.

.2 Comply with specified standards and regulations to ensure safe operations at site.

.3 In event of conflict between any provisions of specified standards and regulations, the most stringent provision governs.

1.7 GENERAL REQUIREMENTS

.1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to commencing any site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.

.2 Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns either accepting or requesting improvements.

.3 Relief from or substitution for any portion or provision of minimum Health and Safety standards specified herein or reviewed site-specific Health and Safety Plan shall be submitted to Departmental Representative in writing.

.4 Erect adequate safety barriers and signs for safety of workers and public.

.5 Develop a Construction Access Plan. The Town of Big Bay and Fisheries and Oceans (Small Craft Harbours) shall be notified and consulted.

1.8 COMPLIANCE REQUIREMENTS

.1 Comply with Ontario Occupational Health and Safety Act, R.S.O. 1.9 0 Chapter 0.1, as amended.

1.9 RESPONSIBILITIY

.1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.

.2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

.3 Where applicable, the Contractor shall be designated "Constructor", as defined by Occupational Health and Safety Act for the Province of Ontario.

1.10 UNFORSEEN HAZARDS

.1 When unforeseen or peculiar safety-related factor, hazard, or condition become evident or occur during performance of Work, immediately stop work and advise Departmental Representative verbally and in writing.

.2 Follow procedures in place for Employees Right to Refuse Work as specified in the Occupational Health and Safety Act for the Province of Ontario.

1.11 HEALTH AND SAFETY COORDINATOR

.1 Employ and assign to Work, competent and authorized representative as Health and Safety Coordinator. Health and Safety Coordinator must:

.1 Have working knowledge of occupational safety and health regulations.

.2 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.

.3 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.

1.12 POSTING OF DOCUMENTS

.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province having jurisdiction, and in consultation with Departmental Representative. The following criteria is to be posted on site:

.1 Contractor's Safety Policy.

.2 Constructor's Name.

.3 Notice of Project.

.4 Name, trade, and employer of Health and Safety Representative or Joint Health and Safety Committee members (if applicable).

.5 Ministry of Labour Orders and reports. Government of Canada HEALTH AND SAFETY REQUIREMENTS Sect 01 35 29.06 Fisheries and Oceans Page 4 Project No. 131-23620-00 2016-08-17

.6 Occupational Health and Safety Act and Regulations for Construction Projects for Province of Ontario.

.7 Address and phone number of nearest Ministry of Labour office.

.8 Material Safety Data Sheets.

.9 Written Emergency Response Plan.

.10 Site Specific Safety Plan.

.11 Valid certificate of first aider on duty.

.12 WSIB "In Case of Injury At Work" poster.

.13 Location of toilet and cleanup facilities.

1.13 CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues identified by Departmental Representative or by authority having jurisdiction in the Province.

.2 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.

.3 Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

1.14 BLASTING

.1 Blasting or other use of explosives is not permitted.

1.15 WORK STOPPAGE

.1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

.2 Assign responsibility and obligation to competent supervisor to stop or start Work when, at competent supervisor's discretion, it is necessary or advisable for reasons of health or safety.

.3 Departmental Representative may also stop Work for health and safety considerations.

END OF SECTION

Part 1 General

1.1 ENVIRONMENTAL MEASURES

.1 Meet or exceed the requirements of all environmental legislation and regulations, including all amendments up to the project date provided that in any case of conflict or discrepancy the more stringent requirements shall apply.

.2 Definitions:

.1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humans; or degrade environment aesthetically, culturally and/or historically.

.2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, air; biological and cultural resources; and includes management of visual aesthetics; noise; solid; chemical; gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

.3 Reference Standards:

.1 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2-2008 Stipulated Price Contract.

.2 U.S. Environmental Protection Agency (EPA)/Office of Water

.1 EPA 832/R-92-005-[92], Storm Water Management for Construction Activities, Chapter 3.

.2 EPA General Construction Permit (GCP) 2012.

1.2 FIRES

.1 Fires and burning of rubbish on site is not permitted.

1.3 DRAINAGE

.1 Provide temporary drainage and pumping required to keep excavations and site free from water.

.2 Ensure pumped water into waterways, sewer or drainage systems is free of suspended materials.

.3 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.4 SITE CLEARING AND PLANT PROTECTION

.1 Protect trees and plants on site and adjacent properties as indicated.

.2 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage.

.1 Avoid unnecessary traffic, dumping and storage of materials over root zones.

.3 Minimize stripping of topsoil and vegetation.

1.5 WORK ADJACENT TO WATERWAYS

.1 Waterways to be kept free of excavated fill, waste material and debris.

.2 Design and construct temporary crossings to minimize erosion to waterways.

.3 Do not skid logs or construction materials across waterways.

.4 Construction equipment to be operated on land only.

1.6 POLLUTION CONTROL

.1 Maintain temporary erosion and pollution control features installed under this Contract.

.2 Control emissions from equipment and plant in accordance with local authorities' emission requirements.

.3 Vehicles/machinery and equipment should be in good repair, equipped with emission controls, as applicable, and operated within regulatory requirements.

.4 Minimize the operation and idling of gas/diesel powered equipment and vehicles, in particular during smog advisories.

.5 Re-fueling of machinery must take place at a safe distance from the waterway as designated by the Departmental Representative.

.6 Prevent sandblasting abrasives and other extraneous materials from contaminating air and waterways beyond application area, by providing temporary enclosures or other approved methods to contain.

.7 Avoid excavation, and other construction activities with potential to release particulates, during windy and prolonged dry periods.

.8 Restore disturbed areas as soon as possible to minimize the duration of soil exposure

.9 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

.10 Stabilize all stockpiled material.

.11 Provide dust control for temporary roads. Cover or wet down gravel and paved areas to minimize the release of dust. Use water to wet down materials. Use chemical dust suppressants only where necessary on problem areas.

.12 Minimize vehicle traffic on exposed soils and stabilize high traffic areas with a clean gravel surface layer or other suitable cover material. Provide dust control for temporary roads.

.13 Do not allow any debris, fill or other foreign material to enter the waterway.

.14 Abide by local noise by-laws.

.15 Make appropriate spill containment and clean-up materials available at all times on site and ensure crews onsite are fully trained on their use. Develop spill prevention and response procedures. In the event of a spill of a deleterious substance:

.1 Immediately contain, limit spread and clean up in accordance with provincial regulatory requirements.

.2 Report immediately to Ontario Spills Action Centre: 1 800 268 6060.

.3 Further information on dangerous goods emergency cleanup and precautions including a list of companies performing this work can be obtained from the Transport Canada 24-hour number (613) 996-6666 collect.

1.7 NOTIFICATION

.1 Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.

.2 Contractor: after receipt of such notice, inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.

.3 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.

.4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

1.8 MEASUREMENT AND PAYMENT

.1 Items included in this specification shall form part of the lump sum arrangement.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Products

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 CONSTRUCTION AND DEMOLITION WASTE

.1 Carefully deconstruct and source separate materials/equipment and divert from demolition & construction waste destined for landfill to maximum extent possible. Reuse, recycle or sell material for reuse except where indicated otherwise. On site sales are not permitted.

.2 Source separate waste and maintain waste audits in accordance with the Environmental Protection Act, Ontario Regulation 102/94 and Ontario Regulation 103/94.

.1 Provide facilities for collection, handling and storage of source separated wastes.

.2 Source separate the following waste:

.1 Brick and hardened concrete.

.2 Corrugated cardboard and paper.

.3 Wood.

.4 Fresh concrete waste.

.5 Concrete admixtures and additives.

.6 Steel.

.7 Organic vegetation.

1.2 WASTE PROCESSING SITES

.1 Miller Waste Systems

.1 20th St E, Owen Sound, ON N4K 5P7.

.2 Telephone: 519-372-1855.

.2 Bruce Area Solid Waste Recycling

.1 126 Concession Rd 14, Southampton, ON N0H 2L0.

.2 Telephone: 519-797-5557.

.3 Waste Management – Mount Forest Transfer Station

.1 226 Industrial Dr, Mount Forest, ON N0G 2L1.

.2 Telephone: +1 844-279-2506.

.4 Waste Management – Mount Forest Hauling

.1 200 Sligo Rd W, Mount Forest, ON N0G 2L2.

.2 Telephone: 519-323-3682.

.5 Or approved alternative location.

1.3 STORAGE, HANDLING AND PROTECTION

.1 Store materials to be reused, recycled and salvaged in locations as directed by Departmental Representative.

.2 Unless specified otherwise, materials for removal do become Contractor’s property.

.3 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.

.4 Protect structural components not removed for demolition from movement or damage.

.5 Support affected structures. If the safety of any component is endangered, cease operations and immediately notify Departmental Representative.

.6 Protect surface drainage, mechanical and electrical from damage and blockage.

1.4 DISPOSAL OF WASTES

.1 Do not bury rubbish or waste materials.

.2 Do not dispose of waste, volatile materials, mineral spirits, oil or paint thinner into waterways, storm, or sanitary sewers.

.3 Remove materials from deconstruction as deconstruction/disassembly Work progresses.

.4 All waste materials should be disposed of in a legal manner at a site approved by Local Authorities.

.5 Arrange, and pay, for testing as required by the Authorities having jurisdiction to determine contamination levels of all waste prior to disposal.

1.5 DEMOLITION REMOVAL AND DISPOSAL – MEASUREMENT FOR PAYMENT

.1 Demolition removal and disposal of all components identified on the drawings and as specified, is considered part of the lump sum.

.2 Item component to be demolished, removed and disposed include, but are not limited to the items listed in Section 3.4, below.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 CANADIAN GOVERNMENTAL DEPARTMENTS CHIEF RESPONSIBILITY FOR THE ENVIRONMENT

.1 Government Chief Responsibility for the Environment:

.1 Province: Ontario

.1 Ministry of Environment and Energy:

.2 Address: 135 St Clair Avenue West, Toronto, ON M4V 1P5 Canada, general inquiries (800)565-4923 or (416)323-4321, fax (416)323-4682

.2 Environment Canada:

.1 Address: Toronto, ON, general inquiries (416)734-4494.

3.2 CLEANING

.1 Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.

.2 Clean up work area as Work progresses.

3.3 PROTECTION

.1 Remove, salvage, protect and store the existing benches located on the Wharf Extension (DFO Asset #404). Following construction, reinstate the benches including the use of bolted connections to secure the benches to the final placement. In event of damage, replace or make repairs to approval of Departmental Representative at no additional cost.

.2 Prior to construction, assess the condition of the existing 150mm (6”) dock cleats and dock bollards. Notify the Departmental Representative immediately of any damage.

.3 Protect from damage all areas used for storage and staging, including any areas outside of federal property limits. In event of damage, immediately replace or make repairs to approval of Departmental Representative at no additional cost.

.4 Prevent movement, settlement, or damage to adjacent structures, including the adjacent Government Wharf (#401). Provide bracing and shoring as required.

3.4 DEMOLITION REMOVAL AND DISPOSAL

.1 Contractor is to remove and dispose of:

- .1 Existing concrete surface of Wharf Extension (#404).
- .2 Rock fill in the concrete superstructure of the Wharf Extension (#404) to depth indicated on the drawings.
- .3 Existing Wharf Extension (#404) concrete parapets, complete with tie rods, to depth indicated on the drawings.
- .4 Existing rubber fenders.
- .5 Existing dock rings.
- .6 Partial removal of existing curbs on the Government Wharf (#401) as indicated in the drawings.
- .7 Partial removal of existing concrete surface of Government Wharf (#401) as indicated. The wire mesh reinforcement of the concrete surface in this location is to remain.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Definitions:

.1 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, include but not limited to: poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or materials that endanger human health or environment if handled improperly.

.2 Waste Management Co-ordinator (WMC): contractor representative responsible for supervising waste management activities as well as co-ordinating related, required submittal and reporting requirements.

.3 Waste Audit (WA): detailed inventory of materials in building. Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project. Indicates quantities of reuse, recycling and landfill.

.4 Waste Reduction Workplan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials. WRW is based on information acquired from WA.

.2 Reference Standards:

.1 CSA International

.1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.

1.2 SITE CONDITIONS

.1 Environmental protection:

.1 Ensure Work is done in accordance with Section 01 35 43 - Environmental Procedures.

1.3 EXISTING CONDITIONS

.1 Structures to be demolished are based on their condition at time of examination prior to tendering.

.2 Remove, protect and store salvaged items in accordance with Section 01 74 21 - Construction/Demolition and Waste Management.

1.4 MEASUREMENT AND PAYMENT

.1 Demolition removal and disposal of all components identified on the drawings and as specified, is considered part of the lump sum.

1.5 REFERENCES

.1 U.S. Environmental Protection Agency (EPA) / Office of Water

.1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

Part 2 Execution

2.1 PREPARATION

.1 Temporary Erosion and Sedimentation Control:

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to: Section 01 35 43 - Environmental Procedures.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during demolition.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal after completion of demolition work.

.2 Protection of in-place conditions:

.1 Work in accordance with Section 01 35 43 - Environmental Procedures.

.2 Prevent movement, settlement or damage of adjacent trees landscaping, adjacent grades, and properties.

.3 Prevent debris from blocking surface drainage systems, which must remain in operation.

2.2 DEMOLITION

.1 Demolish items in accordance with Section 01 74 21 – Construction/Demolition and Waste Management.

.2 Remove contaminated or dangerous materials as defined by authorities having jurisdiction, relating to environmental protection, from site and dispose of in safe manner to minimize danger at site or during disposal.

.3 At end of each day's work, leave work in safe and stable condition.

.4 Only dispose of material specified by selected alternative disposal option as directed in Section 01 74 21 – Construction/Demolition and Waste Management.

.5 Remove and dispose of demolished materials except where noted otherwise and in accordance with authorities having jurisdiction.

2.3 REMOVAL

.1 Remove and Dispose of items in accordance with Section 01 74 21 – Construction/Demolition and Waste Management.

.2 Prevent contamination of removed pavement by topsoil, underlying gravel or other materials.

.3 Suppress dust generated by removal process.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA-A23.1-04/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CAN/CSA-O325.0-92(R2003), Construction Sheathing.

.3 CAN/CSA-S269.3-M92(R2003), Concrete Formwork, National Standard of Canada

1.2 PRICE AND PAYMENT PROCEDURES

.1 Measurement and Payment:

.1 No measurement will be made under this Section.

.2 Cost for Concrete Forming and Accessories shall be included in the item prices for items of concrete work in Section 03 30 00 - Cast-In-Place Concrete.

Part 2 Products materials

.1 Formwork materials:

.1 For concrete without special architectural features, use wood and wood product formwork materials to CSA-O121.

Part 3 Execution

3.1 FABRICATION AND ERECTION

.1 Verify lines, levels and centres before proceeding with formwork and ensure dimensions agree with drawings.

.2 Obtain Departmental Representative’s approval for use of earth forms framing openings not indicated on drawings.

.3 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.

.4 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA-A23.1/A23.2.

.5 Align form joints and make watertight.

.1 Keep form joints to minimum.

.6 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections.

.1 Ensure that anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.

.7 Line forms for following surfaces:

.1 Secure lining taut to formwork to prevent folds.

.2 Pull down lining over edges of formwork panels.

.3 Ensure lining is new and not reused material.

.4 Ensure lining is dry and free of oil when concrete is poured.

.5 Application of form release agents on formwork surface is prohibited where drainage lining is used.

.6 If concrete surfaces require cleaning after form removal, use only pressurized water stream so as not to alter concrete's smooth finish.

.7 Cost of textile lining is included in price of concrete for corresponding portion of Work.

.8 Clean formwork in accordance with CSA-A23.1/A23.2, before placing concrete.

3.2 REMOVAL AND RESHORING

.1 Leave formwork in place for following minimum periods of time after placing concrete.

.1 4 days for slabs, decks and other structural members

.2 Remove formwork when concrete has reached 70 % of its design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.

.3 Provide necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.

.4 Re-use formwork and falsework subject to requirements of CSA-A23.1/A23.2.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 03 33 00 – Cast-In-Place Concrete.

1.2 PRICE AND PAYMENT PROCEDURES

.1 Measurement and Payment:

.1 No measurement will be made under this Section.

.2 Cost for Concrete Reinforcing shall be included in the item price for items of concrete work in Section 03 30 00 - Cast-In-Place Concrete.

1.3 REFERENCES

.1 American Concrete Institute (ACI)

.1 SP-66-04, ACI Detailing Manual 2004.

.2 ASTM International

.1 ASTM A82/A82M-07, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.

.2 ASTM A143/A143M-07, Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.

.3 ASTM A185/A185M-07, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.

.4 ASTM A775/A775M-07b, Standard Specification for Epoxy-Coated Reinforcing Steel Bars.

.3 CSA International

.1 CSA-A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.2 CAN/CSA-A23.3-04(R2010), Design of Concrete Structures.

.3 CSA-G30.18-09, Carbon Steel Bars for Concrete Reinforcement.

.4 CSA-G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.5 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

.6 CSA W186-M1990(R2007), Welding of Reinforcing Bars in Reinforced Concrete Construction.

.4 Reinforcing Steel Institute of Canada (RSIC)

.1 RSIC-2004, Reinforcing Steel Manual of Standard Practice.

1.4 SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

1.5 QUALITY ASSURANCE

.1 Submit to Departmental Representative, minimum 4 weeks prior to starting concrete work, valid and recognized certificate from plant delivering concrete.

Part 2 Products

2.1 MATERIALS

.1 Substitute different size bars only if permitted in writing by Departmental Representative.

.2 Reinforcing steel: billet steel, grade 400, deformed bars to CSA-G30.18, unless indicated otherwise.

.3 Reinforcing steel: weldable low alloy steel deformed bars to CSA-G30.18.

.4 Cold-drawn annealed steel wire ties: to ASTM A82/A82M.

.5 Deformed steel wire for concrete reinforcement: to ASTM A82/A82M.

.6 Epoxy Coating of non-prestressed reinforcement: to ASTM A775/A775M.

.7 Galvanizing of non-prestressed reinforcement: to CAN/CSA-G164, minimum zinc coating 610 g/m5.

.1 Protect galvanized reinforcing steel with chromate treatment to prevent reaction with Portland cement paste.

.2 If chromate treatment is carried out immediately after galvanizing, soak steel in aqueous solution containing minimum 0.2% by weight sodium dichromate or 0.2% chromic acid.

.1 Temperature of solution equal to or greater than 32 degrees and galvanized steels immersed for minimum 20 seconds.

.8 Plain round bars: to CSA-G40.20/G40.21.

2.2 FABRICATION

.1 Fabricate reinforcing steel in accordance with CSA-A23.1/A23.2 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.

.2 Obtain Departmental Representative written approval for locations of reinforcement splices other than those shown on placing drawings.

.3 Upon approval of Departmental Representative, weld reinforcement in accordance with CSA W186.

.4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

.1 Ship epoxy coated bars in accordance with ASTM A775A/A775M.

Part 3 Execution

3.1 PREPARATION

.1 Galvanizing to include chromate treatment.

.1 Duration of treatment to be 1 hour per 25 mm of bar diameter.

.2 Conduct bending tests to verify galvanized bar fragility in accordance with ASTM A143/A143M.

3.2 FIELD BENDING

.1 Do not field bend or field weld reinforcement except where indicated or authorized by Departmental Representative.

.2 When field bending is authorized, bend without heat, applying slow and steady pressure.

.3 Replace bars, which develop cracks or splits.

3.3 PLACING REINFORCEMENT

.1 Place reinforcing steel as indicated on placing drawings and in accordance with CSA-A23.1/A23.2.

.2 Use plain round bars as slip dowels in concrete.

.1 Paint portion of dowel intended to move within hardened concrete with one coat of asphalt paint.

.2 When paint is dry, apply thick even film of mineral lubricating grease.

.3 Prior to placing concrete, obtain Departmental Representative approval of reinforcing material and placement.

.4 Ensure cover to reinforcement is maintained during concrete pour.

.5 Protect epoxy coated portions of bars with covering during transportation and handling.

3.4 FIELD TOUCH-UP

.1 Touch up damaged and cut ends of epoxy coated or galvanized reinforcing steel with compatible finish to provide continuous coating.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 03 10 00 – Concrete Forming and Accessories

.2 Section 03 20 00 – Concrete Reinforcing

.3 Section 03 35 00 – Concrete Finishing

1.2 REFERENCES

.1 ASTM International:

.1 ASTM A497/A497M-07,Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.

.2 ASTM D1751-04(2013)e1, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

.2 CSA International:

.1 CSA A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/ Methods of Test for Concrete.

.2 CSA A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.3 CSA G30.18-09, Carbon steel bars for concrete reinforcement.

.4 CSA G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.5 CAN/CSA S269.3-M92(R2013), Concrete Formwork

1.3 DESIGN REQUIREMENTS

.1 Alternative 1 - Performance: in accordance with CSA A23.1/A23.2, and as described in Mixes of Part 2 – Products.

1.4 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00.

1.5 QUALITY ASSURANCE

.1 Submit to Departmental Representative, minimum 4 weeks prior to starting concrete work, valid and recognized certificate from plant delivering concrete.

.2 Quality Control Plan: submit written report, as described in Part 3 - Verification, to Departmental Representative verifying compliance that concrete in place meets performance requirements.

.3 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29 – Health and Safety Requirements.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Concrete hauling time: maximum allowable time limit for concrete to be delivered to site of work and discharged not to exceed 120 minutes after batching.

.1 Modifications to maximum time limit must be agreed to by the Departmental Representative and concrete producer as described in CSA A23.1/A23.2.

.2 Deviations to be submitted for review by the Departmental Representative.

.2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21.

.2 Ensure emptied containers are sealed and stored safely.

.3 Divert unused concrete materials from landfill to local facility as reviewed by Departmental Representative.

.4 Provide appropriate area on job site where concrete trucks can be safely washed.

.5 Divert admixtures and additive materials from landfill to approved official hazardous material collections site as reviewed by Departmental Representative.

.6 Unused admixtures and additive materials must not be disposed of into sewer systems, into lakes, streams, onto ground or in other locations where it will pose health or environmental hazard.

1.8 MEASUREMENT AND PAYMENT

.1 Cast-in-place concrete will be measured by the cubic metre calculated from neat dimensions as indicated. This will include:

.1 New Extension Wharf (#404) concrete surface

.2 Reinstatement of partially removed portion of existing Government Wharf (#401) concrete surface.

.2 Concrete placed beyond dimensions indicated will not be measured.

.3 No deductions will be made for volume of concrete displaced by reinforcing steel, structural steel, or piles.

.4 Joint accessories including smooth bars, pvc sleeves, joint filler, backer rod and sealant are considered included in the construction of joints and will not be measured separately for payment.

.5 Reinforcing steel, dowels, splices, wire ties, bar supports, chairs, spacers and other accessories are considered included in the placing of concrete and will not be measured separately for payment.

.6 Heating water, aggregates and providing cold weather protection is considered included in the placing of concrete and will not be measured separately for payment.

.7 All work described under clause 3.1 Preparation shall be considered incidental to the cast-in-place concrete and will not be measured separately for payment.

Part 2 Products

2.1 MATERIALS

.1 Cast-in-place concrete:

.1 Cement: to CSA A23.01-09, Type GU.

.2 Minimum compressive strength: 35MPa at 28 days.

.3 Exposure class: C-1 to CSA A23.1/ A23.2.

.4 Aggregate size: 20 mm maximum size to CSA A23.1/A23.2.

.5 Slump: 70 mm +/-20 mm at time of deposit.

.6 Air content: Table 4, Category 1, 6%.

.7 Admixtures: air entraining to ASTM C233/C233M-11 Standard Test Method for Air-Entraining Admixtures for Concrete. Calcium chloride or compounds containing calcium chloride not permitted.

.8 Water: to CSA A23.1/A23.2.

.2 Welded steel wire fabric: flat sheets to ASTM A497/A497M, 102 x 102 mm, MW18.7 x MW 18.7.

.3 Anchor bolts: to CSA G40.20/G40.21, Grade 300W.

.4 Grout: non-shrink, premixed, 35 MPa compressive strength at 24 hours.

.5 Joint Filler: bituminous impregnated fibreboard, to ASTM D1751.

.6 Sealer: exterior grade, non-sag sealant.

.7 Other concrete materials: to CSA A23.1/A23.2.

2.2 FABRICATION

.1 Fabricate reinforcing steel in accordance with Section 03 20 00 - Concrete Reinforcing.

2.3 MIXES

.1 Alternative 1 - Performance Method for specifying concrete: to meet Departmental Representative performance criteria to CSA A23.1/A23.2.

.1 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as in PART 3 - Verification.

.2 Provide concrete mix to meet following hard state requirements:

.1 Durability and class of exposure: C-1.

.2 Compressive strength at 28 age: 35 MPa.

.3 Surface texture: smooth formed finish.

.3 Concrete supplier's certification: both batch plant and materials meet CSA A23.1/A23.2 requirements.

.4 Provide quality management plan to ensure verification of concrete quality to specified performance.

Part 3 Execution

3.1 PREPARATION

.1 Provide Departmental Representative 24 hours minimum notice before each concrete pour. Placing of concrete is permitted only after approval of equipment and mix.

.2 During concreting operations:

.1 Development of cold joints not allowed.

.2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.

.3 Ensure reinforcement and inserts are not disturbed during concrete placement.

.4 Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing.

.5 Surfaces shall be thoroughly cleaned of all foreign material prior to depositing fresh concrete. For hardened concrete surfaces, the aggregate shall be partially exposed and surface to be rough.

.6 Protect previous Work from staining.

.7 Clean and remove stains prior to application of concrete finishes.

.8 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.

.9 In locations where new concrete is dowelled to existing work, drill holes in existing concrete.

.1 Place steel dowels and pack solidly with epoxy grout to anchor and hold dowels in positions as indicated

.10 Do not place load upon new concrete until authorized by Departmental Representative.

3.2 PLACING REINFORCING STEEL

.1 Accurately place reinforcing steel and dowels in the positions shown on the drawings and hold firmly during the placing, compacting and setting of concrete.

.2 Reinforcement steel and dowels must be in place and inspected by the Departmental Representative prior to placement of concrete.

.3 Reinforcing steel fabricating and placing tolerances shall not reduce the concrete cover to less than the specified minimum clear concrete cover noted in the general notes.

.4 Reinforcement requirements are shown on detail drawings. Where details of bar sizing and spacing are not shown, allow for minimum reinforcement in accordance with CAN/CSA A23.3. All reinforcement shown shall be continuous unless detailed otherwise.

3.3 FORMWORK

.1 The design, fabrication, erection, and use of concrete formwork shall be in accordance with Section 03 10 00 Concrete Forming and Accessories.

3.4 CONSTRUCTION

.1 Perform cast-in-place concrete work in accordance with CSA A23.1/A23.2.

3.5 FINISHES

.1 Finish concrete in accordance with Section 03 35 00 Concrete Finishing.

3.6 TIME INTERVAL BETWEEN CONCRETE PLACEMENT

.1 Construction joints: 7 days wet cure continuously.

.2 Control joints: 6 days.

.3 Expansion joints/contraction joints: 1 day.

.4 Stage 2 concrete pour of anchor wall may be placed as soon as initial placing has 25% of design strength but no sooner than 12 hours.

3.7 CURING

.1 Cure concrete in accordance with CSA A23.1/A23.2, Clause 7.4.

.2 Provide cold weather protection during curing period.

3.8 VERIFICATION

.1 Quality Control Plan: ensure concrete supplier meets performance criteria of concrete as established in PART 2 - Products, by Departmental Representative and provide verification of compliance as described in Part 1 - Quality Assurance.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 03 30 00 – Cast-In-Place Concrete.

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-25.20-95, Surface Sealer for Floors.

.2 CSA International

.1 CAN/CSA-A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction//Methods of Test for Concrete.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Provide manufacturer's printed product literature and data sheets for concrete finishes and include product characteristics, performance criteria, physical size, finish and limitations.

.1 Include application instructions for concrete floor treatments.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements:

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

1.5 PRICE AND PAYMENT PROCEDURES

.1 Measurement and Payment:

.1 No measurement will be made under this Section.

.2 Cost for Concrete Finishing shall be included in unit price in items of concrete work in Section 03 30 00 - Cast-In-Place Concrete.

Part 2 Products

2.1 CURING COMPOUNDS

.1 Select low VOC curing compounds.

2.2 MIXES

.1 Mixing ratios in accordance with manufacturer's written instructions.

Part 3 Execution

3.1 EXAMINATION

.1 Verify that slab surfaces are ready to receive work and elevations are as indicated on drawings.

3.2 PREPARATION OF EXISTING SLAB

.1 Rub exposed sharp edges of concrete with carborundum to produce 3 mm radiused edges.

.2 Saw cut control joints to CAN/CSA-A23.1, 24 hours maximum after placing of concrete.

3.3 APPLICATION

.1 Clean over spray. Clean sealant from adjacent surfaces.

3.4 PROTECTION

.1 Protect finished installation in accordance with manufacturer's instructions.

END OF SECTION

Part 1 General

1.1 MEASUREMENT PROCEDURES

.1 Excavation is considered part of the lump sum arrangement and shall include all labour, equipment and material necessary to complete the work.

.2 Supply and installation of clear stone fill will be measured by the tonnes of the material placed and shall include all labour, materials and equipment necessary to do the work.

.3 Supply and installation of Granular A fill will be measured by the tonnes of the material placed and shall include all labour, materials and equipment necessary to do the work.

.4 Compaction shall be considered incidental and not will not be measured separately for payment.

1.2 REFERENCES

.1 ASTM International

.1 ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (600kN-m/m;)

.2 CSA International

.1 CSA A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.3 Ontario Provincial Standard Specification (OPSS):

.1 OPSS 1004, November 2012, Material Specification for Aggregates - Miscellaneous.

.2 OPSS 514, November 2010, Ontario Provincial Standard Specification, Construction Specification for Trenching, Backfilling, and Compacting.

.3 OPSS 1010, April 2013, Material Specification for Aggregate Base, Subbase, Select Subgrade and Backfill Material.

1.3 UTILITY LINES

.1 Before commencing work, establish location and extent of underground utility lines in area of excavation.

.2 Notify Departmental Representative of findings.

1.4 PROTECTION

.1 Grade around excavations to prevent surface water runoff into excavated area.

.2 Protect existing structures and surface features which may be affected by work from damage while work is in progress. Repair any damage resulting from work.

.3 Adequately protect benchmarks, layout markers, survey markers and geodetic monuments for duration of contract.

.4 Protect existing facilities and equipment situated on site or adjacent to site from damage.

1.5 SUBMITTALS

.1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.

Part 2 Products

2.1 MATERIALS

.1 Granular material: to Ontario Provincial Standard Specification 1010, April 2004 for Granular A Aggregate. Maximum size of Granular A is 19.0 mm.

.2 Geotextiles: to Section 31 32 19.01- Geotextiles.

.3 Clear stone to OPSS 1004.

.4 Notify Departmental Representative of source of materials. All material to be from sources satisfactory to Departmental Representative.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions:

.1 Before commencing work verify locations of buried services on and adjacent to site.

.2 Evaluation and Assessment:

.1 Arrange with appropriate authority for relocation of buried services that interfere with execution of work. Pay costs of relocating services.

.2 Not later than 1 week before backfilling or filling, provide to designated testing agency, 10 kg sample of fill materials proposed for use.

.3 Not later than 48 hours before backfilling or filling with approved material, notify Departmental Representative so that compaction tests can be carried out by designated testing agency.

.4 Before commencing work, conduct, with Departmental Representative, condition survey of existing structures, trees and plants, lawns, fencing, service poles, wires, rail tracks and paving, survey bench marks and monuments which may be affected by work.

3.2 PREPARATION

.1 Protection of in-place conditions:

.1 Protect excavations from freezing.

.2 Keep excavations clean, free of standing water, and loose soil.

.3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Departmental Representative's approval.

.4 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.

.5 Protect buried services that are to remain undisturbed.

.2 Removal:

.1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.

.2 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.

.3 Remove trees, stumps, logs, brush, shrubs, bushes, vines, undergrowth, rotten wood, dead plant material, exposed boulders and debris within areas designated on drawings.

3.3 EXCAVATION

.1 Excavate as required to carry out work, in all materials met.

.1 Do not disturb soil or rock below bearing surfaces. Notify Departmental Representative when excavations are complete.

.2 Excavate for slabs and paving to subgrade levels.

.1 Remove topsoil, organic matter, debris and other loose and harmful matter encountered at subgrade level.

3.4 STOCKPILING

.1 Stockpile fill materials in areas designated by Departmental Representative. Stockpile granular materials in manner to prevent segregation and overloading of existing structures.

.2 If required, install silt fence barrier around each stockpile of material and maintain for duration of work.

3.5 SITE QUALITY CONTROL

.1 Fill material and spaces to be filled to be inspected and approved by Departmental Representative.

3.6 BACKFILLING

.1 Do not commence backfilling until areas of work to be backfilled have been inspected and approved by Departmental Representative.

.2 Start backfilling only after inspection and receipt of written approval of fill material and spaces to be filled from Departmental Representative.

.3 Remove snow, ice, construction debris, organic soil and standing water from spaces to be filled.

.4 Lateral support: maintain even levels of backfill around structures as work progresses, to equalize earth pressures.

.5 Backfill all spaces excavated and not occupied by parts of the structure, or other permanent works, with specified material placed as shown on the drawings.

.6 Areas backfilled to be free from debris, snow, ice, water or frozen ground.

.7 Prior to placing fill, compact existing subgrade to obtain same compaction as for specified fill. Cut out "soft" areas and fill with suitable material until specified compaction can be obtained.

.8 Do not backfill around newly placed concrete until concrete has been in place at least 14 days, test cylinders show strength to be at least twice the working stress used in design, and approval has been obtained from the Departmental Representative.

.9 Place and compact fill materials in continuous horizontal layers not exceeding 300 mm loose depth. Use methods to prevent disturbing or damaging any part of the work. Make good any damage.

.10 Maintain optimum moisture content to enable compaction to attain specified density.

.11 Compaction of subgrade: compact existing subgrade under walks, paving, and slabs on grade, to same compaction as specified for fill. Fill excavated areas with stone fill, granular A and a geosynthetic cloth as specified for fill.

.12 Compaction: compact each layer of material to following densities for material to ASTM D698:

.1 To underside of basecourses: 95%.

.2 Basecourses: 100%.

.3 Elsewhere: 90%.

.13 Under slabs:

.1 Use granular A for base courses.

.14 Where working space is limited, employ approved mechanical hand operated tamping devices. When such devices are employed, deposit backfill material in layers not exceeding 150 mm in thickness.

.15 Perform work in accordance with OPSS 514, November 2010, Ontario Provincial Standard Specification, Construction Specification for Trenching, Backfilling, and Compacting.

3.7 GRADING

.1 Grade to ensure that water will drain away from buildings, walls and paved areas, to catch basins and other disposal areas approved by Departmental Representative. Grade to be gradual between finished spot elevations as indicated.

END OF SECTION

Part 1 General

1.1 MEASUREMENT AND PAYMENT

.1 Measure geotextiles in square metres of surface covered by material. No allowance will be made for seams and overlaps.

1.2 REFERENCES

.1 ASTM International

.1 ASTM D4491-99a(2009), Standard Test Methods for Water Permeability of Geotextiles by Permittivity.

.2 ASTM D4751-04, Standard Test Method for Determining Apparent Opening Size of a Geotextile.

.2 Ontario Provincial Standard Specifications (OPSS)

.1 OPSS 1860-November 2010, Material Specification for Geotextiles.

1.3 SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer’s written instructions.

.2 Storage and Handling Requirements:

.1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, well-ventilated area.

.2 Store and protect geotextiles from direct sunlight and UV rays.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIAL

.1 Geotextile: non-woven Terrafix 270R or equivalent, supplied in rolls.

.1 Width: 2 m minimum.

.2 Length: 10 m minimum.

.2 Factory seams: sewn in accordance with manufacturer's recommendations.

.3 Thread for sewn seams: equal or better resistance to chemical and biological degradation than geotextile.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for geotextile material installation in accordance with manufacturer's written instructions.

.1 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied Departmental Representative.

3.2 INSTALLATION

.1 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.

.2 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile.

.3 Overlap each successive strip of geotextile 600 mm over previously laid strip.

.4 Join successive strips of geotextile by sewing.

.5 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.

.6 After installation, cover with overlying layer within 6 hours of placement.

.7 Replace damaged or deteriorated geotextile to approval of Departmental Representative.

.8 Place and compact soil and fill layers in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

3.3 PROTECTION

.1 Vehicular traffic not permitted directly on geotextile.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 31 62 16.13 – Steel Sheet Piles

1.2 REFERENCES

.1 Canadian Standards Association (CSA):

.1 CSA G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

1.3 DELIVERY AND HANDLING

.1 Deliver and handle steel sheet piling in accordance with Section 31 62 16.13 – Steel Sheet Piles.

1.4 EXISTING CONDITIONS

.1 Contractor is responsible for making his own assessment of the type and quality of the in-situ materials and its impact on his proposed construction methods and operations.

.2 Geotechnical investigation is included with the specifications.

1.5 MEASUREMENT PROCEDURES

.1 No separate measurement for payment will be made under this section. Include costs in piling items.

.2 Cost for Pile Installation shall be included in the unit cost for Steel Sheet Pile – Section 31 62 16.13.

1.6 PROTECTION

.1 Adopt safe procedures and protect public and construction personnel, adjacent structures and the work of other sections from all hazards attributable to pile driving operations.

1.7 SCHEDULING OF WORK

.1 Submit schedule of planned sequence of pile driving to Departmental Representative for approval, not less that 2 weeks prior to commencement of pile work.

1.8 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

Part 2 Products

2.1 MATERIALS

.1 Material requirements for piles are specified in Section 31 62 16.13 Steel Sheet Piling.

.2 Supply full length piles

.3 Splice piles only with written approval of Departmental Representative.

2.2 EQUIPMENT

.1 Equipment information: Supply equipment of sufficient size and capacity to adequately install the piling to indicated depth. Prior to bringing on site, submit to Departmental Representative for review, details of equipment for installation of piles. For impact hammers give manufacturer's name, type, rated energy per blow at normal working rate, mass of striking parts of hammer and mass of driving cap. For non-impact methods of installation such as auguring, jacking, vibratory hammers or other means, give full details of characteristics necessary to evaluate performance.

Part 3 Execution

3.1 PREPARATION

.1 Prior to commencement of pile installation inspect the harbour bottom for obstructions, and clear obstructions found on the pile installation alignment.

.2 Ensure that ground conditions at pile locations are adequate to support pile driving operation and load testing operation.

.1 Make provision for access and support of piling equipment during performance of Work.

3.2 FIELD MEASUREMENT

.1 Maintain accurate records of driving for each pile, including:

.1 Type and make of hammer, stroke or related energy.

.2 Pile size, length and heat number, location of pile in pile group, location or designation of pile group.

.3 Sequence of driving piles in group.

.4 Final tip, head and cut-off elevations.

.5 Other pertinent information such as interruption of continuous driving, pile damage.

.2 Provide Departmental Representative with three copies of records.

3.3 INSTALLATION

.1 Notify Departmental Representative at least 48 hours prior to commencement of pile installation.

.2 Provide all necessary facilities for inspection and co-operate with Departmental Representative in inspecting and recording installation data at all times.

.3 Furnish such equipment and labour as necessary to enable Departmental Representative to install instrumentation on piles.

.4 Hold piles securely and accurately in position while driving.

.5 Do not drive piles within a radius of 8 metres of concrete which has been in place less than 2 days unless otherwise directed by Departmental Representative in writing.

.6 Cut off piles neatly and square at elevations indicated on drawings.

.7 Pile cut-offs become property of contractor. Remove cut-off lengths from site on completion of work.

.8 Deliver hammer blows in direct axis of pile.

.9 Reinforcement of pile heads may be required. Assess need and carry out reinforcement of piles, if necessary.

.10 Redrive any piles lifted during driving of adjacent piles.

3.4 PILE CAPACITY

.1 Install each pile with approved pile driving procedures.

.2 Drive each pile to a minimum penetration of the pile tip to elevation shown on the drawings.

3.5 DRIVING TOLERANCES

.1 Install piles to the following tolerances:

.1 Pile heads within 50 mm of locations shown on drawings.

.2 Piles not more that 2 percent of length out of alignment.

.3 Cut off elevation at required elevation.

3.6 DAMAGED/DEFECTIVE PILES

.1 Departmental Representative will reject any pile that is driven out of position or is damaged during driving or handling. Extend piles driven below cut off elevation as directed by Departmental Representative, at no cost to Departmental Representative.

.2 Pull out rejected piles and replace with new piles as directed.

.3 No extra compensation will be made for removing and replacing or other work made necessary through rejection of a defective pile damaged due to faulty workmanship.

.4 Where piles are damaged or caused to drift outside specified tolerance due to piles obstructions or other causes beyond Contractor's control the remedial measures adopted will be paid at the Contract Unit Price or in accordance with the General Conditions if no unit prices apply.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 31 62 00 – Pile Installation, General

1.2 MEASUREMENT PROCEDURES

.1 Supply and install of steel sheet piling will be measured in square metres of piling remaining in place after cut-off and shall include all labour material, and equipment necessary to complete the work.

.2 Steel sheet pile closures will be measured by each closure installed. Steel members, field welds, custom sheet pile sheets, and bagged concrete shall be considered in the unit price of closure and will not be measured separately for payment.

.3 Double channel steel walers including splice plates, bolts, nuts and other associated hardware will be measured by the length, in linear metres, of steel waler installed.

.4 Steel tie rods, including nuts, washers, couplers and lock nuts, will be measured by the linear meter of tie rods installed.

.5 All labour and equipment required for the supply, delivery and installation of steel items will be considered incidental to the work, and will not be measured separately for payment.

.6 Mobilization and de-mobilization of equipment will not be measured separately for payment.

1.3 REFERENCES

.1 ASTM International

.1 ASTM A6/A6M-11, Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.

.2 ASTM A307-10, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile.

.3 ASTM A1011/A1011M-10, Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, and Ultra High Strength.

.4 ASTM A328/A328M-07, Standard Specification for Steel Sheet Piling.

.5 ASTM A857/A857M-07, Standard Specification for Steel Sheet Piling, Cold Formed, Light Gage.

.2 CSA International

.1 CSA G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.2 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel Structures.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.1 Submit manufacturer's instructions, printed product literature and data sheets for piles and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit shop drawings for the following items:

.1 A plan layout of sheet piling sections indicating all dimensions.

.2 Details of the sheet piling sections.

.3 Layout and details of the waler indicating location of splices, splice details, tie bolt details and sheet washer plate details.

.4 Details of steel tie rods, steel plate washers, nuts, lock nuts and couplers.

.3 Certificates:

.1 Submit 2 weeks prior to fabrication, 2 copies of steel producer certificates in accordance with ASTM A1011/A1011M, and mill test reports in accordance with CSA G40.20/G40.21.

.2 Submit copy of certification for fusion welding in accordance with CSA W47.1.

1.5 QUALITY ASSURANCE

.1 Inspection and testing of steel sheet piling material will be carried out by testing laboratory designated by Departmental Representative at any time during course of Work.

.2 Materials inspected or tested by Departmental Representative which fail to meet contract requirements will be rejected.

.3 Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, Contractor to pay costs for additional tests and/or inspections.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area. Store and protect sheet piles from nicks, scratches, and blemishes.

.2 Replace defective or damaged materials with new.

.4 Use slings for lifting piling, and ensure mass is evenly distributed such that piling is not subjected to excessive bending stresses.

.5 Protect piles from damage due to excessive bending stresses, impact, abrasion or other causes during delivery, storage and handling.

.6 Replace or repair damaged piles with steel to CSA G40.20/G40.21.

.7 Store sheet piling on level ground or provide supports so that sheet piling is level when stored.

.1 Provide blocking at spacing not exceeding 5 m so that there is no excessive sagging in piling.

.2 Overhang at ends not to exceed 0.5 m.

.3 Block between lifts directly above blocking in lower lift.

.8 If material is stock-piled on structure, ensure structure is not overloaded.

Part 2 Products

2.1 MATERIALS

.1 Steel sheet piles: to CSA G40.2, Grade 350W, and following:

.2 Continuous interlocking Z section:

.1 Minimum effective section modulus: 1030 cm^3/wall m.

.2 Minimum sheet thickness: 7.5 mm.

.3 Interlocks: to be such that section of interlock bar of 1 m minimum length will pass along full length of pile without binding.

.4 Mark each piece of sheet piling legibly by stencilling or die-and-stamping with information as follows:

.1 Heat number.

.2 Manufacturer's name.

.3 Length and section number. Do not precut lifting or slinging holes in sheet piles.

.3 Structural steel for wales, bearing plates, wales splices, steel pipes, capping channels, support angles and miscellaneous steel: to CSA G40.21, Grade 350 W.

.4 Tie rods, sleeve nuts and turnbuckles:

.1 Tie rods: 43mm diameter, to ASTM A615, Grade 520.

.2 Tie rods: to continuously threaded bar with double corrosion protection.

.3 Sleeve nuts, to have load capacity in excess of capacity of tie rod.

.4 Preassemble, mark and test tie rod assemblies in shop. Align threaded connection to following tolerances at sleeve nut or connector sleeve: 1/80 of normal rod diameter, deviation of centreline, 1 in 160.

.5 Nuts and bolts: hexagon nuts, bolts, and washers: to ASTM A325M.

.6 Backfill material: to Section 31 23 33.01 - Excavating, Trenching and Backfilling.

2.2 SOURCE QUALITY CONTROL: HOT ROLLED SHEET STEEL PILING

.1 Provide results of tests of sheet piling material to be used on project as follows:

.1 One tension test and 1 bend test from each heat for quantities of finished material less than 50 tonnes.

.2 Two tension tests and 2 bend tests from each heat for quantities of finished material exceeding 50 tonnes.

.2 Tension tests in accordance with CSA G40.20/G40.21. Bend tests: to ASTM A6/A6M.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for steel sheet piles installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

.1 Do pile installation Work in accordance with Section 31 62 00 - Pile Installation, General except where otherwise specified.

.2 Do welding in accordance with CSA W59.

.3 Do not begin pile installation until required quality control tests have been completed and test results approved by Departmental Representative.

.4 Submit full details of method and sequence of installation of piling to Departmental Representative for approval prior to start of pile installation work. Details must include templates, bracing, setting and driving sequence and number of piles in panels for driving.

.5 When installation is complete, face of wall at top of sheet piles to be within 75 mm of location as indicated and deviation from vertical not to exceed 1 in 100.

.6 Maintain piles in specified alignment and position until connection to permanent tie rod anchorage system is made.

3.3 OBSTRUCTIONS

.1 If obstruction encountered during driving, leave obstructed pile and proceed to drive remaining piles. Return and attempt to complete driving of obstructed pile later.

.2 Advise Departmental Representative immediately if impossible to drive pile to full penetration, and obtain direction from Departmental Representative on further steps required to complete Work.

3.4 CUTTING

.1 When flame cutting tops of piles, and flame cutting holes in piles approved by Departmental Representative, use following procedure:

.1 When air temperature is above 0 degrees C, no pre-heat is necessary.

.2 When air temperature is below 0 degrees C, pre-heat until steel 25 mm on each side of line of cut has reached a temperature very warm to hand (approximately 35 degrees C). Temperature indicating crayon marks may be used to measure temperature.

.3 Use torch guiding device to ensure smooth round holes or straight edges.

.4 Make cut smooth and free from notches throughout thickness. If grinding is employed to remove notch or crack, finished radius to be minimum 5 mm.

3.5 TIE ROD ANCHORAGE SYSTEM

.1 Support tie rods at intervals along their length.

.2 Fit and adjust tie rod systems so that connections at both waling ends of tie rods are tight before backfilling.

.3 Brace steel sheet pile with waling strips in accordance with shop drawings. Make wales one length between corners and bolt to piles.

3.6 WHARF CLOSURE

.1 Install wharf closure to details indicated on drawings.

.2 Place bagged concrete to the details shown on drawings.

.3 Bagged concrete method:

.1 Use bags made of coarsely woven material to allow concrete to bond between bags.

.2 Fill bags with dry concrete mix not more than 90% full before placing.

.3 Place each concrete bag individually so that bag is stable and securely resting on foundation material or previously placed bags.

3.7 INSPECTION

.1 Steel sheet pile structures may be inspected by divers employed by Fisheries and Oceans after completion of pile driving to confirm that pile toes are properly seated and no significant gaps exist which could cause fill material to escape through pile wall. The contractor shall cooperate and assist in such an inspection.

3.8 BACKFILLING

.1 Backfill in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling and as indicated.

.2 Protect piling tie rods anchorage system from damage or displacement during backfilling operations.

3.9 WORK ON VICINITY OF STRUCTURES

.1 Care must be taken when carrying out construction operations adjacent to existing dockwalls and structures to avoid any damage or undercutting. Repair and make good any damage at no cost to Departmental Representative.

3.10 COOPERATION AND ASSISTANCE

.1 Furnish use of such boats, equipment, labour and materials as may be reasonably necessary to allow Departmental Representative to inspect, monitor and supervise work. Equip boats with approved life jackets, navigation lights and all other safety devices required.

.2 Cooperate with Departmental Representative on inspection and monitoring work, and provide assistance as requested.

3.11 MONITORING OF WORK

.1 Contractor is responsible to monitor effectiveness and productivity of his own work on an ongoing basis.

.2 Contractor to identify and demonstrate effectiveness of proposed monitoring methods prior to commencement of work.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Ontario Provincial Standard Specifications (OPSS):

.1 OPSS 805 November 2010, Construction Specification for Temporary Erosion and Sediment Control Measures.

.2 Ontario Provincial Standard Drawings (OPSD):

.1 OPSD 219.260 November 2006, Turbidity Curtain.

.2 OPSD 219.261 November 2006, Turbidity Curtain, Seam Detail.

.3 Canadian General Standards Board (CGSB):

.1 CAN/CGSB 148.1, No. 2-M85, Methods of Testing Geotextiles and Geomembranes - Mass per Unit Area.

.2 CAN/CGSB 148.1, No. 3-M85, Methods of Testing Geotextiles and Geomembranes - Thickness of Geotextiles.

.3 CAN/CGSB 4.2, No. 11.2-M89(R2013), Textile Test Methods Bursting Strength - Ball Burst Test.

.4 American Society for Testing and Materials (ASTM):

.1 ASTM D4595-11, Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.

1.2 SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

1.3 MEASUREMENT PROCEDURES

.1 Supply and installation of turbidity curtain for environmental protection for all in-water work, maintenance of turbidity curtain during work, and removal of turbidity curtain after all in-water work is completed is part of the lump sum arrangement.

1.4 DELIVERY, STORAGE AND HANDLING

.1 During delivery and storage, protect geotextiles from direct sunlight, ultraviolet rays, excessive heat, mud, dirt, dust, debris and rodents.

Part 2 Products

2.1 MATERIALS

.1 Geotextile: woven synthetic fibre fabric, supplied in rolls.

.1 Composed of: minimum 85% by mass of polypropylene polyester with inhibitors added to base plastic to resist deterioration by ultra-violet and heat exposure for 60 days.

.2 Physical properties:

.1 Thickness: to CAN/CGSB-148.1, No. 3, minimum 0.8 mm.

.2 Mass per unit area: to CAN/CGSB-148.1, No. 2, minimum 220 g/m^2.

.3 Tensile strength and elongation (in any principal direction): to ASTM D4595.

.1 Tensile strength: minimum 900 N, wet condition.

.2 Elongation at break: minimum maximum 25%.

.3 Seam strength: minimum 900 N equal to or greater than tensile strength of fabric.

.4 Mullen burst strength: to CAN/CGSB-4.2, No. 11.2, minimum 2400 N, equal to or greater than tensile strength of fabric.

.3 Seams: sewn in accordance with manufacturer's recommendations.

.4 Thread for sewn seams: equal or better resistance to chemical and biological degradation than geotextile.

.5 Curtain height: to suit water depth and be bottom-weighted to maintain its vertical position.

Part 3 Execution

3.1 GENERAL

.1 Supply, install, maintain and remove turbidity curtains when instructed by the Departmental Representative.

.2 Monitoring of water turbidity outside the turbidity curtain will be done by the Departmental Representative. Turbidity shall not exceed 25 mg/l total suspended solids.

3.2 INSTALLATION

.1 Turbidity curtains shall consist of geosynthetic, load line, flotation, ballast, anchors, mooring buoys, mooring lines, adjustment lines, and tie-downs.

.2 Design to conform to Ontario Provincial Standard Specification, OPSS 805 and Ontario Provincial Standard Drawings OPSD 219.260 and OPSD 219.261 as a minimum.

.3 Turbidity curtains shall be constructed as follows:

.1 The flotation shall provide support along the length of the turbidity curtain.

.2 A sleeve shall be formed and heat-sealed or sewn along the entire bottom edge of the turbidity curtain geosynthetic, to contain the ballast in the sleeve. Breaks may be made in the sleeve to facilitate pulling, provided they are a minimum 100 mm in size and spaced at minimum 3 m intervals.

.3 Where turbidity curtain geosynthetic is joined to provide a continuous run, the sections shall be connected to provide a continuous seal and prevent the escape of turbid water between the sections.

.4 Turbidity curtain, as prepared for installation, shall be of sufficient width to account for water depth and wave action.

.5 Turbidity curtain shall be of sufficient length to permit work inside the area enclosed by the curtain without restricting equipment operations, and personnel from working.

.6 Seal the ends of the turbidity curtain where it terminates at the existing structure face.

.7 Anchor locations shall be established as is necessary to maintain the turbidity curtain in place and functioning.

3.3 OPERATION AND MAINTENANCE

.1 Turbidity curtains shall be installed to prevent sediment passage, from the area enclosed by the curtain, to the remaining water body. Turbidity curtains shall be installed and maintained in a manner that avoids entry of equipment, other than hand-held equipment or boats, to the remaining water body.

.2 Equipment is permitted in the work area enclosed by the turbidity curtain.

.3 Turbidity curtains shall be operated and maintained in the specified location, with the entire top edge above the water surface.

.4 The curtain shall be free of tears and gaps, and the bottom edge of the curtain is to be continuously in contact with the water course bed so that sediment passage from the area enclosed is prevented.

.5 Any folds in the turbidity curtain which form next to the flotation collar shall be regularly monitored and freed of collected sediment.

.6 Monitor and maintain the turbidity curtains booms both during and outside normal working shifts as required. Provide all personnel, materials and equipment necessary to maintain, repair or relocate the turbidity curtain system.

.7 Carry out construction operations to minimize impact on fish habitat from both disturbed sediments and fill materials.

.8 Replace damaged or deteriorated geotextile to approval of Departmental Representative.

.9 Remove turbidity curtain when authorized by the Departmental Representative after completion of the work.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 35 59 14 – Miscellaneous Metals

1.2 MEASUREMENT AND PAYMENT

.1 Supply and installation of rubber fenders to be measured by units supplied, including all accompanying labour and materials, such as channels and bolts.

1.3 REFERENCES

.1 American Society for Testing and Materials International (ASTM)

.1 ASTM A123/A123M-02, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.2 ASTM A153/A153M-05, Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware.

.3 ASTM A307-04, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile.

.4 ASTM D412-06ae2, Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension.

.5 ASTM D429-08, Standard Test Methods for Rubber Property - Adhesion to Rigid Substrates.

.6 ASTM D2240-05(2010), Standard Test Method for Rubber Property-Durometer Hardness.

.2 Canadian Standards Association (CSA International)

.1 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect materials from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

.1 Fender type: 203mm deep, 1.5m long ‘D’ shaped rubber fender

.1 Material: EPDM rubber, homogeneous and free from any defects, impurities and cracks.

.2 To be monolithic construction.

.3 To be in agreement with the material requirements presented in Table 1.

Table 1: Fender Material Properties

Property		Required Material Limits
Tensile Strength		1400 psi
Water Resistance, 70 hr @ 212° F (100° C)		
	Volume Change	± 5%
Polymer Type		100% EPDM

.2 Structural Steel for rolled section including channel: to CAN/CSA-G40.21, Grade 350W.

.3 Structural Steel for plates and miscellaneous steel: to CAN/CSA-G40.21, Grade 300W.

.4 Nuts and bolts: hexagon nuts, bolts and washers: to ASTM A325M.

.5 Welding materials: to CSA W48.

Part 3 Execution

3.1 INSTALLATION

.1 Install the fenders at locations indicated in the drawings.

.2 D shaped fender to be bolted to the channel section.

.3 Channel section to be welded to steel sheet pile out-pan.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM International

- .1 ASTM A123/A123M-09, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .2 ASTM A307-10, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .3 ASTM C881/C881M-13, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
- .4 ASTM C882/C882M-13a, Standard Test Method for Bond Strength of Epoxy-Resin Systems Used With Concrete By Slant Shear.
- .5 ASTM D570-98(2010)e1, Standard Test Method for Water Absorption of Plastics.
- .6 ASTM D638-10, Standard Test Method for Tensile Properties of Plastics.
- .7 ASTM D695-10, Standard Test Method for Compressive Properties of Rigid Plastics.
- .8 ASTM D698-12e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft3 (600 kN-m/m3)).
- .9 ASTM F593-13a, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
- .10 ASTM F594-09e1, Standard Specification for Stainless Steel Nuts.

.2 CSA International

- .1 CSA G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CSA S16-09, Design of Steel Structures.
- .3 CSA W48-14, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
- .4 CSA W59-13 Welded Steel Construction (metal arc welding).

.3 The Society for Protective Coatings (SSPC)

- .1 SSPC-SP 2-82 (R2004), Hand Tool Cleaning.
- .2 SSPC-SP 6/NACE No. 3-07, Commercial Blast Cleaning.
- .3 SSPC-Vis-1-89, Visual Standard for Abrasive Blast Cleaned Steel (Standard Reference Photographs) Editorial Changes, September 1, 2000 (Steel Structures Painting Manual, Chapter 2 – Surface Preparation Spec.).
- .4 SSPC-PA- 2-04, Measurement of Dry Coat Thickness with Magnetic Gauges.
- .5 SSPC Good Painting Practicies, Volume 1, 4th Edition

.4 Health Canada / Workplace Hazardous Materials Information System (WHMIS)

.5 Material Safety Data Sheets (MSDS).

1.2 MEASUREMENT PROCEDURES

.1 Steel cap channel shall be measured by linear metre and shall include all labour, materials and equipment necessary to fabricate, supply and install.

.2 Safety ladders will be measured by the number of units installed, including all labour, materials and equipment to fabricate and install. Tubular handles will be included in the measurement for payment of this item.

.3 Mooring cleats will be measured by the number of units installed, including all labour, materials and equipment to fabricate and install.

.4 Cleaning, shop painting and field painting of steel will not be measured separately for payment, but shall be included in the measurement for payment of each item.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit shop drawings in accordance with CSAA23.3 and CSA-A23.4 and include following items:

.1 Design calculations for items designed by manufacturer.

.2 Details of prestressed and nonprestressed members, reinforcement and their connections.

.3 Camber.

.4 Finishing schedules.

.5 Methods of handling and erection.

.6 Openings, sleeves, inserts and related reinforcement.

.3 Shop Drawings:

.1 Prior to fabrication, submit fabrication shop drawings with general layout, detailed dimensions, welding details, fastener details and all other relevant information necessary for fabrication.

.2 Submit manufacturer’s instructions, printed product literature and data sheets for paint, MSDS sheets, surface preparation requirements, application temperature/conditions, finish and limitations.

.3 Submit drawings stamped and signed by qualified professional engineer registered or licensed in the Province of Ontario, Canada.

.4 Submit samples in accordance with Section 01 33 00 - Submittal Procedures and provide sample and sample number of each finish to be used on project to Departmental Representative.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

.4 Welding companies certified to CSAW47.1.

Part 2 Products

2.1 MATERIALS

.1 Steel plates to: to CSA G40.20/ G40.21, Grade 350W, minimum 30% recycled content.

.2 Structural steel for rolled section: to CAN/CSA – G40. 21, Grade 350W.

.3 Welding materials: to CSA W59.

.4 Welding electrodes: to CSA W48 Series.

.5 Bolts and anchor bolts: to ASTM A307.

.6 Mooring cleats: to ASTM A307.

.7 Paint: high performance, multi-purpose, surface tolerant, epoxy coating.
- .1 Volume Solid: 68%
- .2 Minimum Dry Film thickness: 100 microns
- .3 Grey (subject to final approval of the Departmental Representative).

2.2 FABRICATION

.1 Examine existing field conditions and obtain measurements and dimensions required to fabricate. Advise Departmental Representative of any adjustments and conditions affecting the work.

.2 Confirm fit and field dimensions prior to commencing fabrication of all items.

.3 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

.4 Where possible, fit and shop assemble work, ready for erection.

.5 Threaded rod for adhesive anchors used in ladder supports shall be AISI 304 Stainless Steel.

.6 All steel shall be painted.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for metal fabrications installation in accordance with manufacturer's written instructions.

- .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

.2 Quality Control Plan: ensure concrete supplier meets performance criteria of concrete as established in PART 2 - PRODUCTS, by Departmental Representative and provide verification of compliance as described in PART 1 - QUALITY ASSURANCE.

3.2 FABRICATION

.1 Fabricate steel components as detailed on drawings and weld according to CSA W59.

.2 All flame cut edges shall be as smooth and regular as those produced by edge planing and shall be free of slag.

.3 Surfaces to be welded shall be smooth, uniform and free from birs, fins and other defects which would adversely affect the quality and uniformity of the weld.

.4 Touch up coating on pile caps damaged by handling and installation.

3.3 ERECTION

.1 Do welding work in accordance with CSA W59 unless specified otherwise.

.2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

.3 Supply components for work by other trades in accordance with shop drawings and schedule.

.4 Make field connections as indicated.

.5 Touch-up coating on steel components damaged by handling and installation.

3.4 MOORING CLEATS

.1 Install mooring cleats as indicated.

.2 Mooring cleats to be 150mm (6 inches) long.

3.5 STEEL CAP CHANNEL

.1 Install steel cap channel as indicated.

.2 Where the cap is not fully supported on the sheet piles due to low cut-off elevations, weld angles for support and connection to sheeting.

3.6 SAFETY LADDERS

.1 Fabricate as detailed on drawings.

.2 Provide access and install ladders.

.3 Field weld ladder to the sheet pile and grind all field welds smooth.

3.7 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by metal fabrications installation.

3.8 PAINTING

.1 Preparation of new metals:

.1 Commercial blast clean to remove paint, loose mill scale, welding slag, rust, dirt, oil, grease and other foreign substances in accordance with SSPC-SP6 Commercial Blast Cleaning.

.2 Remove traces of blast products from surfaces pockets and corners to be painted by brushing with clean brushes, by blowing with clean dry compressed air, or by vacuum cleaning.

.3 Prior to starting paint application ensure degree of cleanliness of surface is to SSPC-Vis 1.
1. Apply primer, paint or pretreatment after surface has been cleaned and before deterioration of surface occurs.
2. Clean surfaces again if rusting occurs after completion of surface preparation.

.4 Mixing paint:
1. Do not dilute or thin paint for brush application.
2. Mix ingredients in container before and during use and ensure breaking up of lumps, complete dispersion of settled pigment, and uniform composition
3. Do not mix or keep paint in suspension by means of air bubbling through paint.
4. Thin paint for spraying according to manufacturer’s written instructions.

.2 Paint Application

.1 Apply paint after new surface has been cleaned.

.2 Apply paint using spraying equipment , brush or roller in accordance with the paint manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

.3 Apply one coat of primer 76.2 to 127.0 microns and two coats of paint 101.6 to 152.4 microns. Total dry film thickness 177.8 to 279.4 microns.

.4 Apply each coat of paint as a continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied. Allow complete drying of each coat prior to applying succeeding coats.

.5 Where surface to be painted is not under cover, do not apply paint when:
1. Air temperature is below 5 degrees C or when temperature is expected to drop to 0 degrees C before paint has dried.
2. Temperature of surface is over 50 degrees C unless paint is specifically formulated for application at high temperatures.
3. Fog or mist occurs at site; it is raining or snowing; there is danger of rain or snow; relative humidity is above 85%.
4. Surface to be painted is wet, damp or frosted.
5. Previous coat is not dry.

.6 Supply cover when paint must be applied in damp or cold weather. Supply, shelter, or heat surface and surrounding air to comply with temperature and humidity conditions specified. Protect until paint is dry or until weather conditions are suitable.

.7 Remove paint from areas which have been exposed to freezing, excess humidity, rain, snow or condensation. Prepare surface again and repaint.

.8 Shop painting:
1. Do shop painting after fabrication and surface preparation and before damage to surface occurs from weather or other exposure.
2. Do not paint metal within 50 mm of edge to be welded. Give unprotected steel one coat of approved protective coating after shop fabrication is completed.

.3 Remove weld spatter before painting.

.9 After installation of miscellaneous steel touch up painted surfaces which have been damaged from handling and installation by cleaning to bare metal and apply primer and top coats as specified for shop painting. For welds, prepare surface

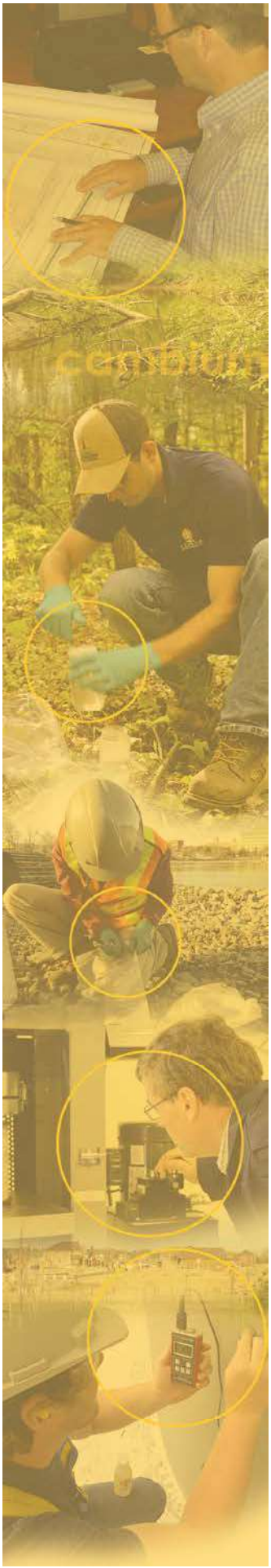
touch up paint around perimeter of plates and brackets. Extend paint a minimum 25 mm beyond weld.

.10 Protect adjacent work and surfaces not to be painted and if damaged, clean and restore such surfaces as directed.

.11 Do not paint metal surfaces which will be embedded in concrete.

END OF SECTION

APPENDIX A



Geotechnical Investigation Report Government Wharf, Big Bay, Wiarton, ON

Cambium Reference No.: 7738-001

January 8, 2019

Prepared for: Planmac Engineering Inc.

CAMBIUM

Cambium Inc.

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Barrie, ON L4N 5R7

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Facsimile: (705) 742.7907

cambium-inc.com

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1.0 INTRODUCTION

Cambium Inc. (Cambium) was retained by Planmac Engineering Inc. (Client) to complete a geotechnical assessment for the proposed sheet pile wall to encapsulate the currently exposed wharf perimeter located at Big Bay, Ontario (Site). A borehole investigation was conducted directly off the wharf, using a cantilevered platform. The geotechnical investigation was required to confirm the subsurface conditions at the Site to provide geotechnical design parameters as input into the design and construction of the proposed sheet pile wall. A Site plan with borehole locations is included in Figure 1 of this report.

This report presents the methodology and findings of geotechnical investigations of the wharf site and addresses requirements and constraints for the design and construction of the proposed construction.

2.0 METHODOLOGY

2.1 BOREHOLE INVESTIGATION

A borehole investigation was conducted on May 14, 2018, to assess subsurface conditions at the Site. Two (2) boreholes, designated as BH101-18 and BH102-18 were advanced at the Site. Borehole BH101-18 was advanced to a depth of 9.1 meters below ground surface (mbgs) and BH102-18 was advanced to 14.2 mbgs. The borehole depths are considered from top of wharf. BH101-18 was terminated due to auger refusal. The boreholes locations are shown on Figure 1. Drilling and sampling was completed using a track-mounted drill rig, under the supervision of Cambium technicians. The boreholes were advanced by a cantilever extension from the existing wharf using mud rotary drilling methods with casing with 50 mm O.D. split spoon samplers. Standard Penetration Test (SPT) N values were recorded for the sampled intervals as the number of blows required to drive a split spoon (SS) sampler 305 mm into the soil using a 63.5 kg drop hammer falling 750 mm, as per ASTM D1586 procedures. The SPT N values are used in this report to assess consistency of cohesive soils and relative density of non-cohesive materials. Once the lake bottom was reached, soil samples were collected at 0.75 m intervals from depths below the lake bottom and 1.5 m intervals at depths greater than 3.0 m below the lake bottom. The encountered soil units were logged in the field using visual and tactile methods, and samples were placed in labelled plastic bags for transport, future reference, possible laboratory testing, and storage. All boreholes were backfilled and sealed in accordance with Ontario Regulation (O.Reg.) 903.

Borehole logs are provided in Appendix A. Site soil and groundwater conditions are described and geotechnical recommendations are discussed in the following sections of this report.

2.2 PHYSICAL LABORATORY TESTING

Physical laboratory testing, including three (3) particle size distribution analyses (LS-702,705), was completed on selected soil samples to confirm textural classification and to assess geotechnical parameters. Moisture content testing was completed on all soil samples. Results are presented in Appendix B and are discussed in subsequent sections of this report.

3.0 SUBSURFACE CONDITIONS

Beneath the water, the lake bottom soils generally consist of sand overlying sandy gravel, overlying silt soils. The individual soil units are described in detail below and shown on the borehole logs provided in Appendix A.

3.1 SAND

A layer of brown sand was encountered at the surface of the lake bottom of both boreholes. This sand layer was encountered at a depth of approximately 4.6 meters below the top of wharf in both boreholes. The thickness of sand varied from 0.15 m to 0.76 m. The sand layer also contained a trace to some silt and was saturated at time of the investigation with moisture content varied from 26.9% to 31.7% based on laboratory testing. Based on SPT N values ranging from 3 to 37, the sand layer is classified as having a very loose to dense relative density.

3.2 SANDY GRAVEL/ SAND AND GRAVEL

Grey Sandy Gravel to Sand and Gravel was encountered in both boreholes. This layer extended from the base of the sand to depths of 9.1 mbgs to 10.6 mbgs. Borehole BH101-18 was terminated in the sandy gravel due to auger refusal. The Sandy Gravel was generally medium grained and contained some silt and a trace of clay. The Sandy gravel was found to be saturated at the time of the investigation. Based on SPT N values ranging from 24 to greater than 50 (for less than 130 mm of penetration), the sandy gravel is considered to have a compact to very dense relative density.

Laboratory particle size distribution analyses were completed for two (2) samples of the sandy gravel material. The analysis results, based on the Unified Soil Classification System (USCS) scale, are summarized below in Table 1, with full results provided in Appendix B.

Table 1 Particle Size Distribution Analysis on Sandy Gravel

Borehole	Depth (mbgs)	Soil	% Gravel	% Sand	% Silt	% Clay
BH101-18 – SS3	6.1 – 6.6	Sandy Gravel trace silt trace clay	58	30	7	5
BH102-18 – SS5	7.6 – 8.2	Sandy Gravel some silt trace clay	47	33	16	4

3.3 SILT

Grey Silt was encountered in borehole BH102-18 underlying the sand and gravel material, at a depth of 10.6 mbgs. The silt extended to a termination depth of 14.2 mbgs. The silt generally contained a trace of sand and clay. The silt was found to vary from moist to saturated at the time of investigation with moisture content varying

from 23.1 % to 27.9% based on laboratory results. SPT N values for the silt ranged from 3 to 8, indicating a soft to firm consistency.

A laboratory particle size distribution analysis were completed for one (1) sample of the silt material. The analysis results, based on the Unified Soil Classification System (USCS) scale, are summarized below in Table 2, with full results provided in Appendix B.

Table 2 Particle Size Distribution Analysis on Silt Soil

Borehole	Depth (mbgs)	Soil	% Gravel	% Sand	% Silt	% Clay	% Moisture Content
BH102-18 – SS8	12.2 – 12.7	Silt trace sand trace clay	0	8	84	8	23.1

3.4 BEDROCK

Bedrock was not encountered in either borehole; auger and spoon refusal was encountered at 9.1 mbgs in BH101-18 though it is not anticipated to be bedrock. Borehole BH102-18 was terminated in native soils at 14.2 mbgs.

4.0 GEOTECHNICAL CONSIDERATIONS

The following recommendations are based on borehole information and are intended to assist designers. Recommendations should not be construed as providing instructions to contractors, who should form their own opinions about site conditions. It is possible that subsurface conditions beyond the borehole locations may vary from those observed; if significant variations are found before or during construction, Cambium should be contacted so that we can reassess our findings, if necessary.

4.1 SHEET PILE WALL

The existing wharf is constructed using Z-shaped interlocked sheet pile wall. The exposed wharf perimeter at the site could be encapsulated by Z-shaped interlocking sheet piles driven to practical refusal in very dense sandy gravel at the Site. The depth to dense sand and gravel at the site was found from 4.8 mbgs to 5.3 mbgs. Detailed design of a sheet pile foundation system is typically completed by a specialty contractors with experience installing their proprietary sheet piles for shoring system. Full time inspection and monitoring of sheet pile installation should be performed by experienced geotechnical personnel. The soil parameters required for the design of sheet pile wall are provided in Section 4.2.

4.2 SOIL PROPERTIES FOR LATERAL EARTH PRESSURE

Based on the results of the geotechnical investigation, Cambium has developed parameters for soil properties for lateral earth pressure to be used in the design of sheet pile wall; these recommended parameters are provided in Table 3, below.

Table 3 Soil Properties for Lateral Earth Pressure

Soil Property	Sand Soils	Sand and Gravel Soils	Silt Soils
Friction Angle, Φ (º)	29	34	22
Cohesion, c_u (kPa)	0	0	5
Unit Weight, γ (kN/m^3)	19	21	18
Earth Pressure Coefficient at rest, k_o	0.52	0.44	0.63
Earth Pressure Coefficient active, k_a	0.35	0.28	0.45
Earth Pressure Coefficient passive, k_p	2.88	3.54	2.20

The following formula may be used to calculate active lateral thrust (P_a) on yielding retaining structures;

$P_a = (H/2)(K_a)(\gamma H+2q)$

where,

H = Height of retaining structure (m)

γ= unit weight of retained soil (kN/m^3)

q = surcharge (kPa)

4.3 DESIGN REVIEW AND INSPECTIONS

Cambium should be contacted to review and approve design drawings, prior to tendering or commencing construction, to ensure that all pertinent geotechnical-related factors have been addressed. It is important that onsite geotechnical supervision be provided for sheet pile installation inspection.

5.0 CLOSING

We trust the information in this report is sufficient for your current needs. If you have questions or comments regarding this document, please do not hesitate to contact at 705-719-0700 ext. 405

Respectfully submitted,

Cambium Inc.

Stuart Baird, M.Eng., P.Eng.
General Manager - Geotechnical

Rob Gethin, P.Eng.
Senior Project Manager

SEB/RLG/ma

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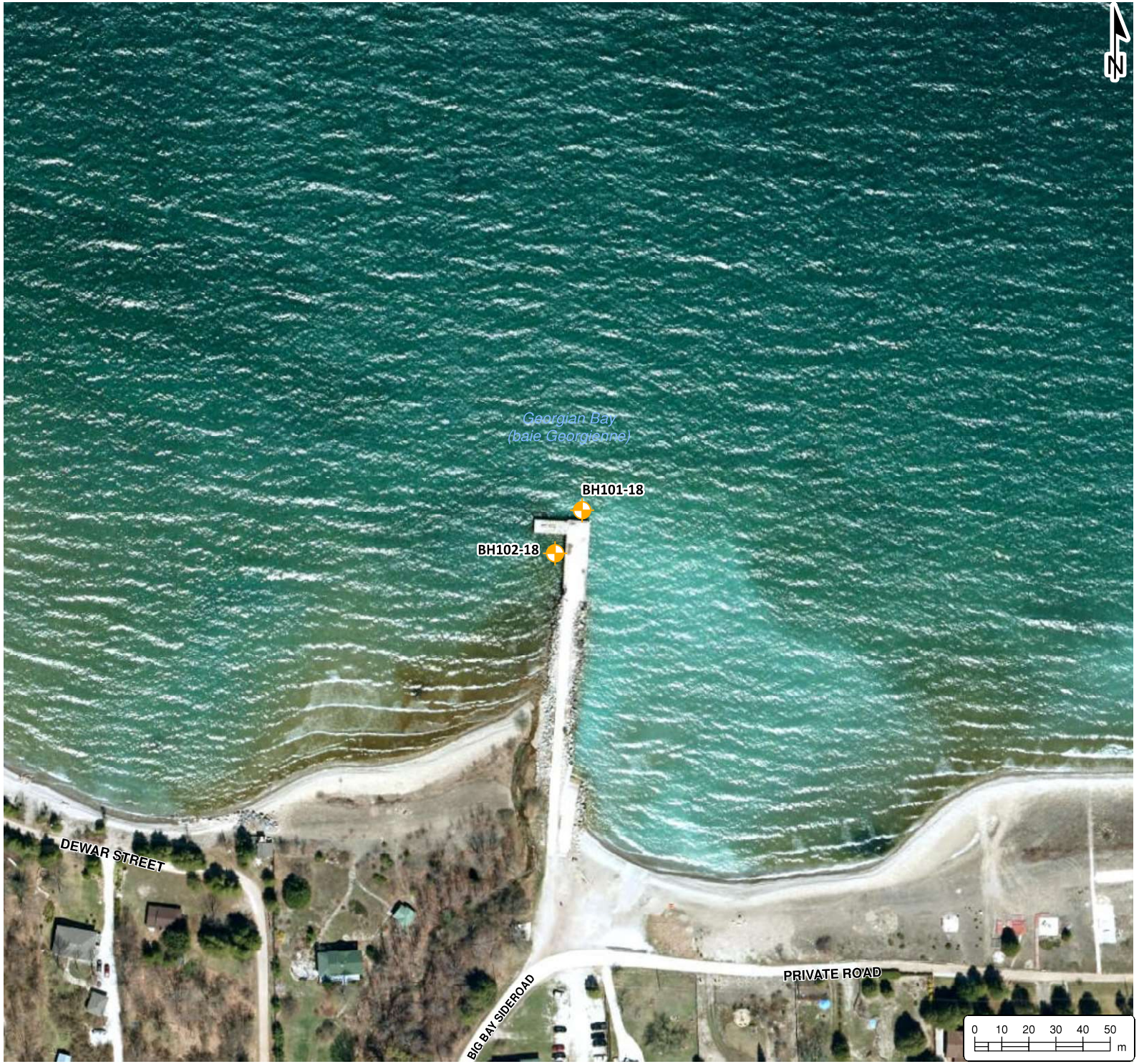
Appended Figures



GEOTECHNICAL INVESTIGATION

PLANMAC ENGINEERING INC.
Big Bay Wharf,
Wiarton, Ontario

LEGEND

Borehole Location

Notes:
- Base mapping features are © Queen's Printer of Ontario, 2017 (this does not constitute an endorsement by the Ministry of Natural Resources or the Ontario Government).
- Distances on this plan are in metres and can be converted to feet by dividing by 0.3048.
- Cambium Inc. makes every effort to ensure this map is free from errors but cannot be held responsible for any damages due to error or omissions. This map should not be used for navigation or legal purposes. It is intended for general reference use only.

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BOREHOLE LOCATION PLAN

Project No.:	7738-001	Date:	June 2018
		Rev.:	
Scale:	1:2,000	Projection:	NAD 1983 UTM Zone 17N
Created by:	TLC	Checked by:	RLG
Figure:	1		

O:\GIS\project_MXDs\7700-7799\7738-001 PLANMAC Engineering Inc. - Geotech - GOvernment Wharf, Big Bay, ON\2018-06-25 FIG 1 - Borehole Location Plan.mxd

Appendix A
Borehole Logs

Peterborough
Barrie
Oshawa
Kingston
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www.cambium-inc.com

Log of Borehole: BH101-18

Client:	Planmac Engineering Inc.	**Project Name:**	Government Wharf	**Project No.:**	7738-001
Contractor:	Walker Drilling Ltd.	**Method:**	Wash boring	**Date Completed:**	2018-06-14
Location:	Big Bay Wharf	**UTM:**	17T, 4960058, 504148	**Elevation:**	-

SUBSURFACE PROFILE			SAMPLE								
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)	% Moisture (25 50 75)	SPT (N) (10 20 30 40)	Well Installation	Remarks
0 / 0										0 meters is inferred as the top of the wharf
-1 / 1		Water								
-2 / 2										
-3 / 3										
-4 / 4		Sand: Brown, sand, some silt, dense, saturated								
-5 / 5		Sand and Gravel: Grey, gravel and sand, trace clay and silt, dense, saturated	1A 1B	SS SS	40	37				
-6 / 6		very dense	2	SS	40	43				
-7 / 7		dense	3	SS	50	50				SS3 GSA: Gravel 58%, Sand 30%, Clay 5%, Silt 7%
-8 / 8		very dense	4	SS	40	43				
-9 / 9			5	SS	90	50				
-10 / 10		Borehole terminated at 9.1 mbgs due to auger refusal	6	SS	90	50				
-11 / 11										
-12 / 12										
-13 / 13										
-14 / 14										
-15 / 15										

Logged By: AG **Input By:** AG

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Log of Borehole: BH102-18

Client:	Planmac Engineering Inc.	**Project Name:**	Government Wharf	**Project No.:**	7738-001
Contractor:	Walker Drilling Ltd.	**Method:**	Wash boring	**Date Completed:**	2018-06-14
Location:	Big Bay Wharf	**UTM:**	17T, 4960044, 504141	**Elevation:**	-

SUBSURFACE PROFILE			SAMPLE								
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N)	% Moisture (25 50 75)	SPT (N) (10 20 30 40)	Well Installation	Remarks
0 / 0										0 meters is inferred as the top of the wharf
-1 / 1		Water								
-2 / 2										
-3 / 3										
-4 / 4										
-5 / 5		Sand: Brown, sand, trace silt, very loose, saturated	1	SS	5	3				
-6 / 6		Sand and Gravel: Grey, gravel and sand, trace clay, very dense, saturated	2	SS	50	50				
			3	SS	40	34				
-7 / 7		compact very dense	4	SS	20	50				
-8 / 8		Sand and Gravel: Grey, gravel and sand, some silt, trace clay, very dense, saturated	5	SS	40	50				
-9 / 9		compact	6	SS	30	24				
-10 / 10										
-11 / 11		Silt: Grey, silt, trace sand, firm, saturated	7	SS	100	6				SS5 GSA: Gravel 47%, Sand 33%, Clay 4%, Silt 16%
-12 / 12			8	SS	100	8				SS8 GSA: Gravel 0%, Sand 8%, Clay 8%, Silt 84%
-13 / 13										
-14 / 14		soft	9	SS	100	3				
-15 / 15		Borehole terminated at 14.2 mbgs in grey silt								

Logged By: AG **Input By:** AG

Appendix B
Physical Laboratory Testing Results

Grain Size Distribution Chart

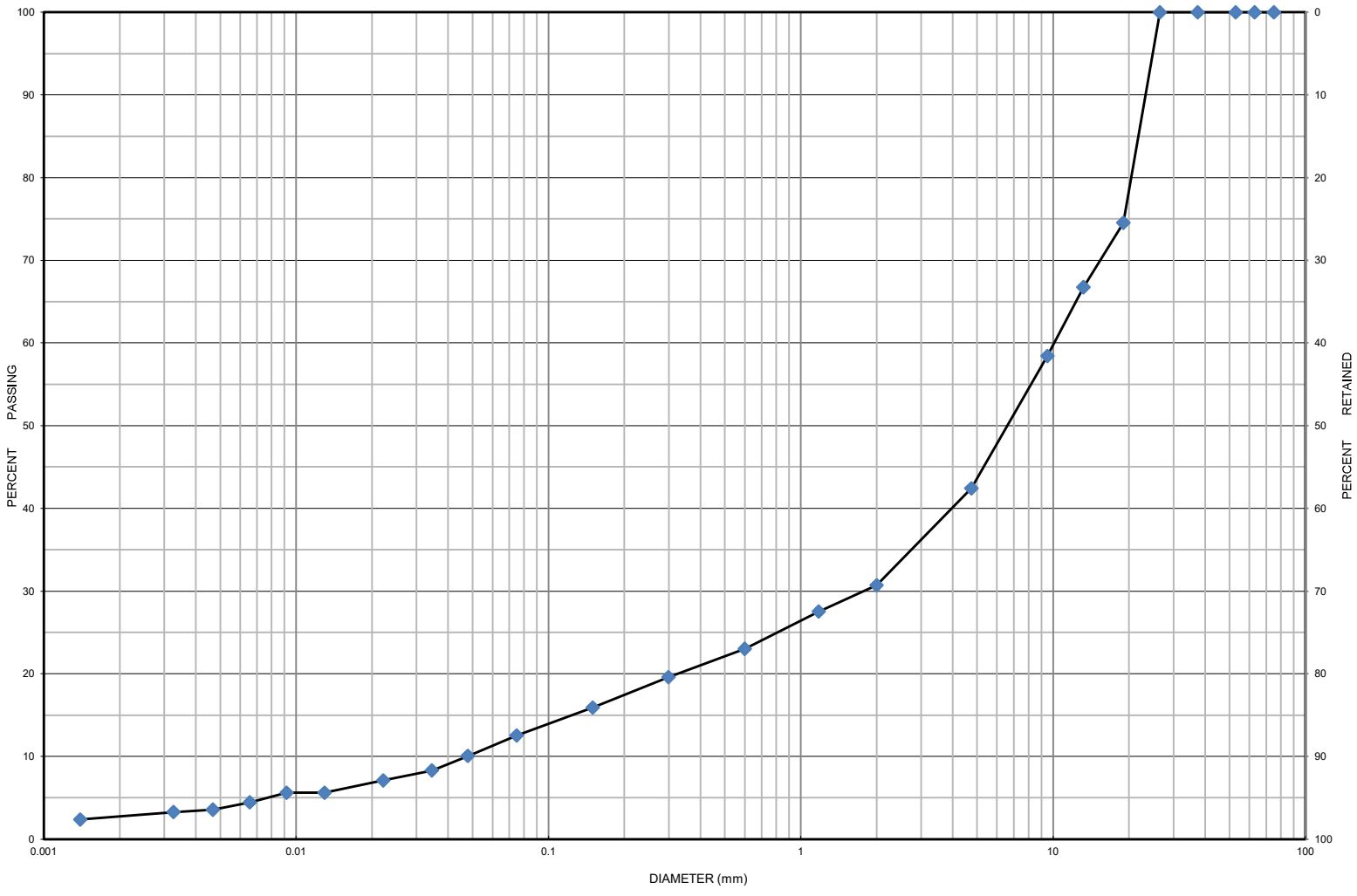
Project Number: *7738-001* **Client:** *PLANMAC Engineering Inc.*

Project Name: *Government Wharf, Big Bay, ON*

Sample Date: *June 14, 2018* **Sampled By:** *Alex Griffin - Cambium Inc.*

Location: *BH 101-18 SS 3* **Depth:** *6.1 m to 6.6 m* **Lab Sample No:** *S-18-0629*

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Location	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 101-18	SS 3	6.1 m to 6.6 m	58	30	12		6.3

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Sandy Gravel trace Silt trace Clay	GP	10.000	1.800	0.480	20.83	0.68

Issued By: _____ *Date Issued:* *July 19, 2018*

(Senior Project Manager)

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Grain Size Distribution Chart

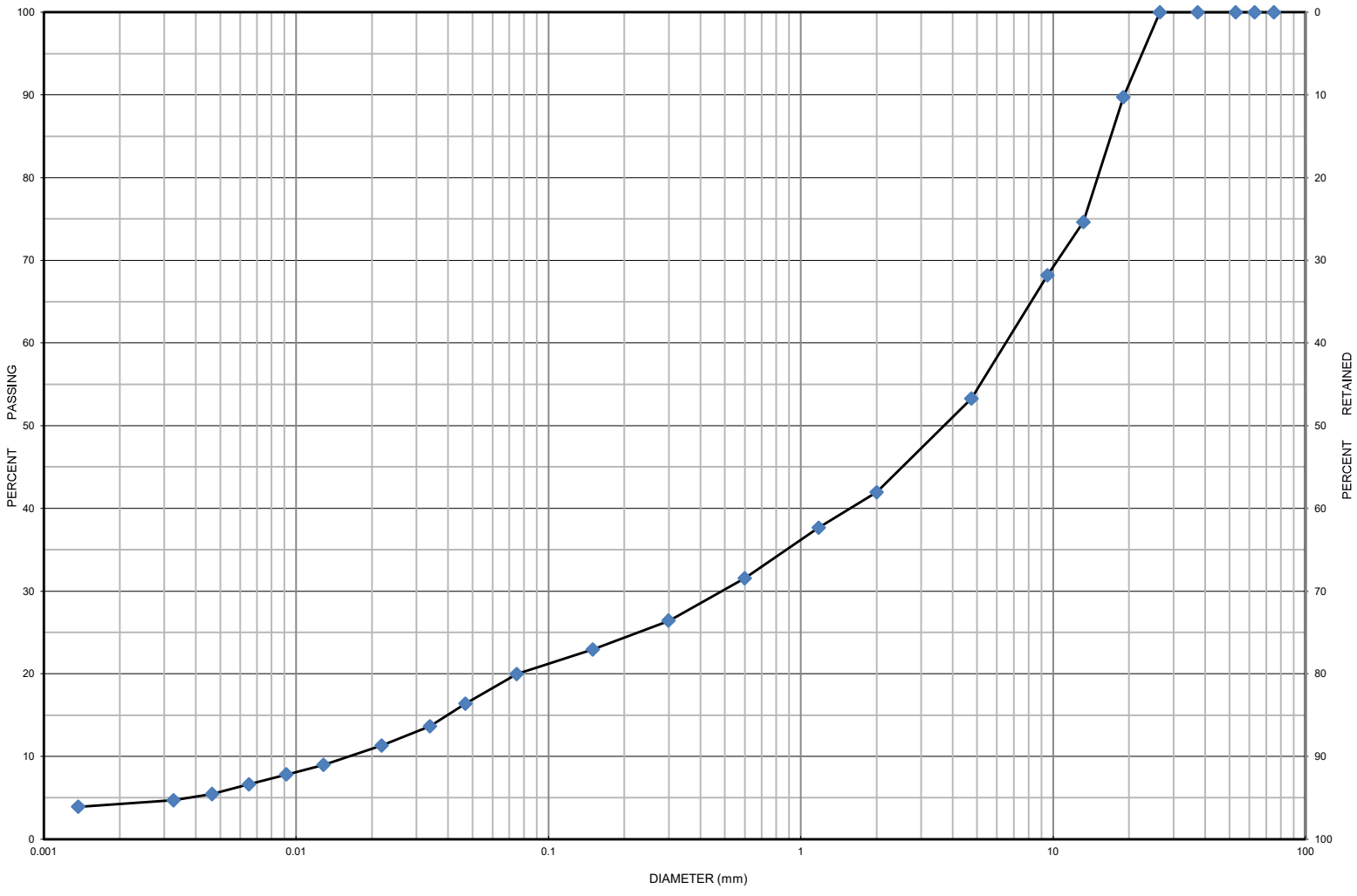
Project Number: *7738-001* **Client:** *PLANMAC Engineering Inc.*

Project Name: *Government Wharf, Big Bay, ON*

Sample Date: *June 14, 2018* **Sampled By:** *Alex Griffin - Cambium Inc.*

Location: *BH 102-18 SS 5* **Depth:** *7.6 m to 8.2 m* **Lab Sample No:** *S-18-0630*

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Location	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 102-18	SS 5	7.6 m to 8.2 m	47	33	20		8.1

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Sandy Gravel some Silt trace Clay	GW	6.500	0.490	0.017	382.35	2.17

Issued By: _____ *Date Issued:* *July 18, 2018*

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Grain Size Distribution Chart

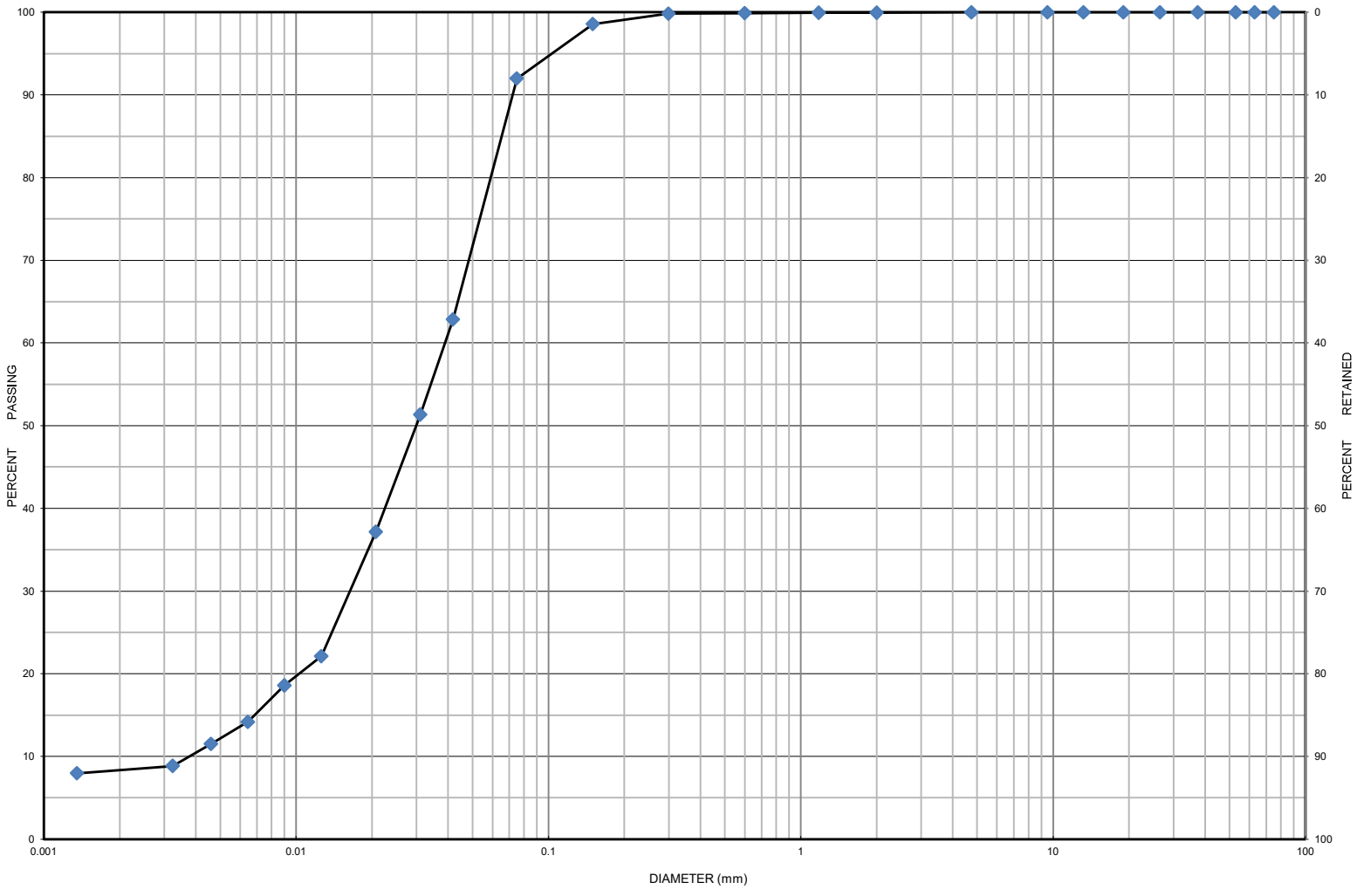
Project Number: *7738-001* **Client:** *PLANMAC Engineering Inc.*

Project Name: *Government Wharf, Big Bay, ON*

Sample Date: *June 14, 2018* **Sampled By:** *Alex Griffin - Cambium Inc.*

Location: *BH 102-18 SS 8* **Depth:** *12.2 m to 12.7 m* **Lab Sample No:** *S-18-0631*

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Location	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 102-18	SS 8	12.2 m to 12.7 m	0	8	92		23.1

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Silt trace Sand trace Clay	ML	0.039	0.017	0.0038	10.26	1.95

Issued By: _____ *Date Issued:* *July 19, 2018*

(Senior Project Manager)

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