

SPECIFICATION N° 161-08318-00

# PARKS CANADA

LOWER NICHOLSON LOCK STATION  
REPLACEMENT OF WHARVE

PARKS CANADA PROJECT NO.30029240



Parks  
Canada

Parcs  
Canada



Canada

SEPTEMBER 7, 2017

REVISION NO.01  
ISSUED FOR TENDER

<u>Section</u>	<u>Title</u>	<u>Pages</u>
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Division 00 - Procurement and Contracting Requirements

00 00 00	SPECIFICATION TITLE SHEET
00 01 10	TABLE OF CONTENTS

Division 01 - General Requirements

01 11 00	SUMMARY OF WORK
01 11 02	GENERAL INSTRUCTIONS
01 14 00	WORK RESTRICTIONS
01 33 00	SUBMITTAL PROCEDURES
01 35 29.06	HEALTH AND SAFETY REQUIREMENTS
01 35 43	ARCHEOLOGICAL AND CULTURAL RESOURCES AND ENVIRONMENTAL PROCEDURES
01 45 00	QUALITY CONTROL
01 56 00	TEMPORARY BARRIERS AND ENCLOSURES
01 74 21	CONSTRUCTION/DEMOLITION WASTE MANAGEMENT AND DISPOSAL

Division 02 - Existing Conditions

02 41 16	STRUCTURE DEMOLITION
02 81 01	HAZARDOUS MATERIALS
02 99 02	DECOMMISSION MONITORING WELL

Division 03 - Concrete

03 10 00	CONCRETE FORMING AND ACCESSORIES
03 20 00	CONCRETE REINFORCING
03 30 00	CAST-IN-PLACE CONCRETE

Division 05 - Metal

05 50 00	METAL FABRICATIONS
----------	--------------------

Division 07 - Thermal and Moisture Protection

07 19 00	WATER REPELLENTS
07 92 00	JOINT SEALING

Division 09 - Finishes

09 91 99	PAINTING FOR MINOR WORKS
----------	--------------------------

Division 31 - Earthwork

31 05 16	AGGREGATE MATERIALS
31 23 33.01	EXCAVATING, TRENCHING AND BACKFILLING
31 32 19.01	GEOTEXTILES
31 36 19	GABION MATTRESSES
31 37 00	RIP-RAP
31 53 13.01	TIMBER CRIBWORK

Division 32 - Exterior Improvements

32 91 19.13	TOPSOIL PLACEMENT AND GRADING
-------------	-------------------------------

32 92 23 SODDING

Division 33 - Utilities

33 41 00 STORM UTILITY DRAINS

Division 35 - Waterway and Marine Construction

35 20 24 DREDGING

35 01 40.92 PRESERVATION OF WATER COURSES

35 59 29 MOORING DEVICES

Drawings

- COVER SHEET

SP-1 Site Plan

GN-0 General Notes

S-01 General Arrangement – Removals

S-02 General Arrangement – Proposed New Construction – Plan and Section

S-03 Proposed Wharf Details

S-04 Timber Crib Details

S-05 Proposed New Concrete Deck and Reinforcing Details

S-06 Miscellaneous Details

**Part 1 General**

**1.1 WORK COVERED BY CONTRACT DOCUMENTS**

- .1 In general, the work of this Contract comprises the complete replacement of the upper and lower wharves at the Black Rapids Lock Station.

**1.2 CONTRACT METHOD**

- .1 Construct Work under lump sum and unit price contract.

**1.3 CONTRACTOR USE OF PREMISES**

- .1 At completion of operations condition of existing work: equal to or better than that which existed before new work started.
- .2 All areas disturbed and presently not sodded shall be sodded at the end of the project. Access road from previous construction activities shall be removed, and ground restored with sod, at the end of construction.

**1.4 OWNER OCCUPANCY**

- .1 Co-operate with Owner in scheduling operations to minimize conflict and to facilitate Owner usage.

**1.5 EXISTING SERVICES**

- .1 When unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.
- .2 Record locations of maintained, re-routed and abandoned service lines.

**1.6 DOCUMENTS REQUIRED**

- .1 Maintain at job site, one copy each document as follows:
  - .1 Contract Drawings.
  - .2 Specifications.
  - .3 Addenda.
  - .4 Reviewed Shop Drawings.
  - .5 List of Outstanding Shop Drawings.
  - .6 Change Orders.
  - .7 Other Modifications to Contract.
  - .8 Field Test Reports.
  - .9 Copy of Approved Work Schedule.
  - .10 Health and Safety Plan and Other Safety Related Documents.
  - .11 Ministry of Labour Notice of Project.
  - .12 Environmental Management Plan and BIA
  - .13 Other documents as specified.

**1.7 COST BREAKDOWN**

- .1 Before submitting first progress claim submit breakdown of contract amount in detail to Departmental Representative. After acceptance by departmental representative cost breakdown will be used as the basis of progress payment.
- .2 Scope of work for items listed below is a general description of the work and is not intended to be complete. See contract drawings and specifications for comprehensive contract requirements.
- .3 Within two weeks following award, provide breakdown of contract price as pre following:
  - .1 Mobilization: Includes work required to set up contractor's facilities on site and general administration of work on site. Includes removal of contractor's facilities from site.
  - .2 Site Access: Includes work required to construct temporary access routes to the work area and includes the removal of temporary access routes and restoration of disturbed areas upon completion of the work.
  - .3 Environmental Protection: Includes the implementation, maintenance, replacement (as required) and removal of environmental protection measures, including (but not limited to) erosion and sediment control, water management, exclusion fencing, tree hording and any other measures as specified in the Contract Documents.
  - .4 Turbidity Curtain: Includes installation of turbidity curtains around the entire working area.
  - .5 Winter Maintenance of Access Roads: Includes all work required for maintaining access roads at the Lower Nicholson's Lock Station as required to access the work.
  - .6 Remove Barbecues and Benches for Reinstatement: Includes removal, salvage and reinstallation of all barbeques and benches which require temporary removal in order to perform the work.
  - .7 Remove Mooring Bollards: Includes all work required for the removal and disposal of the existing mooring bollards on both the upper and lower wharf structures.
  - .8 Remove Existing Concrete Deck on Wharf: Includes all work required for the removal of the existing concrete deck on the wharf.
  - .9 Earth Excavation for Structure: Includes all excavation of native earth material as required to repair the catch basin outlet pipe. Dewatering measures for excavation shall be included in this item (Unit Price).
  - .10 Decommission Monitoring Well: Includes all work required for the decommissioning of all monitoring wells.
  - .11 Dredging: Includes all work required for the excavation of streambed material to bedrock elevation below the wharf (Unit Price).
  - .12 Remove Timber Cribs and Rock Ballast within Cribs: Includes all work required for the removal of the cribs and rock fill ballast in the wharf below the concrete deck.
  - .13 Remove Existing 400mm CSP Outlet Pipe: Includes all work required for the removal of the existing 400mm diameter CSP outlet pipe from the catch basin to the end of the pipe.
  - .14 Geotextile: Includes all work required for the supply and placement of geotextile fabric at all locations as indicated in the Contract Drawings including, but not limited to, within timber cribs, at the base of all earth excavations (Unit Price).

- .15 Rock Fill Mattress: Includes all work required for the supply and placement of a rock fill mattress for the timber cribs of the wharf structure (Unit Price).
- .16 Timber Cribs with Gabion Stone Ballast: Includes all work required for the construction of timber cribs with gabion stone ballast for the wharf structure.
- .17 Concrete in Deck: Includes all work required for the placement and curing of concrete for the deck of the wharf structure.
- .18 Coated Reinforcing Steel: Includes all work required for the supply and placement of coated reinforcing steel in the deck of the wharf structure.
- .19 Greased Sleeves for Coupler Bars: Includes all work required for the supply and installation of greased sleeves which are to be installed on the coupling bars as shown in the contract drawings.
- .20 Install New Mooring Bollards: Includes all work required for supply and installation of new mooring bollards on the wharf structure.
- .21 Painting of Concrete Deck: Includes all work required for the painting of exterior edges (water facing) and end edges of the new concrete wharf deck.
- .22 Concrete Sealer: Includes all work required for the placement of concrete sealer on all exposed concrete surfaces of the wharf deck.
- .23 Install New Weholite Outlet Pipe through Wharf: Includes, but is not necessarily limited to the following:
  - .1 Fabrication and installation of connection plates between wharf and outlet pipe
  - .2 Cutting of cribs to accommodate outlet pipe
  - .3 Supply and installation of 400mm steel sleeve into wharf structure and welded to connection plates
  - .4 Supply and installation of 300mm Weholite outlet pipe within steel sleeve
  - .5 Grout annular space between pipes.
- .24 Install New Weholite Outlet Pipe between Wharf and Existing Catch Basin: Includes, but is not necessarily limited to the following:
  - .1 Supply and installation of new 300mm Weholite outlet pipe
  - .2 Connect new 300mm outlet pipe to existing catch basin
  - .3 At catch basin, seal around new Weholite pipe with grout
  - .4 Outside catch basin, encase entire end of Weholite pipe with concrete
  - .5 Place clear stone bedding below new Weholite pipe
  - .6 Connect 300mm Weholite pipe to section of pipe inside wharf with Weholite pipe couplers
- .25 19mm Clear Stone: Includes all work required for the supply and placement of clear stone backfill behind the new wharf structure as indicated in the Contract Drawings (Unit Price).
- .26 Granular A Backfill to Structure: Includes all work required for the supply and placement of Granular A backfill behind the new wharf structure (Unit Price).
- .27 Granular B Type II Backfill to Structure: Includes all work required for the supply and placement of Granular B Type II backfill behind the new wharf structure (Unit Price).

- .28 Scour Protection (G-10 Gabion Stone): Includes all work required for the placement of rip-rap adjacent to the new wharf structure where the streambed meets the base of the wharf (Unit Price).
- .29 Top Soil: Includes all work required for the supply and placement of imported topsoil in locations as indicated on the Contract Drawings (Unit Price).
- .30 Sod: Includes all work required for the supply and placement of sod in locations as indicated on the Contract Drawings and in all damaged areas including the removal of access road which was installed during previous construction works. All costs associated with watering the new sod shall also be included in this item (Unit Price)
- .31 Reinstatement Site: Includes all work required for reinstating the site to a state which is equal to or better than the state before construction began.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not used.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 33 00 Submittals Procedures

**1.2 MINIMUM STANDARDS**

- .1 Execute work to meet or exceed:
  - .1 National Building Code of Canada, latest edition, Ontario Building Code 2006 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 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, R.R.O. 1990, Reg. 834.
  - .4 Environmental Protection Act, O. Reg. 102/94 and O. Reg. 103/94.
  - .5 Ontario Regulation 634/86 for Diving Operations, for all diving operations if employed by Contractor.
  - .6 Environmental Standards and Guidelines, Ontario Waterways, July 2017

**1.3 SAFETY PLANS**

- .1 Provide a Fire Safety Plan in accordance with National Building Code 2005, Division B, Part 8, section, 8.1.1.1 and NFC 2005, Division B, Part 2, subsection 2.8.2 prior to commencement of work. Deliver two copies of the Fire Safety Plan to the Departmental Representative not later than 14 days before commencing work.
- .2 On award of Contract, submit to Departmental Representative, two copies of Contractor's and sub-contractors':
  - .1 Safety Policy and Program.
  - .2 Safety Communication Plan.
  - .3 Emergency Preparedness Plan.
  - .4 Workplace Safety and Insurance Board LTI rating.
- .3 Make submissions as per Section 01 33 00 Submittals Procedures.

**1.4 TAXES**

- .1 Pay applicable Federal, Provincial and Municipal taxes.

**1.5 FEES, PERMITS AND CERTIFICATES**

- .1 Provide authorities having jurisdiction with information requested.
- .2 Pay fees, obtain and furnish certificates and permits required.
- .3 Immediately after award of Contract, submit WSIB - Workplace Safety and Insurance Board Certificate.



## **1.6 CANAL REGULATIONS AND PERMITS**

- .1 "Historic Canals Regulations" apply to and govern work under this Contract.
- .2 Regulations may be obtained from Justice Canada's website at: <http://laws-lois.justice.gc.ca/eng/regulations/sor-93-220/>.
- .3 Contractor may not mobilize or begin any work until Parks Canada issues permit under Historic Canals Regulation (SOR93-220 Sections, 11, 14 and 15).
- .4 Permit will not be issued before the following submittals are submitted and accepted:
  - .1 Environmental Management Plan (EMP) including all relevant component plans as identified in the ESG document
  - .2 Health and Safety Plan
  - .3 Site Layout Plan
  - .4 Changes to project scope of work not assessed under site-specific BIA will require review and acceptance by Client Department and may require issuing revised permit.

## **1.7 ARCHEOLOGICAL, CULTURAL AND ENVIRONMENTAL HERITAGE PROTECTION**

- .1 The Rideau Canal, including the Black Rapids Wharf, are National Heritage Sites.
- .2 Client Department, Parks Canada Agency, is main Environmental Authority for Rideau Canal Projects.
- .3 Departmental Representative will seek and obtain acceptance of Client Department and PCA Environmental Authority for submittals or changes in scope of work or methodologies that may affect archeological resources, cultural resources or environment prior to providing direction to Contractor.
- .4 Comply with mitigation measures outlined in site-specific Basic Impact Assessment (BIA) and other federal, provincial, territorial or municipal acts or regulations applying to the National Parks and Historic Sites of Canada. Changes to project scope of work not assessed under site-specific BIA will require review and acceptance by Client Department and may require issuing revised permit.
- .5 Site may contain possible cultural and archaeological resources.
- .6 Employ minimal intervention approach for all Work.
- .7 Damage to heritage elements will not be tolerated.
- .8 All work to be in accordance with requirements of Section 01 35 46 – Archeological, Cultural and Environmental Procedures.

## **1.8 EXAMINATION**

- .1 Before submitting tender, examine existing conditions and determine all conditions affecting work.
- .2 Obtain all information which may be necessary for proper execution of Contract and proper bidding.

**1.9 SITE**

- .1 Confine work, including temporary structures, plant, equipment and materials to established limits of site.
- .2 Obtain permit from adjacent properties owners if encroachment is required to carry out work.
- .3 Remove snow and ice to carry out work. Plow and sand access roads as required.
- .4 Do not impede access to private properties.

**1.10 CONSTRUCTION AND STORAGE AREA**

- .1 The limits of the Construction and Storage Area shall be as delineated on the Contract Drawings and as directed by the Contract Administrator.

**1.11 DOCUMENTS**

- .1 Keep on site:
  - .1 One copy of contract documents and reviewed shop drawings.
  - .2 One copy of BIA and approved BMP.

**1.12 MEASUREMENT PROCEDURES**

- .1 Utilize metric units.
- .2 No separate measurements for payment will be made under this section. Include costs of all provision in specific tender items.

**1.13 AS-BUILT RECORD DRAWINGS**

- .1 Record all deviations from the Contract drawings by hand using red marker on full size white prints As-Built Record Drawings.
- .2 Turn one set of As-Built Record Drawings over to Departmental Representative on completion of work.

**1.14 SHOP DRAWINGS**

- .1 Issue to Departmental Representative each shop drawing, product data or brochures for review. Allow Departmental Representative 7 days for reviewing submissions. Hardcopy (2 copies) or electronic submissions will be accepted.
- .2 Where specified, assure that submission bears the stamp of a Professional Engineer, Licensed in the Province of Ontario.
- .3 Responsibility for errors, omissions or deviations from requirements of Contract Documents is not relieved by Departmental Representative's review of submittals.
- .4 The review of shop drawings by Departmental Representative is for sole purpose of ascertaining conformance with general concept. This review shall not mean that 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 for errors or omissions in shop drawings or of responsibility for meeting all requirements of construction and Contract Documents. Without restricting generality of foregoing, Contractor is responsible for dimensions (to be confirmed and correlated at job

site), information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of all sub-trades.

#### **1.15 ADDITIONAL DRAWINGS**

- .1 Departmental Representative may furnish additional drawings to clarify work.
- .2 Such drawings shall become part of Contract Documents.

#### **1.16 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. Preserve the layout and benchmarks prior to removals.
- .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.

#### **1.17 CO-OPERATION AND PROTECTION**

- .1 Execute work with minimum disturbance to public and normal use of site.
- .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 EXISTING UTILITIES**

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

#### **1.19 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.

#### **1.20 INSPECTION AND TESTING**

- .1 The Departmental Representative may employ an Inspection and Testing company to ensure work conforms with Contract Documents. Costs of such tests, if result confirms defective work, will be borne by Contractor.
- .2 When initial tests and inspections reveal work is not to contract requirements, Contractor shall pay for tests and inspections required by Departmental Representative on corrected work.

#### **1.21 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 Departmental Representative take necessary measures to complete work within scheduled time. Do not change schedule without notifying Departmental Representative.
- .3 No in-water work between March 15 and July 15 of any year.
- .4 All work to be performed outside the navigational season. Navigational season dates for lock station is to be verified by owner. Construction shall be completed so that lock station is fully operational during this period.
- .5 Note that some materials specified in Contract are not readily available and require delivery time (such as timber and bolts). Contractor shall consult supplier prior to bidding and bid and schedule work accordingly.
- .6 Supply all labour, material and equipment to finish all work on dates specified, including work on weekends, with artificial light.

#### **1.22 FIRES AND TEMPORARY HEATERS**

- .1 Do not burn rubbish on site.
- .2 Only fires for temporary heaters are permitted on site.
- .3 Maintain temperature required to prevent frost damage to work.

#### **1.23 PROGRESS PHOTOGRAPHS**

- .1 As soon as work commences, take weekly progress photographs in digital format and submit to Departmental Representative.

#### **1.24 DATUM**

- .1 Elevations shown on Drawings are expressed in metres relative to chart datum and not guaranteed.
- .2 Carry out own and unequivocal assessment of all possible water and ice level elevations that may occur during execution of work.

#### **1.25 OPSS AND OPSD**

- .1 OPSS Ontario Provincial Standard Specifications and OPSD Ontario Provincial Standard Drawings quoted in these specifications are available online at <http://www.raqsa.mto.gov.on.ca/techpubs/ops.nsf/OPSHomepage>, or maybe requested from Departmental Representative during course of work.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 56 00 - Temporary Barriers and Enclosures

**1.2 ACCESS AND EGRESS**

- .1 Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders and scaffolding, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.

**1.3 USE OF SITE AND FACILITIES**

- .1 Execute work with least possible interference or disturbance to normal use of premises.
- .2 Close work area to pedestrian and vehicular traffic for the duration of the work.

**1.4 EXISTING SERVICES**

- .1 Notify Departmental Representative and utility companies of intended interruption of services and obtain required permission.
- .2 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

**1.5 FISH TIMING, BREEDING BIRD TIMING AND TURTLE PROTECTION WINDOWS.**

- .1 Adverse impacts should furthermore be minimized and mitigated through the strict adherence to environmental scheduling constraints with regards to in-water works (March 15 – June 30).
- .2 **A.1** Migratory birds, their nests and eggs are protected under the *Migratory Birds Convention Act* (1994). Project works or activities are potentially disruptive activities to birds and should be avoided during breeding times. No vegetation shall be removed from April 1<sup>st</sup> to August 31<sup>st</sup> to protect nesting birds.
- .3 **A.2** To protect Turtle species during hibernation, water drawdown/dewatering should occur either before or as soon after boating navigation season as possible and not be lowered below normal winter operating levels.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3            Execution**

**3.1                NOT USED**

.1            Not Used.

**END OF SECTION**

**Part 1 General**

**1.1 ADMINISTRATIVE**

- .1 Submit to Departmental Representative submittals listed for review. 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.

**1.2 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, Canada.
- .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 14 days for Departmental Representative's 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, in duplicate, 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's review, distribute copies.
- .10 Submit electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.
- .11 Submit electronic copies 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 electronic copies 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 electronic copies 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 electronic copies of manufacturer's 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 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .17 Supplement standard information to provide details applicable to project.
- .18 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.
- .19 The review of shop drawings by Public Canada Agency (PCA) is for sole purpose of ascertaining conformance with general concept.
  - .1 This review shall not mean that PCA 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 for errors or omissions in shop drawings 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 job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

### 1.3 SAMPLES

- .1 Submit for review samples as requested in respective specification Sections. Label samples with origin and intended use.
- .2 Deliver samples prepaid to Departmental Representative's business address.
- .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.

#### **1.4 CERTIFICATES AND TRANSCRIPTS**

- .1 Immediately after award of Contract, submit Workplace Safety and Insurance Board Certificate.
- .2 Submit transcription of insurance immediately after award of Contract.

#### **Part 2 Products**

##### **2.1 NOT USED**

- .1 Not Used.

#### **Part 3 Execution**

##### **3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 33 00 - Submittal Procedures

**1.2 REFERENCES**

- .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations.
- .2 Province of Ontario:
  - .1 Occupational Health and Safety Act and Regulations for Construction Projects, R.S.O. 1990, c.0.1, as amended and O. Reg. 213/91 as amended - Updated 2015.

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .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 operation.
  - .3 Emergency response plan
- .3 Complete and submit to Parks Canada attestation and proof of Compliance with Occupational Health and Safety form after date of notice to proceed and prior to commencement of work.
- .4 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.
- .5 Submit copies of incident and accident reports.
- .6 Submit WHMIS MSDS - Material Safety Data Sheets.
- .7 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.
- .8 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 3 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 2 days after receipt of comments from Departmental Representative.
- .9 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Departmental Representative.

**1.4 FILING OF NOTICE**

- .1 File Notice of Project with Ontario Provincial Ministry of Labour prior to beginning of Work. Submit copy to Parks Canada and post copy on site.
- .2 Contractor shall be responsible and assume the Principal Contractor role for work area.

- .3 Contractor shall agree to install proper site separation and identification in order to maintain time and space at all times throughout life of project.

## **1.5 SAFETY ASSESSMENT**

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

## **1.6 MEETINGS**

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

## **1.7 PROJECT/SITE CONDITIONS**

- .1 Work at site will involve contact with:
  - .1 Open water.
  - .2 Heights greater than 1200mm
  - .3 Noxious weeds such as poison ivy and wild parsnip
  - .4 Bees and other insects with potential allergy
  - .5 Slippery conditions due to ice formation during winter months.
  - .6 Hazards related to working in a natural area including insect, vegetation and wildlife related hazards.
  - .7 Possible tripping hazards such as; rocks, spalled concrete, potholes, roots and other natural features
  - .8 Slip hazard due to steep embankments, uneven or loose soil and rocks.
- .2 Utilize existing pathways and walkways at own risk. Upgrade to satisfy safety requirements.
- .3 Follow all contract Requirements with respect to designated substances report as listed.

## **1.8 GENERAL REQUIREMENTS**

- .1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning 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.

## **1.9 RESPONSIBILITY**

- .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 Contractor will be responsible and assume the role Constructor as described in the Ontario Occupational Health and Safety Act and Regulations for Construction Projects.
- .3 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.

#### **1.10 COMPLIANCE REQUIREMENTS**

- .1 Comply with Ontario Occupational Health and Safety Act, R.S.O. 1990, c. 0.1 and Ontario Regulations for Construction Projects, O. Reg. 213/91.
- .2 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

#### **1.11 UNFORSEEN HAZARDS**

- .1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Ontario having jurisdiction and advise Departmental Representative verbally and in writing.

#### **1.12 HEALTH AND SAFETY CO-ORDINATOR**

- .1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-coordinator. Health and Safety Co-coordinator must:
  - .1 Have site-related working experience specific to activities associated with working around open water and at heights.
  - .2 Have working knowledge of occupational safety and health regulations.
  - .3 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.
  - .4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.
  - .5 Be available to immediately attend and respond to site issues during execution of Work.

#### **1.13 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 Ontario having jurisdiction, and in consultation with Departmental Representative.

#### **1.14 CORRECTION OF NON-COMPLIANCE**

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

#### **1.15 BLASTING**

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

#### **1.16 POWDER ACTUATED DEVICES**

- .1 Use powder actuated tools in conformance with Occupational Health and Safety Act and Regulation for Construction Projects O.Reg. 145/00, s. 30.

**1.17 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.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not used.

**END OF SECTION**

**Part 1 General**

- .1 This Section describes requirements for protection of archeological and cultural resources and the environment that apply to the Work. These requirements apply to all Sections of this Specification, without limiting the conditions and approvals imposed by statute.
- .2 Control work to provide effective archeological, cultural, environmental, waterway, and fish habitat protection. Departmental Representative and Parks Canada Agency (PCA) Environmental Authority will monitor mitigation measures and will identify whenever such measures are found to be ineffective. Change measures or work procedures as directed by Departmental Representative to ensure environmental, waterway, and fish habitat protection.

**1.2 RELATED REQUIREMENTS**

- .1 Section 01 33 00- Submittal Procedures
- .2 Section 01 35 29.06- Health and Safety Requirements
- .3 Section 01 74 21- Construction/Demolition Waste Management and Disposal

**1.3 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.

**1.4 MEASUREMENT AND PAYMENT PROCEDURES**

- .1 No measurement of Environmental procedures.
- .2 Payment included in Lump Sum Price:
  - .1 Item includes work to protect archeological and cultural resources, and provide environmental protection including but not limited to; implementing mitigation measures from the site-specific Basic Impact Assessment (BIA), installation, maintenance, and removal of turbidity curtains, erosion and sediment controls, exclusion fencing, hording, environmental testing, and other environmental procedures.

**1.5 REGULATORY REQUIREMENTS**

- .1 Comply with environmental requirements of Contract Documents, applicable federal, provincial, and local statutes, acts, regulations, and ordinances of Agencies having jurisdiction.
- .2 Client Department, Parks Canada Agency, is main Environmental Authority for Rideau Canal Projects.
- .3 Client Department will not issue permit to authorize start of Work, under Historic Canal Regulations, before review and acceptance of Environmental Management Plan.

- .4 Comply with and enforce compliance by employees of prescribed environmental mitigation measures outlined in Environmental Management Plan and Basic Impact Assessment (BIA).
- .5 Allow PCA Environmental Authority full access to affected Work area and cooperate to provide reasonable facilities for such access.
- .6 Comply with written orders and directions from PCA Environmental Authority to correct deficiencies or implement additional environmental mitigation measures.
- .7 PCA Environmental Authority may issue written stop Work order if elevated turbidity or suspended sediment concentrations are observed.
- .8 Submit copies of environmental orders and directions to Departmental Representative.

## **1.6 HERITAGE PROTECTION**

- .1 The Rideau Canal and the Black Rapids Lock are National Heritage Sites.
- .2 Preserve heritage elements of site by executing Work without damage to site features or character defining elements.
- .3 Notify Departmental Representative and PCA Environmental Authority immediately if heritage items are damaged.
- .4 Employ minimal intervention approach for all Work.
- .5 Access roads, staging areas, and work pads require review and approval.
- .6 Damage to heritage elements will not be tolerated.
- .7 Ensure appropriate supervision work, adequate training for workers, and other necessary precautions to protect existing structures.
- .8 Notify Departmental Representative immediately where reasonable concern exists that damage may result from work.
- .9 Contractor may propose alternative work methodologies to be accepted by Departmental Representative and PCA Environmental Authority.
- .10 Protect possible archeological and cultural resources by excavating only to limits indicated.
  - .1 Excavation beyond indicated limits requires acceptance by PCA Environmental Authority.

## **1.7 CANAL REGULATIONS AND PERMITS**

- .1 "Historic Canals Regulations" apply to and govern work under this Contract.
- .2 Regulations may be obtained from Justice Canada's website at: <http://laws-lois.justice.gc.ca/eng/regulations/sor-93-220/>.
- .3 Contractor may not mobilize or begin any work until Parks Canada issues permit under Historic Canals Regulation (SOR93-220 Sections, 11, 14 and 15).
  - .1 Permit will not be issued before following submittals are submitted and accepted:
    - .1 Environmental Management Plan (EMP)
    - .2 Dewatering Plan
    - .3 Health and Safety Plan
    - .4 Site Layout Plan



- .4 Changes to project scope of work not assessed under site-specific BIA will require review and acceptance by Client Department and may require issuing.

## **1.8 RELICS AND ANTIQUITIES**

- .1 Corner stones and their contents, buried artifacts, remains and evidence of ancient persons and peoples, commemorative plaques, and other objects of historic value and worth, remain property of the Crown. Protect and notify Departmental Representative immediately of discovery of such objects.

## **1.9 ARCHEOLOGICAL AND CULTURAL REQUIREMENTS AND RESTRAINTS**

- .1 Site may contain possible cultural and archaeological resources.
- .2 PCA Environmental Authority may monitor and record some or all aspects of excavations, site access routes, and disturbances to soil overburden due to equipment and general work operations.
- .3 Cease Work immediately in affected Work area and notify Departmental Representative if cultural resources, suspected archeological resources, or character-defining elements are uncovered or damaged during Work.
- .4 Do not resume work until directed by Departmental Representative.
- .5 Proceed with other work and await further direction for work in affected area from Departmental Representative on how to proceed.
- .6 Allow Departmental Representative and PCA Environmental Authority Representative full access to affected Work area and cooperate to provide reasonable facilities for such access.

## **1.10 ENVIRONMENTAL MANAGEMENT PLAN**

- .1 Submittals: in accordance with Section 01 33 00 - SUBMITTAL PROCEDURES.
- .2 Before commencing construction activities or delivery of materials to site, submit Environmental Management Plan for review by PCA's Environmental Authority.
- .3 Environmental Management Plan must include comprehensive overview of known or potential environmental issues to be addressed during construction.
- .4 Address topics at level of detail commensurate with environmental issue and required construction tasks.
- .5 Submit Environment Management Plan (EMP) to Departmental Representative who will co-ordinate review and acceptance by PCA Environmental Authority minimum of 10 working days prior to commencing site setup, construction activities, or delivery of materials to site.
  - .1 Environment Management Plan and its component plans must be prepared by qualified environmental professionals in accordance with Parks Canada Agency's Environmental Standards and Guidelines Document – Ontario Waterways (July 2017) and site-specific Basic Impact Assessment (BIA).
  - .2 PCA Environmental Authority will outline prescribed mitigation measures during construction start-up meeting.
  - .3 Environment Management Plan to detail frequency of monitoring and high-risk construction activities requiring environmental professional on-site.

- .4 Environmental Management Plan to present comprehensive overview of known or potential environmental issues to be addressed during construction.
- .5 Environmental Management Plan to be prepared in accordance with requirements of Federal, Provincial, and Municipal laws and regulations.
- .6 Include measures to avoid causing harm to fish and fish habitat including aquatic species at risk in compliance with the Fisheries Act and Species at Risk Act in accordance with: <http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/measures-mesurem-eng.html>
- .7 Environmental Management Plan to follow baseline water and streambed quality indicated in Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines for the Protection of Aquatic Life: <http://ceqg-rcqe.ca/en/index.html#void>
- .8 Notify Departmental Representative and PCA Environmental Authority of proposed changes to project plans or schedules effecting Environmental Management Plan.
- .9 Contractor to ensure on-site personnel are aware of, and comply with prescribed mitigation measures in Environmental Management Plan.
- .6 Address topics at level of detail commensurate with environmental issue and required construction tasks.
- .7 Environmental Management Plan to include:
  - .1 Names of Responsible Persons: Persons responsible for ensuring adherence to Environmental Management Plan.
  - .2 Names of Waste Handlers: Names and qualifications of persons responsible for manifesting hazardous waste to be removed from site.
  - .3 Names of Instructors: Names and qualifications of persons responsible for training site personnel.
  - .4 Training Program: Description of environmental protection personnel training program. Erosion, Sediment, and Dust Control Plan: Plan which identifies type and location of erosion, sediment, and dust controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion, sediment, and dust control plan, Federal, Provincial, and Municipal laws and regulations.
  - .5 Temporary Works: Drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.
  - .6 Work Area Plan: showing proposed activities in each portion of work area and identifying areas of limited use or non-use.
    - .1 Work area plan to include measures for marking limits of use areas including methods for protection of features to be preserved within authorized work areas.
    - .2 Identify areas for storage of hazardous materials, cleaning hazardous materials, refueling, fuel storage, and other critical areas.
  - .7 Erosion and Sediment Control Plan: identifying type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to

assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.

- .8 Spill Control Plan: including procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.
- .9 Non-Hazardous Solid Waste Disposal Plan: identifying methods and locations for solid waste disposal including clearing debris.
- .10 Air Pollution Control Plan: detailing provisions to assure that dust, debris, materials, and trash, do not become air borne and are contained on project site.
- .11 Contaminant Prevention Plan: that identifies potentially hazardous substances to be used on job site; identifies intended actions to prevent introduction of such materials into air, water, or ground; and details provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.
- .12 Waste Water Management Plan that identifies methods and procedures for management and discharge of waste waters which are directly derived from construction activities, such as dewatering of lock, concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.
- .13 Historical, Archaeological, Cultural Resources, Biological Resources, and Wetlands Plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources, and wetlands.
- .14 Pesticide Treatment Plan: to be included and updated, as required.
- .15 Dewatering Plan: Plan for design, installation, operation and removal of dewatering structures and dewatering systems, to be updated as required.
- .16 Water Quality Testing Reports: to be submitted before start of work, daily during construction activities, and immediately after spills or when changes in water quality observed.
- .17 Traffic Control Plans: including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather.
  - .1 Plans to include measures to minimize amount of material transported onto paved public roads by vehicles or runoff.

## **1.11 EROSION, SEDIMENT AND DUST PROTECTION CONTROL PLAN**

- .1 Submit in accordance with Section 01 33 00 - SUBMITTAL PROCEDURES.
- .2 Submit Erosion and Sediment Control Plan, prepared by a qualified individual. Can be submitted as a stand-alone submission or as part of Environmental Management Plan. Submission to demonstrate:
  - .1 Focus primarily on erosion control and sediment control secondary.
  - .2 Areas to be controlled; including adjacent areas that could be negatively impacted by construction activities
  - .3 Drainage areas and patterns based on construction design and site topography.
  - .4 Plan for directing sediment-laden run-off to on-site detention or retention facilities.
  - .5 Plan for diverting clean storm run-on from site and exposed areas.
  - .6 Channels for necessary design discharge.

- .7 Plans for temporary and permanent erosion control needs for all channels.
- .8 Consideration of project schedule in selecting environmental controls.
- .9 Consideration of seasonal requirements and plans for design controls and practices for controlling associated erosion and settlement.
- .3 Prior to starting work that will create dust or debris, install effective mitigation techniques for erosion, sediment, dust, and debris control in accordance with Federal, Provincial, and Municipal laws and regulations.
  - .1 Maintain these protective measures at all times, including during shut down periods.
  - .2 Choose appropriate controls based on particle size present in sediment.
  - .3 Provide one metre high sediment barrier in areas where, due to construction activities, sediment, or debris may enter Canal or waterway. This includes, but is not limited to, sediment barrier installed around staging and work areas, and on canal bed (or ice surface) parallel to canal wing walls. Install turbidity curtain approximately 2 m to 3 m from wall.
  - .4 Maintain standby supply of pre-fabricated sediment barrier, or an ready-to-install sediment control device.
  - .5 Maintain effective surface drainage and direct runoff away from work areas and into adequately vegetated areas.
  - .6 Excavation to cease during periods of heavy rainfall, unless runoff is contained from entering waterway.
  - .7 Cover or wet down dry materials and rubbish to prevent blowing dust and debris.
  - .8 Implement sediment and erosion and sediment control measures prior to Work and maintain during Work phase. The following principles should be considered:
    - .1 Diversions to limit run-off water.
    - .2 Reduction of erosional forces by surface water velocity reduction.
    - .3 Reduction of sediment development through sediment collection or anchoring.
    - .4 Sedimentation of mobilized sediments.
    - .5 Filtration of sediment carrying flows.
    - .6 Collection of captured or contained sediments.
    - .7 Treatment of pH.
  - .9 Consider particle size present in the sediment to select appropriate control options.
  - .10 Erosion and sediment controls must be selected to treat particle size present in the native soils and sediments on the Work.
  - .11 Environmental protection measures shall be checked after each extreme weather event. Avoid activities that could lead to erosion during excessively wet weather conditions; monitor forecasts for heavy rainfall watches & warnings.
  - .12 All disturbed areas of the work site shall be stabilized immediately and re-vegetated as soon as conditions allow. All exposed areas should be covered with erosion control blankets or other measures to keep the soil in place and prevent erosion until vegetated in the spring.
  - .13 Sediment control measures and exclusion fencing must be removed in a way that prevents the escape or re-suspension of sediments

**1.12 FIRES**

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

**1.13 DRAINAGE**

- .1 Develop and submit erosion and Sediment Control Plan (ESC) identifying type and location of erosion and sediment controls provided. Plan to include monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.
- .2 Storm Water Pollution Prevention Plan (SWPPP) to be substituted for erosion and sediment control plan.
- .3 Provide temporary drainage and pumping as required to keep excavations and site free from water, and to prevent off-site water from entering work site.
- .4 Ensure pumped water into waterways, sewer or drainage systems is free of suspended materials.
- .5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements and EMP/ESG document.
- .6 Any water containing a high level of turbidity will be treated by discharging to settling basins, vegetated areas or sediment traps prior to release to streams (to be identified in a Dewatering Plan). Water quality downstream of construction activities and turbidity curtain should not exceed recommended DFO and CCME guidelines on water quality for the protection of aquatic life. Information on CCME guidelines can be obtained online at: <http://ceqgrcqe.ccme.ca/download/en/217/>. If such a change is observed, work may be stopped until the problem is addressed.

**1.14 SITE CLEARING AND PLANT PROTECTION**

- .1 Protect trees and plants on site and adjacent properties as indicated in the EMP. Only remove vegetation that is identified in the EMP as to be removed, otherwise protect.
- .2 Protect trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2m minimum.
- .3 Protect roots of all trees (that are not designated for removal) to dripline during excavation and site grading to prevent disturbance or damage.
  - .1 Avoid unnecessary traffic, dumping and storage of materials over root zones.
- .4 Minimize stripping of topsoil and vegetation. Only strip material that is identified in the EMP.
- .5 Restrict tree removal to areas designated by DCC Representative.

**1.15 WORK ADJACENT TO WATERWAYS**

- .1 Construction equipment to be operated on land only (except as permitted within the dewatered area of the waterbody).
- .2 Do not use waterway beds for borrow material.
- .3 Waterways to be kept free of excavated fill, waste material and debris.
- .4 Design and construct temporary crossings to minimize erosion to waterways.

- .5 Do not skid logs or construction materials across waterways.

#### **1.16 WILDLIFE PROTECTION**

- .1 Water drawdown to occur either before or soon after boating navigation season and not be lowered below winter operating levels to protect turtle species.
- .2 Detail procedures for preventing turtle entry and nesting within disturbed projects area in Environmental Management Plan.
- .3 Place temporary reptile exclusion fencing around stockpiled material and construction areas that may attract turtle nesting activities.
  - .1 Reptile exclusion fencing must follow the guidance in the document titled Species at Risk Branch, Best Practices Technical Note, Reptile and Amphibian Fencing, Ver. 1.1, developed by the Ontario Ministry of Natural Resources and Forestry:  
[http://files.ontario.ca/environment-and-energy/species-at-risk/mnr\\_sar\\_tx\\_rptl\\_amp\\_fnc\\_en.pdf](http://files.ontario.ca/environment-and-energy/species-at-risk/mnr_sar_tx_rptl_amp_fnc_en.pdf)
- .4 Environment Management Plan to detail procedures for avoiding disturbance to wildlife and nesting birds.
- .5 Do not use synthetic plastic erosion control mats or blankets to prevent entrapment hazard for turtles.

#### **1.17 AQUATIC LIFE PROTECTION**

- .1 In water work to be completed before March 15, 2018 to protect fish populations. Restricted in-water activities between March 15<sup>th</sup> and June 30<sup>th</sup> are in-water excavation, in-filling, rock/armour stone placement, transfer/movement of granular material or aggregates.
- .2 Amphibians, reptiles, fish, or crustaceans that could become or have become trapped within dewatered cofferdam area, or in other construction zones, to be captured and transferred "live" immediately to nearest waterbody as directed by Departmental Representative.
  - .1 Work program to be overseen by Departmental Representative and PCA Environmental Authority to ensure proper capture and handling of aquatic life.
  - .2 Advise Departmental Representative and PCA Environmental Authority 24 hours prior to fish rescue.
  - .3 Minimize length of time fish are out of the water.
  - .4 Use appropriate equipment when removing stranded fish.
  - .5 Monitor Work areas with deeper pool areas where fish are congregating, if safe to do so seine or dip nets can be operated to remove the fish.
  - .6 Document by species, counted and removed any fish found within dewatered areas, fish to be placed in nearest waterbody.
- .3 Should suspected species at risk, specifically snakes or turtles, be encountered during project staging, construction, or demobilization, contact Departmental Representative and PCA Environmental Authority immediately.
- .4 Report to Departmental Representative and PCA Environmental Authority, invasive species found within dewatered cofferdam area project area.
- .5 Invasive species to be euthanized rather than returned to water system.

### **1.18 SPECIES AT RISK**

- .1 Potential species at risk in project areas include; Eastern Whip-poor-will, Eastern Musk Turtle, Blanding's Turtle, and Snapping Turtle.
- .2 Provide training to all employees before beginning work on site on identifying species at risk and procedures to follow if species at risk is encountered.
- .3 Stop work and contact Departmental Representative and PCA Environmental Authority on how to proceed if a species at risk does not or cannot leave site.
- .4 Perform daily site sweeps before beginning work to ensure that there are no turtles in work area.
- .5 Minimize disturbed areas and clearly mark Work space.
- .6 If species at risk are observed or encountered, animal must not be harmed or harassed, stand back and allow animal to leave site.

### **1.19 INVASIVE SPECIES**

- .1 Clean mud, dirt, and vegetation off clothing and footwear before entering work site and before leaving work site.
- .2 Clean mud, dirt, and vegetation off machinery and equipment before entering work site and before leaving work site. Inspect and clean in accordance with Clean Equipment Protocol for Industry: [http://www.ontarioinvasiveplants.ca/wp-content/uploads/2016/07/Clean-Equipment-Protocol\\_June2016\\_D3\\_WEB-1.pdf](http://www.ontarioinvasiveplants.ca/wp-content/uploads/2016/07/Clean-Equipment-Protocol_June2016_D3_WEB-1.pdf).
- .3 Equipment and vehicles to be used in water, to be cleaned before and after use. This includes any visible mud, vegetation, mussels.
  - .1 Drain of standing water
  - .2 Clean with hot water (> 50 °C) at high pressure (> 250 psi).
  - .3 Allow to dry for 2-7 days in sunlight before transporting between waterbodies.
  - .4 Conduct cleaning minimum 30 m from edge of waterbody.
- .4 Submit photo and report to Invading Species Hotline (1-800-563-7711) or online at EDDMapS Ontario, <https://www.eddmaps.org/ontario/> and to Departmental Representative and PCA Environmental Authority if an invasive species is suspected.
- .5 Conduct site assessment for invasive plant infestations prior to carrying out field activities.
- .6 Use weed-free material for erosion control and stabilization ensuring that seed does not potentially contain invasive plants.
- .7 Commercially purchased seeds should have a label that states Purity: no less than 75% and preferably over 85%.
- .8 Weed seed content: tag should state no invasive plants are present, only use certified weed-free seed.
- .9 Germination of desired seed: germination should not be less 50% for most species with exceptions for some shrubs and forbs.
- .10 Move only contaminate-free materials to non-infested areas to prevent spread of invasive plants.

- .11 Familiarize workers with invasive species potentially present within work site areas including but not limited to; European Buckthorn, Japanese knotweed, and Zebra mussel.
- .12 Properly dispose of any found invasive species to ensure no further propagation.

#### **1.20 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 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area.
- .4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.
- .5 Any water containing a high level of silt or sediment will be treated by discharging to settling basins, vegetated areas or sediment traps prior to release to streams (to be identified in a Dewatering Plan). Water quality downstream of construction activities and turbidity curtain should not exceed recommended DFO and CCME guidelines on water quality for the protection of aquatic life. Information on CCME guidelines can be obtained online at: <http://ceqgrcqe.ccme.ca/download/en/217/>. If such a change is observed, work may be stopped until the problem is addressed.
- .6 Provide a marine grade turbidity curtain across all areas where sediments can enter the watercourse. Anchor or weight down turbidity curtain along its length to form a continuous seal on the river bed with adequate flotation at water surface to prevent over spills of turbid water.

#### **1.21 SPILLS**

- .1 Have environmental emergency response plan in place, spill kit, and other materials readily available on-site to respond quickly if spills occur.
  - .1 Spill kit to be maintained on site.
  - .2 Contractor to ensure adequate additional resources available
- .2 Report spills immediately to Departmental Representative, PCA Environmental Authority, and Ontario Ministry of Environment Spills Action Centre (Telephone No. 1-800-268-6060).
- .3 Secure source of spill to stop flow of spill and isolate area of spill.
- .4 Using appropriate safety precautions, collect liquid or solidify liquid with an inert, non-combustible material, or absorbent pads.
- .5 Clean-up, remove, and dispose of contaminated materials in accordance with Federal requirements, MSDS, or as directed by Ontario Ministry of Environment.
- .6 Be responsible for costs of cleaning up spills by method accepted by Departmental Representative and PCA Environmental Authority.
- .7 Submit documentation of remediation techniques and test results.



**1.22 TREATED WOOD**

- .1 Wood must not be treated with preservative on-site with the exception of small spot treatments. If spot treatments are required they are to be conducted on an impermeable surface and to be completely dry before installation.
- .2 Ensure that any Treated Wood purchased is marked with an End Tag to certify that it has been treated to the applicable CSA treatment standard. The end tag should show the preservative used, the use category, the product group and a plant identification number. Use of Treated Wood must be in accordance to the CSA O80 Standard Product Group and Use Category system that corresponds to the planned context-specific use.
- .3 To mitigate risk of leaching, a sealer or coating may be used. Penetrating sealers are recommended in addition to waterproofing the wood, the application of such sealers reduces the release of chemicals contained in CCA-Treated Wood by 80% to 95%.
- .4 To reduce leaching, wood treated with borate preservatives should not be used in locations where it will be subject to heavy rains or ground contact.
- .5 If the Treated Wood will be subject to a wet environment after installation it is recommended to allow time to dry or "age" the wood prior to installation, as the leaching of pesticides from Treated Wood decreases exponentially with time. With in-water installations, most metal leaching from CCA-Treated Wood occurs in the first 90 days following. In above water structures, most CCA leaching is thought to occur in the first year.
- .6 The use of cleaning and bleaching products containing sodium hypochlorite, sodium hydroxide, sodium percarbonate, citric or oxalic acid on Treated Wood should be avoided as these products can cause the wood to release toxic chemicals.
- .7 To minimize the need for in-field treatment it is recommended that framing, sawing, cutting and drilling be done before treatment to the maximum degree possible, preferably in a contained area to collect and remove sawdust and a minimum of 30m from water.
- .8 Treated wood must be visually inspected before use to ensure that it appears clean and its surface is free of preservative residues. Otherwise, the lumber should not be used and should be disposed of in accordance with the manufacturer's guidelines and with local and provincial regulations.
- .9 Exposed cut ends and drill holes should be field-treated with a preservative (along with a sealer) in accordance with the manufacturer's and the Pesticide Label instructions, preferably a minimum of 30m from water and in a protected cutting area prior to the assembly of the wooden structure.
- .10 Workers must always cut and work with Treated Wood outdoors or in an adequately ventilated area.
- .11 Collect all remaining scraps, cuttings, wood chips and sawdust derived from treated wood products in a timely manner and dispose of them at an appropriate disposal facility and as specified in the Pesticide Label. Do not compost waste material.

**1.23 NOTIFICATION**

- .1 PCA Environmental Authority 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 Management plan.

- .2 Contractor: after receipt of such notice, inform PCA Environmental Authority of proposed corrective action and take such action for approval by PCA Environmental Authority.
  - .1 Take action only after receipt of written approval by PCA Environmental Authority.
- .3 PCA Environmental Authority 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.

## **Part 2 Products**

### **2.1 NOT USED**

- .1 Not Used.

## **Part 3 Execution**

### **3.1 EQUIPMENT MAINTENANCE AND REFUELLING**

- .1 Any machinery that appears to have not been cleaned will not be permitted on site. For additional information or guidance on how to properly clean equipment, see the Clean Equipment Protocol for Industry developed by the Ontario Invasive Plant Council and found here: [http://www.ontarioinvasiveplants.ca/wp-content/uploads/2016/07/Clean-Equipment-Protocol\\_June2016\\_D3\\_WEB-1.pdf](http://www.ontarioinvasiveplants.ca/wp-content/uploads/2016/07/Clean-Equipment-Protocol_June2016_D3_WEB-1.pdf)
- .2 Refuel and maintain equipment off slopes and away from water bodies, on impermeable pads and at a recommended distance of 30 meters from any watercourse to allow full containment of spills. In the event that the recommended distance is not feasible or practical, proper storage/re-fuelling mats will be employed at the project site.
- .3 Maintain equipment to avoid leakage of fuels and liquids. Ensure measures are in place to minimize impacts of accidental spills; an emergency spill kit shall be kept on-site and employed immediately should a spill occur. In case of a spill, notify the Ontario Spill Action Centre immediately at 1-800-268-6060 and the Parks Canada Project Manager. Should a spill occur, further mitigation and/or remediation measures may be required.

### **3.2 CLEANING**

- .1 Progress Cleaning: Leave Work area clean at end of each day.
- .2 Ensure public waterways, storm and sanitary sewers remain free of waste and volatile materials disposal.
- .3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.
- .4 Waste Management: separate waste materials in accordance with Section 01 74 21-Construction/Demolition Waste Management and Disposal.

**END OF SECTION**

**Part 1 General**

**1.1 INSPECTION**

- .1 Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
- .2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative instructions, or law of Place of Work.
- .3 If Contractor covers, or permits to be covered, Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work at contractor's expense.
- .4 Departmental Representative will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Departmental Representative shall pay cost of examination and replacement.

**1.2 INDEPENDENT INSPECTION AGENCIES**

- .1 Independent Inspection/Testing Agencies will be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Departmental Representative.
- .2 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .3 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Departmental Representative. Pay costs for retesting and re-inspection.
- .4 Upon completion of all work an underwater inspection will be carried out by divers to ensure that all works have been completed as specified in the Contract Documents. Contractor will be required rectify any and all non-conforming work.

**1.3 ACCESS TO WORK**

- .1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.
- .2 Co-operate to provide reasonable facilities for such access.

**1.4 PROCEDURES**

- .1 Notify appropriate agency and Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made. A minimum of 72 hours notice must be made in advance of desired test date unless approved otherwise. Failure to provide notice may result in delays to construction operations. Claims for delays related to inadequate notice cannot be considered.

- .2 Submit samples and/or materials required for testing, as specifically requested in specifications at no additional cost to Departmental Representative. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.
- .3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

## **1.5 REJECTED WORK**

- .1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
  - .1 For the purposes of this section, defective work also includes any work that may have been installed by the Contractor without inspection specifically requested in specifications or otherwise requested by the Departmental Representative in advance of the installation.
- .2 Make good other Contractor's work damaged by such removals or replacements promptly.
- .3 If, in opinion of Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Departmental Representative will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Departmental Representative.

## **1.6 REPORTS**

- .1 Submit 2 copies of inspection and test reports to Departmental Representative.

## **1.7 TESTS AND MIX DESIGNS**

- .1 Furnish test results and mix designs as requested.
- .2 Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work will be appraised by Departmental Representative and may be authorized as recoverable.

## **1.8 MILL TESTS**

- .1 Submit mill test certificates as requested.

## **1.9 TURBIDITY CURTAIN INSTALLATION**

- .1 Due to the unevenness of the streambed, contractor may require service of divers to ensure that the turbidity curtain conforms to the contours of the streambed without any gaps whatsoever. At no time shall any sediment or other materials be permitted to be released from the construction area.

## **Part 2 Products**

### **2.1 NOT USED**

- .1 Not Used.

**Part 3          Execution**

**3.1          NOT USED**

.1          Not Used.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 74 21 - Construction/Demolition Waste Management and Disposal

**1.2 REFERENCES**

- .1 Canadian Standards Association (CSA International)
  - .1 CSA-O121-08 (R2013), Douglas Fir Plywood.

**1.3 INSTALLATION AND REMOVAL**

- .1 Provide temporary controls in order to execute Work expeditiously.
- .2 Remove from site all such work after use.

**1.4 HOARDING**

- .1 Erect temporary site enclosure using 1.8 m high steel welded wire fencing. Provide two lockable access gates. Maintain fence in good repair during and after work hours. Ensure each fence panel is staked into the ground with minimum 300mm long spikes or weighted with sandbags. Provide bracing to free ends. Respond to requests by Departmental Representative or PCA site staff to re-stand fallen fencing such that fencing is re-erected within 6 hours after normal work hours. Re-erect and further stabilize fallen fencing immediately during work hours.
- .2 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

**1.5 GUARD RAILS AND BARRICADES**

- .1 Provide as required by governing authorities.

**1.6 ACCESS TO SITE**

- .1 Provide and maintain access gates, roads, sidewalk crossings, ramps and construction runways as may be required for access to Work.

**1.7 PUBLIC TRAFFIC FLOW**

- .1 Restrict access of public traffic to site.

**1.8 FIRE ROUTES**

- .1 Maintain access to property including overhead clearances for use by emergency response vehicles.

**1.9 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY**

- .1 Protect surrounding private and public property from damage during performance of Work.
- .2 Be responsible for damage incurred.

**1.10 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials for disposal and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

**Part 2 Products**

**2.1 NOT USED**

- .1 Not Used.

**Part 3 Execution**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

## **Part 1        General**

### **1.1        WASTE MANAGEMENT GOALS**

- .1        Minimize amount of non-hazardous solid waste generated by project and accomplish maximum source reduction, reuse and recycling of solid waste produced by CRD activities.
- .2        Protect environment and prevent environmental pollution damage.

### **1.2        RELATED REQUIREMENTS**

- .1        Section 01 33 00- Submittal Procedures

### **1.3        REFERENCE STANDARDS**

- .1        Ontario Ministry of Environment
  - .1        Ontario 3 R's Regulations (regulation 102/94) for waste management programs applicable to construction and demolition projects greater than 2,000 m<sup>2</sup>.
  - .2        Ontario Environmental Protection Act (EPA)
    - .1        Regulation 102/94, Waste Audits and Waste Reduction Workplans.
    - .2        Regulation 103/94, Source Separation Programs.
  - .3        Canadian Construction Association (CCA)
    - .1        CCA 81-2001: A Best Practices Guide to Solid Waste Reduction.
  - .4        Public Works and Government Services Canada (PSPC)
    - .1        2002 National Construction, Renovation and Demolition Non-Hazardous Solid Waste Management Protocol.
    - .2        CRD Waste Management Market Research Report (available from PSPC's Environmental Services).
    - .3        Sustainable Development Strategy 2007-2009: Target 2.1 Environmentally Sustainable Use of Natural Resources.
      - .1        Real Property projects over \$1 million and in communities where industrial recycling is supported, implementation of CRD waste management practices will be completed, with waste materials being reused or recycled.
      - .2        Contractually ensure resources used in construction or maintenance are consumed and recovered in a sustainable manner.

### **1.4        DEFINITIONS**

- .1        Approved/Authorized recycling facility: waste recycler approved by applicable provincial authority or other users of material for recycling approved by the Departmental Representative.
- .2        Class III: non-hazardous waste - construction renovation and demolition waste.
- .3        Construction, Renovation and/or Demolition (CRD) Waste: Class III solid, non-hazardous waste materials generated during construction, demolition, and/or renovation activities
- .4        Inert Fill: inert waste - exclusively asphalt and concrete.



- .5 Waste Source Separation Program (WSSP): implementation and co-ordination of ongoing activities to ensure designated waste materials will be sorted into pre-defined categories and sent for recycling and reuse, maximizing diversion and potential to reduce disposal costs.
- .6 Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.
- .7 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.
- .8 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- .9 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:
  - .1 Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.
  - .2 Returning reusable items including pallets or unused products to vendors.
- .10 Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.
- .11 Separate Condition: refers to waste sorted into individual types.
- .12 Source Separation: act of keeping different types of waste materials separate beginning from the point they became waste.

## **1.5 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00- Submittal Procedures.
- .2 Prepare and submit on monthly basis, throughout project or at intervals agreed to by Departmental Representative the following:
  - .1 Receipts, scale tickets, waybills, and/or waste disposal receipts that show quantities and types of materials reused, recycled, or disposed of.
  - .2 Written monthly summary report detailing cumulative amounts of waste materials reused, recycled and landfilled, and brief status of ongoing waste management activities.
- .3 Submit prior to final payment the following:
  - .1 Provide receipts, scale tickets, waybills, waste disposal receipts that confirm quantities and types of materials reused, recycled or disposed of and destination.

## **1.6 USE OF SITE AND FACILITIES**

- .1 Execute Work with minimal interference and disturbance to normal use of premises.

## **1.7 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 become Contractor's property.
- .3 Protect, stockpile, store and catalogue salvaged items.

- .4 Protect structural components not removed and salvaged materials from movement or damage.
- .5 Protect surface drainage, mechanical and electrical from damage and blockage.
- .6 Provide on-site facilities and containers for collection and storage of reusable and recyclable materials.
- .7 Separate and store materials produced during project in designated areas.
- .8 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated processing facilities.
  - .1 On-site source separation is recommended.
  - .2 Remove co-mingled materials to off site processing facility for separation.
  - .3 Obtain waybills, receipts and/or scale tickets for separated materials removed from site.

## **1.8 DISPOSAL OF WASTES**

- .1 Do not bury rubbish or waste materials.
- .2 Do not dispose of oil, mineral spirits, volatile materials, waste or paint thinner into waterways, storm, or sanitary sewers.
- .3 Keep records of construction waste including:
  - .1 Number and size of bins.
  - .2 Waste type of each bin.
  - .3 Total tonnage generated.
  - .4 Tonnage reused or recycled.
  - .5 Recycled waste destination.
- .4 Remove materials on-site as Work progresses.
- .5 Prepare project summary to verify destination and quantities on a material-by-material basis as identified in the waste audit.

## **1.9 SCHEDULING**

- .1 Co-ordinate Work with other activities at site to ensure timely and orderly progress of Work.

## **Part 2 Products**

### **2.1 NOT USED**

- .1 Not Used.

## **Part 3 Execution**

### **3.1 APPLICATION**

- .1 Handle waste materials in accordance with appropriate regulations and codes.

### **3.2 CLEANING**

- .1 Progress Cleaning: Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.
- .3 Waste Management: separate waste materials for recycling.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
  - .2 Source separate materials to be reused/recycled into specified sort areas.

### **3.3 DIVERSION OF MATERIALS**

- .1 On-site sale of salvaged, reusable material is permitted.

### **3.4 CANADIAN GOVERNMENTAL DEPARTMENTS CHIEF RESPONSIBILITY FOR THE ENVIRONMENT**

- .1 Schedule G - Government Chief Responsibility for the Environment:

Province	Address	General Inquires	Fax
Ontario	Ministry of Environment and Energy, 135 St. Clair Avenue West Toronto ON M4V 1P5	416-323-4321 800-565-4923	416-323-4682
	Environment Canada Toronto ON	416-734-4494	

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 33 00 - Submittal Procedures
- .2 Section 01 35 43 – Archeological and Cultural Resources and Environmental Procedures
- .3 Section 01 56 00 - Temporary Barriers and Enclosures
- .4 Section 01 74 21 - Construction/Demolition Waste Management Disposal
- .5 Section 02 81 01 - Hazardous Materials.

**1.2 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.

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures and Section 01 74 21 - Construction/Demolition Waste Management Disposal.
- .2 Submit copies of certified weigh bills from authorized disposal sites and reuse and recycling facilities for material removed from site upon request of Departmental Representative.
- .3 Shop Drawings:
  - .1 Submit for review and approval demolition drawings, diagrams or details showing sequence of demolition work and supporting structures and underpinning.
  - .2 Submit demolition drawings stamped and signed by Professional Engineer registered or licensed in Ontario, Canada.
  - .3 Erosion and Sedimentation Control: submit erosion and sedimentation control plan in accordance with authorities having jurisdiction.
  - .4 Construction Waste Management:
    - .1 Submit project Waste Management Plan.

**1.4 QUALITY ASSURANCE**

- .1 Regulatory Requirements: Ensure Work is performed in compliance with applicable Provincial/Territorial and Municipal regulations.

**1.5 SITE CONDITIONS**

- .1 Environmental protection:
  - .1 Ensure Work is done in accordance with Section 01 35 43 - Archeological and Cultural Resources and Environmental Procedures.

- .2 Ensure Work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.
- .3 Fires and burning of waste or materials is not permitted on site.
- .4 Do not bury rubbish waste materials.
- .5 Do not dispose of waste or volatile materials including but not limited to: mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers.
  - .1 Ensure proper disposal procedures are maintained throughout project.
- .6 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers, or onto adjacent properties.
- .7 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with authorities having jurisdiction.
- .8 Protect trees, plants and foliage on site and adjacent properties where indicated.
- .9 Prevent extraneous materials from contaminating air beyond application area, by providing temporary enclosures during demolition work.
- .10 Cover or wet down dry materials and waste to prevent blowing dust and debris. Control dust on all temporary roads.

## **1.6 EXISTING CONDITIONS**

- .1 If material resembling spray or trowel applied asbestos or other designated substance listed as hazardous be encountered in course of demolition, stop work, take preventative measures, and notify Departmental Representative immediately. Proceed only after receipt of written instructions have been received from Departmental Representative.

## **Part 2 Products**

### **2.1 EQUIPMENT**

- .1 Leave machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.

## **Part 3 Execution**

### **3.1 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: requirements of authorities having jurisdiction.
  - .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 - Archeological and Cultural Resources and Environmental Procedures.
- .2 Prevent movement, settlement or damage of adjacent structures, services, walks, paving, trees, landscaping, adjacent grades, properties, parts of existing facility to remain.
  - .1 Provide bracing, shoring and underpinning as required.
  - .2 Repair damage caused by demolition as directed by Departmental Representative.
- .3 Support affected structures and, if safety of structure being demolished, adjacent structures or services appears to be endangered, take preventative measures, stop Work and immediately notify Departmental Representative and PCA.

### **3.2 DEMOLITION**

- .1 Do demolition work in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.
- .2 Blasting operations not permitted during demolition.
- .3 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.
- .4 Prior to start of Work remove contaminated or hazardous materials as defined by authorities having jurisdiction from site and dispose of at designated disposal facilities in safe manner and in accordance with Section 02 81 01 - Hazardous Materials.
- .5 Demolish parts of structures as indicated.
- .6 At end of each day's work, leave Work in safe and stable condition.
- .7 Demolish to minimize dusting. Keep materials wetted as directed by Departmental Representative.

### **3.3 CLEANING**

- .1 Waste Management: separate waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .2 Transport material designated for alternate disposal using approved and in accordance with applicable regulations.
- .3 Dispose of materials not designated for alternate disposal in accordance with applicable regulations.

**END OF SECTION**

## **Part 1 General**

### **1.1 RELATED REQUIREMENTS**

- .1 Section 01 33 00 - Submittal Procedures
- .2 Section 01 35 29.06 - Health and Safety Requirements
- .3 Section 01 35 43 - Archeological and Cultural Resources and Environmental Procedures
- .4 Section 01 74 21 Construction/Demolition Waste Management and Disposal

### **1.2 REFERENCE STANDARDS**

- .1 Department of Justice Canada (Jus)
  - .1 Transportation of Dangerous Goods Act, 1992 (TDG Act) [1992], (c. 34).
  - .2 Transportation of Dangerous Goods Regulations (T-19.01-SOR/2001-286).
- .2 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .3 National Research Council Canada Institute for Research in Construction (NRC-IRC)
  - .1 National Fire Code of Canada-2015.

### **1.3 DEFINITIONS**

- .1 Dangerous Goods: product, substance, or organism specifically listed or meets hazard criteria established in Transportation of Dangerous Goods Regulations.
- .2 Hazardous Material: product, substance, or organism used for its original purpose; and is either dangerous goods or material that will cause adverse impact to environment or adversely affect health of persons, animals, or plant life when released into the environment.
- .3 Hazardous Waste: hazardous material no longer used for its original purpose and that is intended for recycling, treatment or disposal.

### **1.4 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for hazardous materials and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Submit two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements and 01 35 43 - Archeological and Cultural Resources and Environmental Procedures to Departmental Representative for each hazardous material required prior to bringing hazardous material on site.

### **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 Transport hazardous materials and wastes in accordance with Transportation of Dangerous Goods Act, Transportation of Dangerous Goods Regulations, and applicable provincial regulations.
- .4 Storage and Handling Requirements:
  - .1 Co-ordinate storage of hazardous materials with Departmental Representative and abide by internal requirements for labelling and storage of materials and wastes.
  - .2 Store and handle hazardous materials and wastes in accordance with applicable federal and provincial laws, regulations, codes, and guidelines.
  - .3 Store and handle flammable and combustible materials in accordance with National Fire Code of Canada requirements.
  - .4 Keep no more than 45 litres of flammable and combustible liquids such as gasoline, kerosene and naphtha for ready use.
    - .1 Store flammable and combustible liquids in approved safety cans bearing the Underwriters' Laboratory of Canada or Factory Mutual seal of approval.
    - .2 Storage of quantities of flammable and combustible liquids exceeding 45 litres for work purposes requires the written approval of the Departmental Representative.
  - .5 Transfer of flammable and combustible liquids is prohibited within buildings.
  - .6 Transfer flammable and combustible liquids away from open flames or heat-producing devices.
  - .7 Solvents or cleaning agents must be non-flammable or have flash point above 38 degrees C.
  - .8 Store flammable and combustible waste liquids for disposal in approved containers located in safe, ventilated area. Keep quantities to minimum.
  - .9 Observe smoking regulations, smoking is prohibited in areas where hazardous materials are stored, used, or handled.
  - .10 Storage requirements for quantities of hazardous materials and wastes in excess of 5 kg for solids, and 5 litres for liquids:
    - .1 Store hazardous materials and wastes in closed and sealed containers.
    - .2 Label containers of hazardous materials and wastes in accordance with WHMIS.
    - .3 Store hazardous materials and wastes in containers compatible with that material or waste.
    - .4 Segregate incompatible materials and wastes.
    - .5 Ensure that different hazardous materials or hazardous wastes are stored in separate containers.
    - .6 Store hazardous materials and wastes in secure storage area with controlled access.
    - .7 Maintain clear egress from storage area.
    - .8 Store hazardous materials and wastes in location that will prevent them from spilling into environment.



- .9 Have appropriate emergency spill response equipment available near storage area, including personal protective equipment.
- .10 Maintain inventory of hazardous materials and wastes, including product name, quantity, and date when storage began.
- .11 When hazardous waste is generated on site:
  - .1 Co-ordinate transportation and disposal with Departmental Representative.
  - .2 Comply with applicable federal, provincial and municipal laws and regulations for generators of hazardous waste.
  - .3 Use licensed carrier authorized by provincial authorities to accept subject material.
  - .4 Before shipping material obtain written notice from intended hazardous waste treatment or disposal facility it will accept material and it is licensed to accept this material.
  - .5 Label container(s) with legible, visible safety marks as prescribed by federal and provincial regulations.
  - .6 Only trained personnel handle, offer for transport, or transport dangerous goods.
  - .7 Report discharge, emission, or escape of hazardous materials immediately to MOE Spills Hotline, Departmental Representative, PCA Environmental Authority and appropriate provincial authority. Take reasonable measures to control release.
- .12 Ensure personnel have been trained in accordance with Workplace Hazardous Materials Information System (WHMIS) requirements.
- .13 Report spills or accidents immediately to MOE Spills Hotline and Departmental Representative. Submit a written spill report to Departmental Representative within 24 hours of incident.

## Part 2 Products

### 2.1 MATERIALS

- .1 Description:
  - .1 Bring on site only quantities of hazardous material required to perform Work.
  - .2 Maintain MSDS in proximity to where materials are being used. Communicate this location to personnel who may have contact with hazardous materials.
- .2 List of Designated Substances:
  - .1 In accordance with the Occupational Health and Safety Act, R.S.O. 1990, c. 0.1, the Contractor is advised of the presence of the following Designated Substance(s):

Substance	Location
Arsenic	Timber components of existing weirs (copper chromate arsenate treatment)
Lead	Paint on Existing Bollards
Silica	Concrete

- |  |  |                 |
|--|--|-----------------|
|  | Benzene  | Not Present     |
|  | Vinyl Chloride, Coke Oven Emissions, Ethylene Oxide, Acrylonitrile and Isocyanates | Not Present     |
|  | Mercury  | Not Present     |
|  | Bird Droppings   | Throughout Site |
- .3 Poison Ivy and wild parsnip may be present throughout the site.

### **Part 3 Execution**

#### **3.1 DESIGNATED SUBSTANCES**

- .1 Treat removal of designated substances in accordance with Occupational Health and Safety Act, R.S.O. 1990, c. 0.1 and Section 01 74 21 Construction/Demolition Waste Management and Disposal.
- .2 Treat section of the work containing designated substances which are to remain in accordance with Occupational Health and Safety Act, R.S.O. 1990, c. 0.1.

#### **3.2 CLEANING**

- .1 Progress Cleaning: Leave Work area clean at end of each day.
- .2 Final Cleaning: Upon completion remove surplus materials, rubbish, tools and equipment.
- .3 Waste Management: separate waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .1 Dispose of hazardous waste materials in accordance with applicable federal and provincial acts, regulations, and guidelines.
  - .2 Recycle hazardous wastes for which there is approved, cost effective recycling process available.
  - .3 Send hazardous wastes to authorized hazardous waste disposal or treatment facilities.
  - .4 Burning, diluting, or mixing hazardous wastes for purpose of disposal is prohibited.
  - .5 Disposal of hazardous materials in waterways, storm or sanitary sewers, or in municipal solid waste landfills is prohibited.
  - .6 Dispose of hazardous wastes in timely fashion in accordance with applicable provincial regulations.
  - .7 Minimize generation of hazardous waste to maximum extent practicable. Take necessary precautions to avoid mixing clean and contaminated wastes.
  - .8 Identify and evaluate recycling and reclamation options as alternatives to land disposal, such as:
    - .1 Hazardous wastes recycled in manner constituting disposal.
    - .2 Hazardous waste burned for energy recovery.
    - .3 Lead-acid battery recycling.
    - .4 Hazardous wastes with economically recoverable precious metals.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 31 23 33.01 – Excavation, Trenching and Backfilling
- .2 Section 03 30 00 – Cast-In-Place Concrete

**1.2 PAYMENT**

- .1 Decommission Monitoring Well – Item:
  - .1 There will be no measurement for payment as this item will be paid by lump sum.
  - .2 Payment at the Contract price for the appropriate tender items for the decommissioning of monitoring wells shall be full compensation for all labour, equipment, and material to do the work.

**Part 2 Products**

**2.1 MATERIALS**

- .1 Water: to OPSS 1302.
- .2 Grout: to Section 03 30 00 – Cast-In-Place Concrete

**Part 3 Execution**

**3.1 Decommission Well**

- .1 Excavate around monitoring well and take necessary precautions to protect it from damage.
- .2 Cut the well casing at the base of the excavation and remove. This may be done as the excavation progresses.
- .3 Immediately after cutting, cover the top of the casing to prevent the entry of any foreign materials.

Fill the remaining casing with grout and leave in-place during construction. Care shall be taken to prevent damage to remaining pipe during the course of construction.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 33 00 - Submittal Procedures
- .2 Section 01 74 21 - Construction/Demolition Waste Management and Disposal
- .3 Section 02 81 01 - Hazardous Materials.
- .4 Section 07 92 00 - Joint Sealants

**1.2 REFERENCE STANDARDS**

- .1 Canadian Standards Association (CSA International)
  - .1 CSA-A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
  - .2 CSA-O86S1-05, Supplement No. 1 to CAN/CSA-O86-14, Engineering Design in Wood.
  - .3 CSA O121-08 (R2013), Douglas Fir Plywood.
  - .4 CSA O151-09 (R2014), Canadian Softwood Plywood.
  - .5 CSA O153-13, Poplar Plywood.
  - .6 CAN/CSA-O325.0-92(R2003), Construction Sheathing.
  - .7 CSA O437 Series-93(R2011), Standards for OSB and Waferboard.
  - .8 CSA S269.1-16, Falsework and Formwork.
  - .9 CAN/CSA-S269.3-M92(R2013), Concrete Formwork, National Standard of Canada
- .2 Underwriters' Laboratories of Canada (ULC)
  - .1 CAN/ULC-S701-11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit shop drawings for formwork and falsework.
  - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Ontario, Canada.
- .3 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 02 81 01 - Hazardous Materials.
- .4 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, special architectural exposed finishes, ties, liners, and locations of temporary embedded parts. Comply with CSA S269.1, for falsework drawing. Comply with CAN/CSA-S269.3 for formwork drawings.
- .5 Indicate formwork design data: permissible rate of concrete placement, and temperature of concrete, in forms.

- .6 Indicate sequence of erection and removal of formwork/falsework as directed by Departmental Representative.

#### **1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Store and manage hazardous materials in accordance with 02 81 01 Hazardous Materials.
- .2 Waste Management and Disposal:
  - .1 Separate waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .2 Place materials defined as hazardous or toxic in designated containers.
  - .3 Divert wood materials from landfill as approved by Departmental Representative.
  - .4 Divert plastic materials from landfill as approved by Departmental Representative.
  - .5 Divert unused form release material from landfill to an official hazardous material collections site as approved by the Departmental Representative.

### **Part 2 Products**

#### **2.1 MATERIALS**

- .1 Formwork materials:
  - .1 Wood and wood product formwork materials to CSA-O121, CAN/CSA-O86, CSA O437 Series or CSA-O153.
  - .2 Rigid insulation board: to CAN/ULC-S701.
- .2 Form ties: removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm diameter in concrete surface.
- .3 Form release agent: non-toxic, biodegradable, low VOC.
- .4 Form stripping agent: colourless mineral oil, non-toxic, biodegradable, low VOC, free of kerosene, with viscosity between 15 to 24 mm<sup>2</sup>/s at 40 degrees C, flashpoint minimum 150 degrees C, open cup.
- .5 Falsework materials: to CSA-S269.1.
- .6 Sealant: to Section 07 92 00 - Joint Sealants.

### **Part 3 Execution**

#### **3.1 FABRICATION AND ERECTION**

- .1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.
- .2 Fabricate and erect falsework in accordance with CSA S269.1.
- .3 Do not place shores and mud sills on frozen ground.
- .4 Provide site drainage to prevent washout of soil supporting mud sills and shores.

- .5 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.
- .6 Align form joints and make watertight. Keep form joints to minimum.
- .7 Use 25 mm chamfer strips on external corners and/or 25 mm fillets at interior corners, joints, unless specified otherwise.
- .8 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.
- .9 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.
- .10 Clean formwork in accordance with CSA-A23.1/A23.2, before placing concrete.
- .11 Repair with colour matches dry pack non-shrink grout all holes left by formwork or accessories.

### **3.2 REMOVAL AND RESHORING**

- .1 Leave formwork in place for minimum 7 day period after placing concrete.
- .2 Remove formwork when concrete has reached 85% of its design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.
- .3 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 01 33 00 - Submittal Procedures
- .2 Section 01 45 00 - Quality Control
- .3 Section 01 74 21 - Construction/Demolition Waste Management and Disposal

**1.2 PRICE AND PAYMENT PROCEDURES**

- .1 Measurement and Payment:
  - .1 There will be no measurement for payment as payment for the reinforcing steel will be paid by lump sum.

**1.3 REFERENCE STANDARDS**

- .1 ASTM International
  - .1 ASTM A143/A143M-07 (2014), Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.
  - .2 ASTM A722 / A722M – 15, Standard Specification for High-Strength Steel Bars for Prestressed Concrete
  - .3 ASTM A775/A775M-16, Standard Specification for Epoxy-Coated Reinforcing Steel Bars.
  - .4 ASTM A1064 / A1064M - 16a Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
- .2 CSA International
  - .1 CSA-A23.1-14/A23.2-14, 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/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  - .5 CSA W186-M1990(R2012), Welding of Reinforcing Bars in Reinforced Concrete Construction.
- .3 Reinforcing Steel Institute of Canada (RSIC)
  - .1 RSIC-2004, Reinforcing Steel Manual of Standard Practice.

**1.4 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prepare reinforcement drawings in accordance with RSIC Manual of Standard Practice.
- .3 Shop Drawings:

- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Ontario, Canada.
  - .1 Indicate placing of reinforcement and:
    - .1 Bar bending details.
    - .2 Lists.
    - .3 Quantities of reinforcement.
    - .4 Sizes, spacings, locations of reinforcement and mechanical splices if approved by Departmental Representative, with identifying code marks to permit correct placement without reference to structural drawings.
    - .5 Indicate sizes, spacings and locations of chairs, spacers and hangers.
- .2 Detail lap lengths and bar development lengths to CAN/CSA-A23.3, unless otherwise indicated.

## **1.5 QUALITY ASSURANCE**

- .1 Submit in accordance with Section 01 45 00 - Quality Control and as described in PART 2 - SOURCE QUALITY CONTROL.
  - .1 Mill Test Report: provide Departmental Representative with certified copy of mill test report of reinforcing steel, minimum 2 weeks prior to beginning reinforcing work.
  - .2 Upon request submit in writing to Departmental Representative proposed source of reinforcement material to be supplied.

## **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 off ground, in accordance with manufacturer's recommendations and in a clean, dry, well-ventilated area.
  - .2 Replace defective or damaged materials with new.

## **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 400W, 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 Chairs, bolsters, bar supports, spacers: to CSA-A23.1/A23.2.
- .8 Mechanical splices: subject to approval of Departmental Representative.
- .9 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's 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 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.

### **3.2 PLACING REINFORCEMENT**

- .1 Place reinforcing steel as indicated on placing drawings in accordance with CSA-A23.1/A23.2.
- .2 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.
- .3 Ensure cover to reinforcement is maintained during concrete pour.
- .4 Protect epoxy coated portions of bars with covering during transportation and handling.

### **3.3 FIELD TOUCH-UP**

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

### **3.4 CLEANING**

- .1 Progress Cleaning: Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.
- .3 Waste Management: separate waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 33 00 - Submittal Procedures
- .2 Section 01 35 29.06 - Health and Safety Requirements
- .3 Section 01 35 43 - Archeological and Cultural Resources and Environmental Procedures
- .4 Section 01 45 00 - Quality Control
- .5 Section 01 74 21 - Construction/Demolition Waste Management and Disposal
- .6 Section 03 20 00 - Concrete Reinforcing
- .7 Section 07 92 00 Joint Sealing

**1.2 PRICE AND PAYMENT PROCEDURES**

- .1 Measurement and Payment:
  - .1 There will be no measurement for payment as all concrete placed in the project shall be paid as lump sum.

**1.3 REFERENCE STANDARDS**

- .1 ASTM International
  - .1 ASTM C260/C260M-10a, Standard Specification for Air-Entraining Admixtures for Concrete.
  - .2 ASTM C309-11, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
  - .3 ASTM C494/C494M-15a, Standard Specification for Chemical Admixtures for Concrete.
  - .4 ASTM C1017/C1017M-13e1, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
  - .5 ASTM D412-15a, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.
  - .6 ASTM D624-00(2012), Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.
  - .7 ASTM D1751-04(2013)e1, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).
  - .8 ASTM D1752-04a(2013), Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-51.34-M86(R1988), Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
- .3 CSA International

- .1 CSA A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .2 CSA A283-13, Qualification Code for Concrete Testing Laboratories.
- .3 CSA A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

#### **1.4 ABBREVIATIONS AND ACRONYMS**

- .1 Portland Cement: hydraulic cement, blended hydraulic cement (XXb - b denotes blended) and Portland-limestone cement.
  - .1 Type GU, GUb and GUL - General use cement.
  - .2 Type MS and MSb - Moderate sulphate-resistant cement.
  - .3 Type MH, MHb and MHL - Moderate heat of hydration cement.
  - .4 Type HE, HEb and HEL - High early-strength cement.
  - .5 Type LH, LHb and LHL - Low heat of hydration cement.
  - .6 Type HS and HSb - High sulphate-resistant cement.
- .2 Fly ash:
  - .1 Type F - with CaO content less than 15%.
  - .2 Type CI - with CaO content ranging from 15 to 20%.
  - .3 Type CH - with CaO greater than 20%.
- .3 GGBFS - Ground, granulated blast-furnace slag.

#### **1.5 ADMINISTRATIVE REQUIREMENTS**

- .1 Pre-installation Meetings: Convene pre-installation meeting one week prior to beginning concrete works.
  - .1 Ensure key personnel, site supervisor, Departmental Representative speciality contractor - finishing, forming, testing laboratories attend.
    - .1 Verify project requirements.

#### **1.6 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00- Submittal Procedures.
- .2 Concrete pours: provide accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken as described in PART 3 - FIELD QUALITY CONTROL.
- .3 Concrete hauling time: provide for review by Departmental Representative deviations exceeding maximum allowable time of 120 minutes for concrete to be delivered to site of Work and discharged after batching.
- .4 Provide two copies of WHMIS MSDS in accordance with Section 01 35 29.06- Health and Safety Requirements.

#### **1.7 QUALITY ASSURANCE**

- .1 Quality Assurance: in accordance with Section 01 45 00- Quality Control.

- .2 Provide Departmental Representative, minimum 4 weeks prior to starting concrete work, with valid and recognized certificate from plant delivering concrete.
  - .1 Provide test data and certification by qualified independent inspection and testing laboratory that materials and mix designs used in concrete mixture will meet specified requirements.
- .3 Minimum 4 weeks prior to starting concrete work, provide proposed quality control procedures for review by Departmental Representative on following items:
  - .1 Falsework erection.
  - .2 Hot weather concrete.
  - .3 Cold weather concrete.
  - .4 Curing.
  - .5 Finishes.
  - .6 Formwork removal.
  - .7 Joints.
- .4 Quality Control Plan: provide written report to Departmental Representative verifying compliance that concrete in place meets performance requirements of concrete as established in PART 2 - PRODUCTS.

## **1.8 DELIVERY, STORAGE AND HANDLING**

- .1 Delivery and Acceptance Requirements:
  - .1 Concrete hauling time: deliver to site of Work and discharged within 120 minutes maximum after batching.
    - .1 Do not modify maximum time limit without receipt of prior written agreement from Departmental Representative and concrete producer as described in CSA A23.1/A23.2.
    - .2 Deviations to be submitted for review by Departmental Representative.
  - .2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

## **Part 2 Products**

### **2.1 DESIGN CRITERIA**

- .1 Performance: to CSA A23.1/A23.2, and as described in MIXES of PART 2 - PRODUCTS.

### **2.2 PERFORMANCE CRITERIA**

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

### **2.3 MATERIALS**

- .1 Portland Cement: to CSA A3001, Type GU.
- .2 Blended hydraulic cement: Type GUB to CSA A3001.

- .3 Portland-limestone cement: Type GUL to CSA A3001.
- .4 Supplementary cementing materials: to CSA A3001.
  - .1 Slag: GGBFS
  - .2 Fly Ash Replacement: Type F, CI and CH
- .5 Water: to CSA A23.1.
- .6 Aggregates: to CSA A23.1/A23.2.
- .7 Admixtures:
  - .1 Air entraining admixture: to ASTM C260.
  - .2 Chemical admixture: to ASTM C494 . Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.
  - .3 Corrosion-inhibiting admixture: to C 494 Type S.
  - .4 Lithium-based admixture: to C 494 Type.
  - .5 Shrinkage-reducing admixture (SRA): to C 494 Type S.
  - .6 Viscosity-modifying agent (VMA): to C 494 Type S.
- .8 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents to CSA A23.1/A23.2.
  - .1 Compressive strength: minimum 35MPa at 28 days.
- .9 Joint fillers:
  - .1 As per Section 07 92 00- Joint Sealing

## **2.4 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 Quality Control Plan.
  - .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 minimum.
    - .3 Aggregate size 20 mm maximum.
  - .3 Provide quality management plan to ensure verification of concrete quality to specified performance.
  - .4 Concrete supplier's certification: both batch plant and materials meet CSA A23.1 requirements.

## **Part 3 Execution**

### **3.1 PREPARATION**

- .1 Obtain Departmental Representative's written approval before placing concrete.
  - .1 Provide 24 hours minimum notice prior to placing of concrete.

- .2 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing.
- .3 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.
- .4 Ensure reinforcement and inserts are not disturbed during concrete placement.
- .5 Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing in adverse weather.
- .6 Protect previous Work from staining.
- .7 Clean and remove stains prior to application for concrete finishes.
- .8 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .9 Do not place load upon new concrete until authorized by Departmental Representative.

### **3.2 INSTALLATION/APPLICATION**

- .1 Do cast-in-place concrete work to CSA A23.1/A23.2.
- .2 Anchor bolts:
  - .1 Set anchor bolts to templates in co-ordination with appropriate trade prior to placing concrete.
- .3 Grout under base plates using procedures in accordance with manufacturer's recommendations which result in 100 % contact over grouted area.
- .4 Finishing and curing:
  - .1 Finish concrete to CSA A23.1/A23.2.
  - .2 Form finish is acceptable, provided it is free from voids and honeycomb.
  - .3 Finish exposed horizontal surface of structures with float finish.
  - .4 Use procedures as reviewed by Departmental Representative to remove excess bleed water. Ensure surface is not damaged.
  - .5 Rub exposed sharp edges of concrete with carborundum to produce 3 mm minimum radius edges unless otherwise indicated.
- .5 Joint fillers:
  - .1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Departmental Representative.
  - .2 When more than one piece is required for joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.
  - .3 Locate and form construction and expansion joints as indicated.
  - .4 Install joint filler.
  - .5 Use 20 mm thick joint filler to separate slabs-on-grade from vertical surfaces and extend joint filler from bottom of slab to within 20 mm of finished slab surface unless indicated otherwise.

### **3.3 SURFACE TOLERANCE**

- .1 Concrete tolerance to CSA A23.1.

### **3.4 FIELD QUALITY CONTROL**

- .1 Inspection and testing of concrete and concrete materials will be carried out by testing laboratory certified to CSA A283 as designated by Departmental Representative for review to CSA A23.1/A23.2.
- .2 Field Tests: The following tests will be carried out by testing agency appointed by the Departmental Representative on site.
  - .1 Slump
  - .2 Temperature
  - .3 Plastic Air content
- .3 Remove concrete from site which does not conform to the requirements of the mix design or exceeds the time allowed for placement at the contractor's expense.
- .4 Compressive strength:
  - .1 Cylinders for will be cast by testing agency appointed by the departmental representative.
  - .2 Four concrete cylinders will be cast per test. One cylinder will be broken at 7 days and two at 28 days. The fourth cylinder will be broken if one of the first three provides negative results or it may be broken to provide 56 day results.
  - .3 Testing for Early Strength
    - .1 Prepare sets of cylinders, if desired, for early strength determination in addition to the cylinders required for determination of strength at 28 Days.
    - .2 Be responsible for all aspects of the preparation, storing, and transportation of cylinders for early strength determination. The Contractor shall pay for any additional testing.
    - .3 Cure cylinders for early strength determination by storing the cylinders in or on the structure as near as possible to the component that they represent. Provide the same protection for the cylinders as provided for the elements on all surfaces as is given to the portions of the structure that they represent.
    - .4 Identify the time of testing for early-break cylinders and provide the Departmental Representative with 1 Business Day advance notice to arrange testing. Deliver cylinders for early strength determination immediately prior to the time of testing to the third party testing laboratory.
    - .5 Remove falsework or shoring before the end of the 7 day curing period only where concrete test results provide a minimum of 85% of specified minimum 28 day compressive strength.

### **3.5 COLD WEATHER REQUIREMENTS**

- .1 For concrete and grout placed when air temperature is at or below 5 degrees Celsius, in addition to cold weather requirements of CAN/CSA-A23.1/A23.2:
  - .1 Protect concrete by a wind and weather proof shelter to allow free circulation of inside air around fresh concrete. At no point let walls of shelter touch formwork. Provide sufficient space within shelter for removal of formwork for finishing. Design shelter



- to sustain wind, snow and ice loading as specified in 2015 National Building Code of Canada.
- .2 Keep concrete surfaces moist continuously during 7 day curing period.
  - .3 Supply approved heating equipment. Vent the products of combustion outside the protective shelter. Equipment shall be capable of keeping inside air at a constant temperature sufficiently high to maintain concrete at following curing temperatures:
    - .1 Ensure that a minimum substrate temperature of 5 degrees Celsius shall be achieved and maintained for a period of 24 hours prior to casting concrete.
    - .2 For an initial 3 days of curing ensure that the concrete surfaces are maintained at a temperature of not less than 15 degrees Celsius nor more than 27 degrees Celsius.
    - .3 Maintain the temperature of concrete surfaces at not less than 10 degrees Celsius for an additional 4 days until 7 days after the concrete is cast.
    - .4 Reduce temperature at a rate not exceeding 10 degrees Celsius per day until outside temperature has been reached.
  - .4 Provide 24 hour watch when cold weather curing of concrete is in effect. Take prompt action when equipment failures are observed or temperatures appear to fall below or exceed allowable limits.
  - .5 In case of heating equipment malfunction, maintain standby heating equipment and additional fuel on site in sufficient quantity and as limited by Section 01 35 43- Archeological and Cultural Resources and Environmental Procedures.
  - .6 Temperature monitoring:
    - .1 Provide temperature monitoring for all cast in place concrete elements and within all heating enclosures in accessible locations to Departmental Representative for temperature monitoring during the curing period.
    - .2 Provide a minimum of 3 Thermocouple Sets in Each Element and provide 2 Thermocouples in Each Set.
    - .3 Provide thermocouple in locations where the concrete is expected to reach the highest and lowest temperature.
    - .4 Ensure thermometers are placed in both areas suspected to be of highest and lowest temperature within enclosures. Ensure to acclimatize and reset thermometers upon placement into enclosures at commencement of curing period.
  - .7 Pay testing agency appointed by Departmental Representative for testing of concrete that is found to have exceeded or fallen below permissible temperatures during curing period. Where concrete is found to be deficient through testing or visual observation, at the discretion of the Departmental Representative, remove all defective concrete at no additional cost. Where defective concrete is deemed acceptable by Departmental Representative provide a credit in an amount satisfying the Departmental Representative.

### 3.6 CLEANING

- .1 Waste Management: separate waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .1 Provide appropriate area on job site where concrete trucks and be safely washed.

- .2 Divert unused admixtures and additive materials (pigments, fibres) from landfill to official hazardous material collections site as approved by Departmental Representative.
- .3 Do not dispose of unused admixtures and additive materials into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.
- .4 Prevent admixtures and additive materials from entering drinking water supplies or streams.
- .5 Using appropriate safety precautions collect liquid or solidify liquid with inert, non-combustible material and remove for disposal.
- .6 Dispose of waste in accordance with applicable local, Provincial/Territorial and National regulations.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 33 00- Submittal Procedures

**1.2 REFERENCE STANDARDS**

- .1 ASTM International
  - .1 ASTM A53/A53M-07, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
  - .2 ASTM A307-07b, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .2 CSA International
  - .1 CSA G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  - .2 CAN/CSA G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
  - .3 CSA S16-09, Design of Steel Structures.
  - .4 CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
  - .5 CSA W59-M03(R2008), Welded Steel Construction (Metal Arc Welding) Metric.
- .3 Green Seal Environmental Standards (GS)
  - .1 GS-11-2008, 2nd Edition, Paints and Coatings.
- .4 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .5 The Master Painters Institute (MPI)
  - .1 Architectural Painting Specification Manual - current edition.

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00- Submittal Procedures.
- .2 Shop Drawings:
  - .1 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

**1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Storage and Handling Requirements:
  - .1 Store materials in dry location, off ground and in clean, dry, well-ventilated area.
  - .2 Replace defective or damaged materials with new.

**Part 2 Products**

**2.1 MATERIALS**

- .1 Steel sections and plates: to CSA G40.20/G40.21, Grade 350W.
- .2 Steel pipe: to ASTM A53/A53M standard weight, black finish.
- .3 Welding materials: to CSA W59.
- .4 Welding electrodes: to CSA W48 Series.
- .5 Bolts and anchor bolts: to ASTM A307.
- .6 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

**2.2 FABRICATION**

- .1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
- .2 Where possible, fit and shop assemble work, ready for erection.
- .3 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

**2.3 FINISHES**

- .1 Shop coat primer: in accordance with chemical component limits and restrictions requirements and VOC limits of GS-11.

**2.4 SHOP PAINTING**

- .1 Primer: VOC limit 250g/L maximum to GS-11.
- .2 Apply one shop coat of primer to metal items, with exception of galvanized or concrete encased items.
- .3 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 degrees C.
- .4 Clean surfaces to be field welded; do not paint.

**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.

### **3.2 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 Exposed fastening devices to match finish and be compatible with material through which they pass.
- .4 Supply components for work by other trades in accordance with shop drawings and schedule.
- .5 Make field connections with bolts to CSA S16.
- .6 Touch-up field welds, bolts and burnt or scratched surfaces with primer after completion:
  - .1 Primer: maximum VOC limit 250g/L to GS-11.
- .7 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.
  - .1 Primer: maximum VOC limit 250g/L to GS-11.

### **3.3 CLEANING**

- .1 Progress Cleaning: Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

### **3.4 PROTECTION**

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by metal fabrications installation.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 33 00 - Submittal Procedures
- .2 Section 01 35 29.06 - Health and Safety Requirements
- .3 Section 01 35 43 - Archeological and Cultural Resources and Environmental Procedures

**1.2 REFERENCE STANDARDS**

- .1 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-37-GP-37M-[77], WITHDRAWN Application of Hot Asphalt for Dampproofing or Waterproofing.
  - .2 CAN/CGSB-37-GP-6Ma-[83], Asphalt, Cutback, Unfilled, for Dampproofing.
- .2 National Cooperative Highway Research Program (NCHRP) December 1981, Report No. 244.
- .3 AASHTO Designation T259 and T260, Chloride Permeability of Concrete.
- .4 American Society of Testing and Materials (ASTM).
- .5 ASTM C672/C672M-12, Standard Test Method for Scaling Resistance of Concrete Surfaces Exposed to De-icing Chemicals.
- .6 Oklahoma Dept. of Transportation OHD-L-35, 92- Test for Moisture Vapour Permeability of Treated Concrete.
- .7 Canadian Standards Association (CSA).
  - .1 CSA-A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction.

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for water repellents and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Submit WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements and 01 35 43 - Archeological and Cultural Resources and Environmental Procedures. Indicate VOC's for water repellent.
- .3 Manufacturer's Instructions:
  - .1 Submit manufacturer's installation instructions.

**1.4 QUALITY ASSURANCE**

- .1 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

## **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 off ground, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Replace defective or damaged materials with new.

## **1.6 SITE CONDITIONS**

- .1 Ambient Conditions:
  - .1 Maintain substrate temperature at water repellent installation area in accordance with water repellent manufacturer's printed instructions.
  - .2 Apply coating during dry weather. Allow surfaces to dry minimum of 3 days after rainfall or cleaning before applying further coats.
  - .3 Protect plants and vegetation which might be damaged by water repellents.
  - .4 Protect surfaces not intended to have application of water repellents.

## **Part 2 Products**

### **2.1 CONCRETE SEALER**

- .1 Concrete sealer must comply with the following:
  - .1 The active ingredient in the sealer to be one of the following:
    - .1 Alkylalkoxysilane.
    - .2 Oligomeric alkoxy siloxane/silane.
    - .3 Monomeric silane.
  - .2 Carrier:
    - .1 alcohol or mineral spirits.
  - .3 Active Ingredient Content: minimum 40% by weight.
  - .4 Appearance: clear.
  - .5 Water Repellency:
    - .1 The sealer to comply with requirements of Cube Test – Series II of NCHRP Report 244, when tested on concrete samples designed for Class C-1 exposure as per CAN/CSA-A23.1- 00, Concrete Materials and Methods of Concrete Construction, with treated samples exhibiting less than 25 % weight gain of untreated samples when submerged in 15 % solution of NaCl for 21 days.
  - .6 Freeze Thaw Resistance
    - .1 The Sealer to comply with requirements of ASTM C672/C672M-98e1, with no scaling observed after 100 freeze-thaw cycles.
  - .7 Resistance to Chloride Penetration as per AASHTO Designation T259 and T260
    - .1 Less than 0.37 kg/m<sup>3</sup> at 12.5 mm level.

- .2 Less than 0.34 kg/m<sup>3</sup> at 25 mm level.
- .8 Moisture Vapour Transmission
- .1 100 % minimum as per OHD-L-35

### **Part 3 Execution**

#### **3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable 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 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

#### **3.3 PREPARATION**

- .1 Pressure wash concrete surfaces to remove all laitance, loose material, flakes and any foreign material and matter. Do not allow dirt or debris or laden run-off to enter watercourse. Install debris catch complete with filter fabric below bridge deck, downstream of retaining walls and other areas to be sprayed to satisfaction of Departmental Representative prior to pressure washing. Include plan in environmental mitigation plan submission for approval.
- .2 Utilize 35 MPa water pressure minimum with cleaning rate of 10 m<sup>2</sup>/hour or less.
- .3 Allow the surface to dry.

#### **3.4 APPLICATION**

- .1 Apply sealer as per the following:
  - .1 Do not thin.
  - .2 Do not apply below temperatures of +5°C or when ambient temperature is expected to fall below +5°C within 12 hours following application.
  - .3 Apply to completely dry surface.
  - .4 Roll to point of rejection obtaining the minimum coverage specified in the manufacturer's written recommendations. Do not spray sealant due to risk of contamination of watercourse. Protect from spills and overruns.

#### **3.5 FIELD QUALITY CONTROL**

- .1 After water repellent has dried, spray coated surfaces with water to verify coating coverage. Allow Departmental Representative to witness tests.



**3.6 CLEANING**

- .1 Progress Cleaning: Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

**3.7 PROTECTION**

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by water repellent application.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 33 00 Submittal Procedures
- .2 Section 01 35 29.06 Health and Safety Requirements
- .3 Section 01 35 43 Archeological and Cultural Resources and Environmental Procedures

**1.2 REFERENCE STANDARDS**

- .1 ASTM International
  - .1 ASTM D1751-04 (2013)e1, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)
  - .2 ASTM D1752-04a (2013), Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
  - .3 ASTM D6690-01 Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for joint sealants and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Manufacturer's product to describe:
    - .1 Caulking compound.
    - .2 Primers.
    - .3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.
  - .3 Submit WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements and 01 35 43 - Archeological and Cultural Resources and Environmental Procedures.
- .3 Manufacturer's Instructions:
  - .1 Submit instructions to include installation instructions for each product used.

**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 the ground, in dry location, in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
  - .2 Store and protect joint filler from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.

## **1.5 SITE CONDITIONS**

- .1 Ambient Conditions:
  - .1 Proceed with installation of joint sealants only when:
    - .1 Ambient and substrate temperature conditions are within limits permitted by joint sealant manufacturer or are above 4.4 degrees C.
    - .2 Joint substrates are dry.
    - .3 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.
- .2 Joint-Width Conditions:
  - .1 Proceed with installation of joint sealants only where joint widths are more than those allowed by joint sealant manufacturer for applications indicated.
- .3 Joint-Substrate Conditions:
  - .1 Proceed with installation of joint sealants only after contaminants capable of interfering with adhesion are removed from joint substrates.

## **1.6 ENVIRONMENTAL REQUIREMENTS**

- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to Health Canada.

## **1.7 PRICE AND PAYMENT PROCEDURES**

- .1 Measurement and Payment:
  - .1 Measure sealant in form and fill groove in metres calculated from dimensions as indicated on contract drawings.
  - .2 Do not measure for installation of joint filler. Include the cost associated with installation of joint filler in the cost of the concrete item.

## **Part 2 Products**

### **2.1 SEALANT MATERIALS**

- .1 Joint sealing compound: to ASTM D6690 and as specified in the Contract Documents.
- .2 Shipments of hot-poured rubberized asphalt joint/crack sealant compounds shall meet the requirements given in Table 1.

Table 1 – Testing Requirements

Test	Criteria
Cone Penetration @ 25 C	$\leq 90$ units
Flow (mm)	$\leq 5$
Bond – 3 cycles @ 50% extension at -18° C	Pass

.3 Pouring Point

- .1 The pouring point for hot-poured rubberized asphalt joint/crack sealant compounds shall be at least 10°C lower than the safe heating temperature recommended by the manufacturer.
- .2 For hot-poured rubberized asphalt joint/crack sealant compounds used for sealing joints and cracks in Portland cement concrete pavements, the pouring point shall also be the lowest temperature to which the material is heated and at which it is suitable for filling a 12.5 mm wide and 40 mm deep groove formed between two blocks of concrete without inclusions of large air voids or discontinuities and without damage to the material.
- .3 For hot-poured rubberized asphalt joint/crack sealant compounds used for sealing joints and cracks in asphalt pavements, the pouring point shall also be the lowest temperature to which the material is heated and at which it is suitable for filling a 40 mm wide and 10 mm deep groove cut in asphaltic concrete pavement without inclusions of large air voids or discontinuities and without damage to the material.

.4 Packaging and Marking

- .1 The sealing compound shall be packaged in 22 kg or smaller units. It shall be contained in a polyethylene bag, and the bags, shall, in turn be placed in a metal container. Each container shall be legibly marked with the following information:
  - .1 Designated trade name of the compound
  - .2 Manufacturer's name
  - .3 Batch number
  - .4 Date of manufacture
  - .5 Quantity contained

**2.2 JOINT CLEANER**

- .1 Non-corrosive and non-staining type, compatible with sealant in accordance with sealant manufacturer's written recommendations.
- .2 Primer: in accordance with sealant manufacturer's written recommendations.

**2.3 JOINT FILLER**

- .1 The joint filler shall be according to ASTM D1751 for Type A or ASTM D1752 for Type B.

- .2 The type of material supplied shall be as specified in the Contract Documents.
- .3 Cutting and Tolerance
  - .1 The joint filler shall be cut neatly, free from burrs to the sizes specified in the Contract Documents.
  - .2 Holes for dowel bars in the joint filler shall be neatly punched in the exact position specified and shall be free from loose fibres.
  - .3 Pieces of the joint filler shall be according to the dimensions in the Contract Documents with the following tolerances:
    - .1 Thickness 0 to 1.5 mm
    - .2 Depth  $\pm 3$  mm
    - .3 Length  $\pm 3$  mm
- .4 Packaging and Marking
  - .1 Each shipment of joint filler shall be provided with an itemized statement of the number and dimensions of the pieces. The brand name and the thickness of the material shall be clearly stamped on the pieces or on a label attached securely to each bundle.
  - .2 Each piece of self-expanding cork filler shall be individually wrapped in waterproof material and shall be sealed in a manner that will prevent the entrance of moisture.
  - .3 The material shall be suitably packaged to permit shipping, handling, and storage without damage.

### **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 joint sealants 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 APPLICATION**

- .1 Placing Joint Fillers
  - .1 Joint fillers shall be firmly fixed in position before any concrete is placed so that their final position in the concrete remains as shown in the Contract Documents and are true to line and grade.
- .2 Placing Joint Sealing Compounds
  - .1 Preparation of Joint
    - .1 Concrete at all joints shall be sound; clean; dry; and free of all dust, debris, and deleterious material.

- .2 The joint face shall be true to line so that the joint seal shall bear on the joint face fully and uniformly.
- .2 Placing Hot Poured Rubberized Asphalt Joint Sealing Compounds
  - .1 Where specified in the Contract Documents, a 20 mm wide and 20 mm deep rectangular groove shall be formed. This groove shall be made either by dry sawing or routing, with vertical sides, and be located directly over the joint for the full length of the joint.
  - .2 Immediately prior to placing the hot-poured asphaltic sealing compound, the groove shall be dry and clean of any dust or debris using oil-free compressed air. The temperature of the air and the materials that are to be in contact with the sealing compound shall be 2 °C or greater at the time of installation.
  - .3 Cakes of joint sealing compound shall be melted on the job site and shall be continuously agitated in the mechanically agitated heating and mixing kettle. The contents shall be continuously agitated until the material can be drawn free flowing and lump free from the mixing kettle at a temperature within the range recommended by the manufacturer.
  - .4 Joint sealing compound shall be poured using hand pouring pots, mechanical methods, or any other method that gives satisfactory results.
  - .5 Shields shall be provided to prevent the compound from being spilled on the concrete curb, barrier or parapet walls, expansion joints, deck drains, and on the newly placed hot mix asphalt.
  - .6 Sufficient joint sealing compound shall be poured into the groove so that upon completion of the work the surface of the compound is flush with the surface of the pavement. If the compound subsides to a level below the surface of the pavement, a second pouring shall be done. When more than one pouring is required to fill the groove, succeeding pours shall be made immediately.
  - .7 Damage to the joint sealing compound caused by the Contractor's operation shall be repaired.
  - .8 Traffic shall not be permitted over the joint sealing compound until the compound has cooled to ambient temperature.

### **3.3 CLEANING**

- .1 Progress Cleaning:
  - .1 Leave Work area clean at end of each day.
  - .2 Clean adjacent surfaces immediately.
  - .3 Remove excess and droppings, using recommended cleaners as work progresses.
  - .4 Remove masking tape after initial set of sealant.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

### **3.4 PROTECTION**

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by joint sealants installation.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 33 00- Submittal Procedures
- .2 Section 01 35 29.06- Health and Safety Requirements

**1.2 REFERENCE STANDARDS**

- .1 Green Seal Environmental Standards (GS)
  - .1 GS-11-2008, 2nd Edition, Paints and Coatings.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .3 The Master Painters Institute (MPI)
  - .1 Maintenance Repainting Manual - current edition.
- .4 National Research Council Canada (NRC)
  - .1 National Building Code of Canada 2015 (NBC).

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00- Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for paint and coating products and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06- Health and Safety Requirements.
- .3 Samples:
  - .1 Submit for review and acceptance of each unit.
  - .2 Samples will be returned for inclusion into work.

**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 Provide and maintain dry, temperature controlled, secure storage.
  - .2 Store painting materials and supplies away from heat generating devices.
  - .3 Store materials and equipment in well ventilated area within temperature as recommended by manufacturer.
- .4 Fire Safety Requirements:



- .1 Supply 1 fire extinguisher adjacent to storage area.
- .2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
- .3 Handle, store, use and dispose of flammable and combustible materials in accordance with National Fire Code of Canada (NFC) requirements.

## **1.5 SITE CONDITIONS**

- .1 Temperature, Humidity and Substrate Moisture Content Levels:
  - .1 Apply paint finishes when ambient air and substrate temperatures at location of installation can be satisfactorily maintained during application and drying process, within MPI and paint manufacturer's prescribed limits.
  - .2 Test concrete, masonry and plaster surfaces for alkalinity as required.
  - .3 Apply paint to adequately prepared surfaces, when moisture content is below paint manufacturer's prescribed limits.
- .2 Additional application requirements:
  - .1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Supply paint materials for paint systems from single manufacturer.
- .2 Conform to latest MPI requirements for painting work including preparation and priming.
- .3 Materials in accordance with MPI - Maintenance Repainting Manual.
  - .1 Primer: VOC limit 100g/L maximum to GS-11.
  - .2 Paint: VOC limit 100g/L maximum to GS-11.
- .4 Colours:
  - .1 To match existing for specific element being replaced/repainted. Submit proposed Colour Schedule to Departmental Representative for review.
- .5 Mixing and tinting:
  - .1 Perform colour tinting operations prior to delivery of paint to site, in accordance with manufacturer's written recommendations.
  - .2 Use and add thinner in accordance with paint manufacturer's recommendations.
    - .1 Do not use kerosene or similar organic solvents to thin water-based paints.
  - .3 Thin paint for spraying in accordance with paint manufacturer's written recommendations.
  - .4 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.
- .6 Gloss/sheen ratings:

- .1 To match existing for specific element being replaced/repainted.
- .7 Exterior painting:
  - .1 Concrete Vertical and Horizontal Surfaces: exterior, water facing edges of concrete wharf decks
    - .1 EXT 3.1A - Latex finish.
  - .2 Structural Steel and Metal Fabrications: Bollards, hand railings and other miscellaneous metal.
    - .1 EXT 5.1D - Alkyd finish.
  - .3 Dimension Lumber:
    - .1 EXT 6.2B - Waterborne solid colour stain finish.

### **Part 3 Execution**

#### **3.1 GENERAL**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheets.
- .2 Perform preparation and operations for interior painting in accordance with MPI - Maintenance Repainting Manual except where specified otherwise.

#### **3.2 EXAMINATION**

- .1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Departmental Representative damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.
- .2 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple "cover patch test". Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

#### **3.3 PREPARATION**

- .1 Protection of in-place conditions:
  - .1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by Departmental Representative.
  - .2 Protect factory finished products and equipment.
- .2 Surface Preparation:
  - .1 Remove electrical cover plates, light fixtures, surface hardware and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-installed after painting is completed.
  - .2 Clean and prepare surfaces in accordance with coating manufacturer's recommendations.

- .3 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.
- .4 Where possible, prime non-exposed surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.
  - .1 Apply vinyl sealer to MPI #36 over knots, pitch, sap and resinous areas.
  - .2 Apply wood filler to nail holes and cracks.
  - .3 Tint filler to match stains for stained woodwork.
- .5 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.
- .6 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements.
- .7 Touch up of shop primers with primer as specified.

### **3.4 APPLICATION**

- .1 Paint only after prepared surfaces have been accepted by Departmental Representative.
- .2 Use method of application approved by Departmental Representative.
  - .1 Conform to manufacturer's application recommendations.
- .3 Apply coats of paint in continuous film of uniform thickness.
  - .1 Repaint thin spots or bare areas before next coat of paint is applied.
- .4 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.
- .5 Sand and dust between coats to remove visible defects.

### **3.5 CLEANING**

- .1 Progress Cleaning: Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.
- .3 Place primer and paint defined as hazardous or toxic waste, including tubes and containers, in containers or areas designated for hazardous waste.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 33 00 - Submittal Procedures

**1.2 REFERENCE STANDARDS**

- .1 ASTM International:
  - .1 ASTM D4791-10, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.
- .2 Ontario Provincial Standard Specifications (OPSS)/Ontario Ministry of Transportation:
  - .1 OPSS 1001, Nov 2005, Material specification for aggregates - general
  - .2 OPSS 1010, Apr 2004, Material specification for aggregates - base, subbase, select subgrade, and backfill material.

**1.3 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for aggregate materials and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
  - .1 Submit samples in accordance with Section 01 33 00 – Submittal Procedures.
  - .2 Allow continual sampling by Departmental Representative during production.
  - .3 Provide Departmental Representative with access to source and processed material for sampling.
  - .4 Pay cost of sampling and testing of aggregates which fail to meet specified requirements.

**1.4 DELIVERY, STORAGE AND HANDLING**

- .1 Transportation and Handling: handle and transport aggregates to avoid segregation, contamination and degradation.

**Part 2 Products**

**2.1 MATERIALS**

- .1 Granular Material to conform to Ontario Provincial Standards Specification 1004 and 1010.

**2.2 SOURCE QUALITY CONTROL**

- .1 Inform Departmental Representative of proposed source of aggregates, provide gradation and provide access for sampling 2 weeks minimum before starting production.

- .2 If materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate alternative source.
- .3 Advise Departmental Representative a minimum of 2 weeks in advance of proposed change of material source.
- .4 Acceptance of material at source does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.

### **Part 3 Execution**

#### **3.1 NOT USED**

- .1 Not Used.

#### **3.2 PREPARATION**

- .1 Topsoil Stripping:
  - .1 Dispose of topsoil off site.
- .2 Stockpiling:
  - .1 All stockpiling shall conform to mitigation procedures identified in the site specific BIA.
  - .2 Stockpile aggregates on site in locations as indicated unless directed otherwise by Departmental Representative. Do not stockpile on completed pavement surfaces or close to watercourse.
  - .3 Deliver aggregates on demand in sufficient quantities to meet project schedules.
  - .4 Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment. Excavating areas to permit stockpiling is prohibited. Deliver material on demand where insufficient level ground on site exists for stockpiling.
  - .5 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.
  - .6 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by Departmental Representative within 48 hours of rejection.
  - .7 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.
  - .8 Do not cone piles or spill material over edges of piles.

#### **3.3 CLEANING**

- .1 Progress Cleaning: Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.
- .3 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.
- .4 Leave any unused aggregates in neat compact stockpiles as directed by Departmental Representative.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 33 00 - Submittal Procedures.
- .2 Section 01 35 29.06 - Health and Safety Requirements.
- .3 Section 01 35 43 - Archeological and Cultural Resources and Environmental Procedures.
- .4 Section 01 45 00 - Quality Control.
- .5 Section 01 56 00 - Temporary Barriers and Enclosures.
- .6 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
- .7 Section 02 41 13 Selective Site Demolition.
- .8 Section 31 05 16 Aggregate Materials.
- .9 Section 31 32 19.01 Geotextiles.

**1.2 MEASUREMENT PROCEDURES**

- .1 Excavated materials will be measured in cubic metres in their original location.
  - .1 Common excavation quantities measured will be actual volume removed within following limits:
    - .1 Width for excavation for structures as indicated.
    - .2 Depth from ground elevation immediately prior to excavation, to elevation as indicated.
- .2 Shoring, bracing, cofferdams, underpinning and de-watering of excavation will not be measured separately for payment and shall be considered part of the work for this item.
  - .1 Shoring/protection measures required for the slopes associated with the deep excavations/dredging behind and below the existing wharf structure shall be specified and paid for under the Dredging item.
- .3 Backfilling to authorized excavation limits will be measured in tonnes for each type of material specified.
- .4 Excavations below water level shall be considered Dredging and shall be paid for under separate dredging item. This item shall only cover excavation which occurs above the waterline.

**1.3 REFERENCE STANDARDS**

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM C117-13, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
  - .2 ASTM C136/C136M-14, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - .3 ASTM D422-63(2007)e2, Standard Test Method for Particle-Size Analysis of Soils.

- .4 ASTM D698-12e2, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup>) (600 kN-m/m<sup>3</sup>).
- .5 ASTM D1557-12e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup>) (2,700 kN-m/m<sup>3</sup>).
- .6 ASTM D4318-10e1, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
  - .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
- .3 Canadian Standards Association (CSA International)
  - .1 CAN/CSA-A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
    - .1 CSA-A3001-13, Cementitious Materials for Use in Concrete.
  - .2 CSA-A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .4 U.S. Environmental Protection Agency (EPA)/Office of Water
  - .1 EPA 832R9-2005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.
- .5 Ontario Provincial Standard Specifications (OPSS)/Ontario Ministry of Transportation (Access on-line as per Section 01 11 00 - Summary of Work):
  - .1 OPSS 501, Nov 2005, construction specification for compacting.
  - .2 OPSS 514, Nov 2009, Construction specification for trenching, backfilling, and compacting.
  - .3 OPSS 1001, Nov 2005, Material specification for aggregates - general
  - .4 OPSS 1010, Apr 2004, Material specification for aggregates - base, subbase, select subgrade, and backfill material.

#### 1.4 DEFINITIONS

- .1 Unclassified excavation: excavation of deposits of whatever character encountered in Work.
- .2 Waste material: excavated material unsuitable for use in Work or surplus to requirements.
- .3 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.
- .4 Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.
- .5 Unsuitable materials:
  - .1 Weak, chemically unstable, and compressible materials.
  - .2 Frost susceptible materials:
    - .1 Fine grained soils with plasticity index less than 10 when tested to ASTM D4318, and gradation within limits specified when tested to ASTM D422 and ASTM C136: Sieve sizes to CAN/CGSB-8.1 and CAN/CGSB-8.2.
    - .2 Table:



Sieve Designation	% Passing
2.00 mm	100
0.10 mm	45 - 100
0.02 mm	10 - 80
0.005 mm	0 - 45

- .3 Coarse grained soils containing more than 20 % by mass passing 0.075 mm sieve.

## 1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Quality Control: in accordance with Section 01 45 00 - Quality Control:
- .3 Preconstruction Submittals:
  - .1 Submit to testing agency, retained and paid by Contractor, samples of all backfill materials used on this project.
  - .2 Submit to Departmental Representative gradation testing of all materials and certificate of compliance.
  - .3 Submit, to Departmental Representative, shop drawings for all temporary works (i.e. shoring, bracing, etc.) bearing the stamp and signature of a qualified professional engineer licensed in Ontario, Canada.
- .4 Samples:
  - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
  - .2 Inform Departmental Representative at least 4 weeks prior to beginning Work, of proposed source of fill and unshrinkable fill materials and provide access for sampling.

## 1.6 QUALITY ASSURANCE

- .1 Design and implement shoring, bracing, etc. in accordance with the Ontario Ministry of Labour Requirements. Submit design and supporting data at least 2 weeks prior to beginning Work.
- .2 Design and supporting data submitted to bear stamp and signature of qualified professional engineer registered or licensed in Province of Ontario, Canada.
- .3 Keep design and supporting data on site.
- .4 Engage services of qualified professional Engineer who is registered or licensed in the Province of Ontario, Canada to inspect cofferdams, shoring, bracing and underpinning required for Work.
- .5 Health and Safety Requirements:
  - .1 Carry out construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

## 1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Waste management and disposal in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

- .2 All excavated material to be disposed of off-site.

## **1.8 EXISTING CONDITIONS**

- .1 Examine available reports as specified in Contract.
- .2 Buried services:
  - .1 Before commencing work establish location of buried services on and adjacent to site.
  - .2 Prior to beginning excavation Work, notify applicable Departmental Representative establish location and state of use of buried utilities and structures.
  - .3 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Granular material: to Section 31 05 16 – Aggregate Materials for:
  - .1 Granular A.
  - .2 Granular B, Type II.
  - .3 19mm Clear Stone (Backfill to Structures)
  - .4 50mm Clear Stone (Levelling Pad for Cribs)
- .2 Supply all imported fill from approved source of Roadway Authority.
- .3 Geotextiles: to Section 31 32 19.01 - Geotextiles.

## **Part 3 Execution**

### **3.1 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 requirements of authorities having jurisdiction.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

### **3.2 SITE PREPARATION**

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

### **3.3 PREPARATION/PROTECTION**

- .1 Protect existing features in accordance with Section 01 56 00 - Temporary Barriers and Enclosures and applicable local regulations.
- .2 Keep excavations clean, free of standing water, and loose soil.

- .3 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.
- .4 Protect buried services that are required to remain undisturbed.

### **3.4 STOCKPILING**

- .1 Stockpile fill materials in suitable areas.
- .2 Protect fill materials from contamination.
- .3 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

### **3.5 COFFERDAMS, SHORING, BRACING AND UNDERPINNING**

- .1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Health and Safety Act for the Province of Ontario.
- .2 Construct temporary Works to depths, heights and locations as indicated.
- .3 During backfill operation:
  - .1 Unless otherwise indicated or directed by Departmental Representative, remove sheeting and shoring from excavations.
  - .2 Do not remove bracing until backfilling has reached respective levels of such bracing.
- .4 When sheeting is required to remain in place, cut off tops at elevations as indicated.
- .5 Upon completion of construction:
  - .1 Remove cofferdams, shoring and bracing.
  - .2 Remove excess materials from site and restore watercourses as directed by Departmental Representative.

### **3.6 DEWATERING AND HEAVE PREVENTION**

- .1 Keep excavations free of water while Work is in progress.
- .2 Provide for Departmental Representative review details of proposed dewatering or heave prevention methods, including dikes, well points, and sheet pile cut-offs.
- .3 Protect open excavations against flooding and damage due to surface run-off.
- .4 Dispose of water in accordance with Section 01 35 43 - Archeological and Cultural Resources and Environmental Procedures and in manner not detrimental to public and private property, or portion of Work completed or under construction.

### **3.7 EXCAVATION**

- .1 Advise Departmental Representative at least 7 days in advance of excavation operations for initial cross sections to be taken.
- .2 Excavate to lines, grades, elevations and dimensions as indicated.
- .3 Remove concrete, paving, demolished foundations and rubble and other obstructions encountered during excavation in accordance with Section 02 41 13 - Selective Site Demolition.

- .4 Excavation must not interfere with bearing capacity of adjacent foundations.
- .5 Keep excavated and stockpiled materials safe distance away from edge of trench.
- .6 Restrict vehicle operations directly adjacent to open trenches.
- .7 Dispose of excavated material off site.
- .8 Do not obstruct flow of natural watercourses.
- .9 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .10 Notify Departmental Representative when bottom of excavation is reached.
- .11 Obtain Departmental Representative approval of completed excavation.
- .12 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative.
- .13 Hand trim, make firm and remove loose material and debris from excavations.
  - .1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.
  - .2 Clean out rock seams and fill with concrete mortar or grout to approval of Departmental Representative.
- .14 Install geotextiles in accordance with Section 31 32 19.01 - Geotextiles.

### 3.8 BACKFILLING

- .1 Do not proceed with backfilling operations until completion of following:
  - .1 Departmental Representative has inspected and approved of construction below finish grade.
  - .2 Inspection, testing, approval, and recording location of underground utilities.
  - .3 Removal of concrete formwork.
  - .4 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.
- .2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
- .3 Do not use backfill material which is frozen or contains ice, snow or debris.
- .4 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.
- .5 Backfilling around installations:
  - .1 Place bedding and surround material as specified elsewhere.
  - .2 Do not backfill around or over cast-in-place concrete within 24 hours after placing of concrete.
  - .3 Place layers simultaneously on both sides of installed Work to equalize loading. Difference not to exceed 1.0m.
  - .4 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:

- .1 Permit concrete to cure for minimum 14 days or until it has sufficient strength to withstand earth and compaction pressure and approval obtained from Departmental Representative:
- .2 If approved by Departmental Representative, erect bracing or shoring to counteract unbalance, and leave in place until removal is approved by Departmental Representative.
- .5 Compaction: compact each layer of Granular material to following densities for material to ASTM D698:
  - .1 Granular B, Type II: 98%.
  - .2 Granular A: 98%.
- .6 Place unshrinkable fill in areas as indicated.
- .7 Consolidate and level unshrinkable fill with internal vibrators.
- .8 Restore surface of excavation with material and finish to match existing adjoining surfaces.

### **3.9 RESTORATION**

- .1 Upon completion of Work, remove waste materials and debris in accordance to Section 01 74 21 – Construction/Demolition Waste Management and Disposal, trim slopes, and correct defects as directed by Departmental Representative.
- .2 Replace topsoil as directed by Departmental Representative.
- .3 Clean and reinstate areas affected by Work as directed by Departmental Representative.
- .4 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

### **3.10 GRADING**

- .1 Grade to be gradual between finished spot elevations shown on drawings and fully matching existing adjacent surfaces.
- .2 Fill and grade site to achieve elevations indicated.

### **3.11 FIELD QUALITY CONTROL**

- .1 Testing of materials and compaction of backfill will be carried out by testing laboratory retained and paid by Departmental Representative.
- .2 Do not begin backfilling or filling operations until material has been approved for use by Departmental Representative.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 33 00 - Submittal Procedures
- .2 Section 31 23 33.01 - Excavating, Trenching and Backfilling.

**1.2 MEASUREMENT AND PAYMENT**

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

**1.3 REFERENCE STANDARDS**

- .1 Ontario Provincial Standard Specifications (OPSS)
  - .1 OPSS 1860-April 2012, Material Specification for Geotextiles.

**1.4 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for geotextiles and include product characteristics, performance criteria, physical size, finish and limitations.

**1.5 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 off ground, in dry location and in accordance with manufacturer's recommendations in clean, dry, 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 synthetic fibre fabric, supplied in rolls.
  - .1 Composed of: minimum 95% by mass of polypropylene, polyethylene, polyester, or other synthetic polymers, excluding polyamides.
- .2 Physical properties:
  - .1 Thickness: to CAN/CGSB-148.1, No.3, minimum 3.5 mm.
  - .2 Tensile strength and elongation (in any principal direction): to ASTM D4595.
    - .1 Tensile strength: minimum 1450 N, wet condition.

- .2 Elongation at break: 70 to 110%.
- .3 Tear strength: minimum 600 N.
- .3 Bursting strength: to CAN/CGSB-148.1, No.6.1 minimum 3500 kPa, wet condition.
- .4 Ultra Violet (UV) Stability: to ASTM B4355 No less than 50% retained tensile strength at 500 hours
- .5 Hydraulic properties:
  - .1 Filtration opening size (FOS): to CAN/CGSB-148.1 No.10 40 – 110 µm.
- .3 Securing pins and washers: to CSA G40.21, Grade 300W, hot-dipped galvanized with minimum zinc coating of 600 g/m<sup>2</sup> to ASTM A123/A123M.
- .4 Factory seams: sewn in accordance with manufacturer's recommendations.
- .5 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 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 Place geotextile material by unrolling onto graded surface in orientation, manner and locations indicated.
- .2 Place geotextile material smooth and free of tension stress, folds, wrinkles and creases.
- .3 Place geotextile material on sloping surfaces in one continuous length from toe of slope to upper extent of geotextile.
- .4 Overlap each successive strip of geotextile 600mm over previously laid strip.
- .5 Join successive strips of geotextile by sewing.
- .6 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.
- .7 After installation, cover with overlying layer within 4 hours of placement.
- .8 Replace damaged or deteriorated geotextile to approval of Departmental Representative.
- .9 Place and compact soil layers in accordance with Section 31 23 33.01 - Excavating, Trenching and Backfilling.

**3.3 CLEANING**

- .1 Progress Cleaning: Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

**3.4 PROTECTION**

- .1 Vehicular traffic not permitted directly on geotextile. Replace all geotextile driven on at discretion of Departmental Representative.

**END OF SECTION**



**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 33 00- Submittal Procedures
- .2 Section 01 35 43- Archeological and Cultural Resources and Environmental Procedures
- .3 Section 31 37 00- Rip-Rap
- .4 Section 35 20 24- Dredging
- .5 Section 31 32 19.16- Geotextile Soil Stabilization

**1.2 PRICE AND PAYMENT PROCEDURES**

- .1 Measurement procedures:
  - .1 Measure rock fill mattress in tonnes of rock placed as indicated.

**1.3 REFERENCE STANDARDS**

- .1 ASTM International
  - .1 ASTM C117-13, Standard Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing.
  - .2 ASTM C127-12, Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate.
  - .3 ASTM C136-13, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
  - .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
- .3 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.

**1.4 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00- Submittal Procedures.
- .2 Contractor to submit detailed procedure for installation of gabion mattress including methods for leveling top surface and verifying elevation of top surface.

**Part 2 Products**

**2.1 MATERIALS**

- .1 Mattress material to following requirements:
  - .1 Gabion mattress material to be as per Section 31 37 00- Rip-Rap

- .2 Top 300mm layer of mattress: graded with maximum particle size of 50mm.

### **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 gabion mattresses 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 PREPARATION**

- .1 Environmental Protection:
  - .1 Provide erosion and sediment control measure to prevent migration of suspended sediments in downstream areas and erosion of on-site soils/sediments during execution of Work in accordance with Section 01 35 43- Archeological and Cultural Resources and Environmental Procedures.
- .2 Dredge, in accordance with Section 35 20 24- Dredging, area where mattress is to be placed to solid bedrock.
- .3 Sound area in presence of Departmental Representative before placing mattress material, and record elevation of bedrock on which mattress to be placed.

#### **3.3 PLACEMENT**

- .1 Ensure that no frozen material is used in placing.
- .2 Do not place mattress material until bottom area has been reviewed by Departmental Representative.
- .3 Place geotextiles in accordance with Section 31 32 19.16- Geotextile soil stabilization.
- .4 Place mattress materials to dimensions as indicated.
- .5 Prevent segregation in placing of material sizes.
- .6 Do not place material during weather judged unsuitable by Departmental Representative.
- .7 Place material immediately prior to planned placement of timber cribs.
- .8 Do not displace or damage geotextile when placing rock fill mattress.
- .9 Level top surface of mattress to specified grade.
  - .1 Use sweep beam suspended from barge as screed to level surface of each mattress layer.
  - .2 Other methods of levelling may be employed subject to review of Departmental Representative.

**3.4 TOLERANCES**

- .1 Surface of mattress to be parallel with elevation as indicated with mean elevation of surface within 75 mm of elevations as indicated.
- .2 Establish mean elevation from spot elevations taken at 2m intervals.
  - .1 Do not allow spot elevation to differ more than 50mm from mean.

**3.5 SCOUR PROTECTION**

- .1 Place scour protection to details as indicated as soon as practicable after placement of cribs.

**3.6 CLEANING**

- .1 Progress Cleaning: Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 31 32 19.01- Geotextiles
- .2 Section 01 74 21- Construction/Demolition Waste Management and Disposal
- .3 Section 31 36 19- Gabion Mattresses
- .4 Section 31 53 13.01- Timber Cribwork

**1.2 MEASUREMENT PROCEDURES**

- .1 Rock Fill Mattress: Measurement in tonnes of material placed.
- .2 Scour Protection (G-10 Gabion Stone): Measurement in tonnes of material placed.

**1.3 REFERENCE STANDARDS**

- .1 Ontario Provincial Standard Specifications (OPSS)
  - .1 OPSS 1004-November 2012, Material Specification for Aggregates Miscellaneous.

**1.4 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

**Part 2 Products**

**2.1 STONE**

- .1 In accordance with OPSS 1004, November 2012, (Table 8)
  - .1 Gradation:
    - .1 Rock Fill Mattresses (Below Timber Cribs): Gabion Stone G-3
      - .1 Top 300mm layer of mattress to be graded with clear stone with maximum particle size of 50mm.
    - .2 Rip Rap scour protection at base of cribs (outside of cribs): Gabion Stone G-3
    - .3 Timber Crib Ballast: Gabion Stone G-10

**2.2 GEOTEXTILE FILTER**

- .1 Geotextile: in accordance with Section 31 32 19.01 - Geotextiles.

**Part 3 Execution**

**3.1 PLACING**

- .1 Rip-Rap Scour Protection for Cribs:

- .1 Place geotextile on prepared surface in accordance with Section 31 32 19.01- Geotextiles and as indicated. Avoid puncturing geotextile.
- .2 Place rip-rap to thickness and details as indicated.
- .3 Place stones in manner approved by Departmental Representative to secure surface and create a stable mass. Place larger stones at bottom of slopes.
- .2 Rock Fill Mattresses (below Cribs):
  - .1 As per Section 31 36 19- Gabion Mattresses.
- .3 Timber Crib Ballast:
  - .1 As per Section 31 53 13.01- Timber Cribwork

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 33 00- Submittal Procedures
- .2 Section 01 45 00- Quality Control
- .3 Section 01 35 29.06- Health and Safety Requirements
- .4 Section 01 74 21- Construction/Demolition Waste Management and Disposal
- .5 Section 31 36 19- Gabion Mattresses

**1.2 MEASUREMENT PROCEDURES**

- .1 There will be no measurement for payment. Timber cribs shall be paid as Lump Sum to the dimensions shown on the Contract Drawings.

**1.3 REFERENCE STANDARDS**

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM A307-04, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
  - .2 ASTM C136-05, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- .2 American Wood-Preserver's Association (AWPA)
  - .1 AWPA M4-02, Standard for the Care of Preservation - Treated Wood Products.
- .3 Canadian Standards Association (CSA International)
  - .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
  - .2 CSA-G40.20/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  - .3 CAN/CSA G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
  - .4 CSA-O80 Series-97(R2002), Wood Preservation.
- .4 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
  - .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
- .5 Canadian Wood Council
  - .1 Wood Design Manual - 2005.
- .6 National Lumber Grades Authority (NLGA)
  - .1 Standard Grading Rules for Canadian Lumber 2003 edition.

**1.4 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00- Submittal Procedures.
- .2 Shop Drawings:

- .1 Submit shop drawings in accordance with Section 01 33 00- Submittal Procedures.
- .2 Submit proposed placing method for ballast to Departmental Representative for approval, prior to placing of ballast.

## **1.5 QUALITY ASSURANCE**

- .1 Quality Assurance: in accordance with Section 01 45 00- Quality Control.
- .2 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06- Health and Safety Requirements.
- .3 Worker protection:
  - .1 Workers must wear long sleeved clothing, eye protection, dust masks and gloves when handling, drilling, sawing, cutting or sanding preservative treated wood and applying preservative materials.
  - .2 Workers must not eat, drink or smoke while applying preservative material.
  - .3 Clean up spills of preservative materials immediately with absorbent material. Safely discard of adsorbent material to sanitary landfill.

## **1.6 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials in accordance with Section 01 74 21- Construction/Demolition Waste Management and Disposal.
- .2 Place materials defined as hazardous or toxic in designated containers.
- .3 Ensure emptied containers are sealed and stored safely.
- .4 Do not dispose of preservative treated wood through incineration.
- .5 Do not dispose of preservative treated wood with other materials destined for recycling or reuse.
- .6 Dispose of treated wood, end pieces, wood scraps and sawdust at a sanitary landfill.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Timber: use timber graded and stamped in accordance with applicable grading rules and standards of associations or agencies approved to grade lumber by Canadian Lumber Standards Accreditation Board of CSA.
  - .1 Species: Douglas Fir
  - .2 Grade: No. 1 (or better)
  - .3 Grading authority: NLGA.
  - .4 Preservative treatment: Pressure Treated (as per CSA O80, for Use Category UC4.2)
- .2 Miscellaneous steel:
  - .1 Hot dip galvanized: to CAN/CSA-G164.
  - .2 Wire nails, spikes, staples: to CSA-B111.
  - .3 Bolts, nuts, washers: to ASTM A307.

- .4 Ogee washers: to Wood Design Manual.
- .5 Steel straps and plates: to CAN/CSA-G40.21, Grade 350W
- .3 Ballast for filling cribs to following requirements:
  - .1 G-10 Gabion Stone in accordance with OPSS 1004 (Nov 2012), Table 8 and as per Section 31 37 00- Rip-Rap.
- .4 Rock Fill mattress: to Section 31 36 19- Gabion Mattresses.

### **Part 3 Execution**

#### **3.1 PREPARATION**

- .1 Dredge area of crib base to bedrock.
- .2 Place and level rock fill mattress in accordance with Section 31 36 19- Gabion Mattresses.
- .3 Before construction, stockpile sufficient ballast to completely fill cribs.
- .4 Take closely spaced accurate soundings, precisely located by template, to surface of mattress, to determine actual configuration of base area of crib.
  - .1 Construct crib bottom to match base configuration.

#### **3.2 CRIB CONSTRUCTION**

- .1 Precut and pre-bore timber prior to preservative treatment.
- .2 Bore holes for drift bolts 1.5mm smaller diameter than bolt and for full length of bolt. Bore holes for machine bolts to same diameter as bolts.
- .3 Construct timber cribwork to full height prior to sinking in final position in work.
- .4 Levelling pieces:
  - .1 Place timber levelling pieces beneath bottom timbers to conform to shape of base area.
  - .2 Place levelling pieces horizontally.
  - .3 Secure succeeding pieces at intersections of bottom timbers and vertical posts, and other levelling pieces with machine bolts.
- .5 Bottom timbers:
  - .1 Crosswise bottom timbers to be of one piece.
  - .2 Lengthwise bottom timbers to be minimum 6m long.
  - .3 Splice timbers in lengthwise direction at centre of 1.5m long splice block
  - .4 Stagger butt joints in bottom timbers; joints maximum 0.5m from crosswise timber; do not locate in same bay as joint in course below.
- .6 Longitudinals:
  - .1 Butt join exterior and interior longitudinals in centre of 1.5m block.
  - .2 Secure block to lower timber with drift bolt at centre and secure longitudinals and splice at ends to block with drift bolts.
  - .3 Longitudinals minimum 4m.



- .4 Stagger joints in longitudinal timbers: do not join in same bay or on same vertical post.
- .5 Secure longitudinals to intersection of cross ties with drift bolt and to intersection of vertical posts with machine bolt every third course of longitudinals.
- .6 Countersink machine bolts on exterior face, full height of cribwork
- .7 Cross ties: one length across cribs.
  - .1 Secure cross ties to intersection of longitudinals with drift bolt and to intersection of vertical posts with machine bolt every third course of cross tie.
- .8 Vertical posts: one length from bottom of cribwork to top of cribwork.

### **3.3 HANDLING TREATED TIMBER**

- .1 Handle treated material without damaging original treatment.
  - .1 Replace treated timber with major damage to original treatment, as instructed by Departmental Representative.
- .2 Field treatment: apply and saturate cuts, minor surface damage, abrasions, and nail and spike holes with preservative to CAN/CSA-O80 Series.

### **3.4 BALLAST**

- .1 Place ballast to avoid damage to timber cribwork.
- .2 Place ballast so that differential height of fill between adjacent cells, at any time, will be less than 1m.

### **3.5 TOLERANCES**

- .1 1 in 300 in overall dimensions.

### **3.6 CLEANING**

- .1 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 33 00 - Submittal Procedures
- .2 Section 01 35 43 Archeological and Cultural Resources and Environmental Procedures
- .3 Section 01 74 21 - Construction/Demolition Waste Management and Disposal

**1.2 MEASUREMENT PROCEDURES**

- .1 Preparation of sub-grade for placing of topsoil will not be measured for payment.
- .2 Topsoil stripping will not be measured.
- .3 Measure supplying, placing and spreading topsoil in square metres as determined from actual surface area covered.
  - .1 Specified depth of topsoil: measured and approved by Departmental Representative after settlement and consolidation as specified.

**1.3 REFERENCE STANDARDS**

- .1 Agriculture and Agri-Food Canada
  - .1 The Canadian System of Soil Classification, Third Edition, 1998.

**1.4 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Quality control submittals:
  - .1 Soil testing: submit certified test reports showing compliance with specified performance characteristics and physical properties as described in PART 2 - SOURCE QUALITY CONTROL.
  - .2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .3 .

**1.5 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

**Part 2 Products**

**2.1 TOPSOIL**

- .1 Topsoil for seeded areas: mixture of particulates, microorganisms and organic matter which provides suitable medium for supporting intended plant growth.

- .1 Soil texture based on The Canadian System of Soil Classification, to consist of 20 to 70 % sand, minimum 7 % clay, and contain 2 to 10 % organic matter by weight.
- .2 Contain no toxic elements or growth inhibiting materials.
- .3 Finished surface free from:
  - .1 Debris and stones over 50 mm diameter.
  - .2 Course vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.
- .4 Consistence: friable when moist.

## **2.2 SOURCE QUALITY CONTROL**

- .1 Advise Departmental Representative of sources of topsoil to be utilized with sufficient lead time for testing.
- .2 Contractor is responsible for amendments to supply topsoil as specified.
- .3 Soil testing by recognized testing facility for PH, P and K, and organic matter.
- .4 Testing of topsoil will be carried out by testing laboratory designated by Departmental Representative.
  - .1 Soil sampling, testing and analysis to be in accordance with Provincial standards.

## **Part 3 Execution**

### **3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL**

- .1 Temporary Erosion and Sediment Control in accordance with Section 01 35 43 - Archeological and Cultural Resources and Environmental Procedures.

### **3.2 PREPARATION OF EXISTING GRADE**

- .1 Verify that grades are correct.
  - .1 If discrepancies occur, notify Departmental Representative and do not commence work until instructed by Departmental Representative.
- .2 Grade soil, eliminating uneven areas and low spots, ensuring positive drainage.
- .3 Remove debris, roots, branches, stones in excess of 50 mm diameter and other deleterious materials.
  - .1 Remove soil contaminated with calcium chloride, toxic materials and petroleum products.
  - .2 Remove debris which protrudes more than 75 mm above surface.
  - .3 Dispose of removed material off site.
- .4 Cultivate entire area which is to receive topsoil to minimum depth of 100 mm.
  - .1 Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.

### **3.3 PLACING AND SPREADING OF TOPSOIL/PLANTING SOIL**

- .1 Place topsoil after Departmental Representative has accepted subgrade.

- .2 Spread topsoil in uniform layers not exceeding 150 mm.
- .3 For sodded areas keep topsoil 15 mm below finished grade.
- .4 Spread topsoil as indicated to following minimum depths after settlement.
  - .1 150 mm for seeded areas.
  - .2 135 mm for sodded areas.
- .5 Manually spread topsoil/planting soil around trees, shrubs and obstacles.

### **3.4 FINISH GRADING**

- .1 Grade to eliminate rough spots and low areas and ensure positive drainage.
  - .1 Prepare loose friable bed by means of cultivation and subsequent raking.
- .2 Consolidate topsoil to required bulk density using equipment approved by Departmental Representative.
  - .1 Leave surfaces smooth, uniform and firm against deep footprinting.

### **3.5 ACCEPTANCE**

- .1 Departmental Representative will inspect and test topsoil in place and determine acceptance of material, depth of topsoil and finish grading.

### **3.6 SURPLUS MATERIAL**

- .1 Dispose of materials except topsoil not required off site.

### **3.7 CLEANING**

- .1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 33 00 - Submittal Procedures
- .2 Section 01 35 29.06 - Health and Safety Requirements
- .3 Section 01 35 43 - Archeological and Cultural Resources and Environmental Procedures
- .4 Section 01 74 21 - Construction/Demolition Waste Management and Disposal
- .5 Section 32 91 19.13 - Topsoil Placement and Grading

**1.2 MEASUREMENT AND PAYMENT**

- .1 Payment for sodding will be made at unit price bid of actual area surface measurements taken and computed by Departmental Representative for:
  - .1 Commercial Grade Turf Grass Nursery Sod per square metre.

**1.3 ADMINISTRATIVE REQUIREMENTS**

- .1 Scheduling:
  - .1 Schedule sod laying to coincide with preparation of soil surface.
  - .2 Schedule sod installation when frost is not present in ground.

**1.4 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for sod, geotextile and fertilizer and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Submit WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements and 01 35 43 - Archeological and Cultural Resources and Environmental Procedures.
- .3 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements of seed mix, seed purity, and sod quality.

**1.5 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section 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 accordance with supplier's recommendations.

- .2 Replace defective or damaged materials with new.

## **Part 2 Products**

### **2.1 MATERIALS**

- .1 Commercial Grade Turf Grass Nursery:
  - .1 Grown solely from seed mixture of cultivars of Kentucky Bluegrass and Chewing Fescue or Creeping Red Fescue.
  - .2 Not more than 5 broadleaf weeds and up to 20% native grasses per 40 square metres.
  - .3 Mowing height limit: 30 to 70 mm.
  - .4 Soil portion of sod: 10 mm in thickness.
- .2 Sod establishment support:
  - .1 Wooden pegs or Biodegradable starch pegs: minimum 150 mm in length
- .3 Water:
  - .1 Water shall not have contaminants or impurities that would adversely affect the germination and growth of vegetation.
- .4 Fertilizer:
  - .1 To Canada "Fertilizers Act" and Fertilizers Regulations.
  - .1 Fertilizer shall be supplied in bags bearing the manufacturer's label indicating net weight and guaranteed analysis.
  - .2 Fertilizer shall be in granular form, dry, free flowing without lumps.
  - .3 Fertilizer shall be supplied with a minimum analysis of 16% nitrogen, 3% phosphorus, and 15% potash. The guaranteed analysis ratio shall be 3-1-2.
  - .4 The total nitrogen component of the fertilizer shall be minimum 30% water insoluble nitrogen (controlled, slow release nitrogen) by weight.

### **2.2 SOURCE QUALITY CONTROL**

- .1 Obtain written approval from Departmental Representative of sod at source.
- .2 When proposed source of sod is approved, use no other source without written authorization from Departmental Representative.

## **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 sod 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.

### **3.2 PREPARATION**

- .1 Verify that grades are correct and prepared in accordance with Section 32 91 19.13 - Topsoil Placement and Grading. If discrepancies occur, notify Departmental Representative and commence work when instructed by Departmental Representative.
- .2 Do not perform work under adverse field conditions such as frozen soil, excessively wet soil or soil covered with snow, ice, or standing water.
- .3 Fine grade surface free of humps and hollows to smooth, even grade, elevations indicated, to tolerance of plus or minus 15 mm for Commercial Grade Turf Grass Nursery, surface to drain naturally.
- .4 Fertilizer shall be applied uniformly to the surface area designated for sodding, a maximum of 48 hours prior to sod placement, at the rate specified on its bag by the manufacturer.
- .5 Remove and dispose of weeds; debris; stones 25 mm in diameter and larger; soil contaminated by oil, gasoline and other deleterious materials; off site in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

### **3.3 SOD PLACEMENT**

- .1 Lay sod within 24 hours of being lifted if air temperature exceeds 20 degrees C.
- .2 Lay sod sections in rows, joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with sharp implements.
- .3 Provide close contact between sod and soil by light rolling. Use of heavy roller to correct irregularities in grade is not permitted.

### **3.4 SOD PLACEMENT ON SLOPES AND PEGGING**

- .1 Start laying sod at bottom of slopes.
- .2 Peg sod on slopes steeper than 3 horizontal to 1 vertical, within 1 m of drainage channels and ditches to following pattern:
  - .1 100 mm below top edge at 200 mm on centre for first sod sections along contours of slopes.
  - .2 Not less than 3 pegs per square metre.
  - .3 Not less than 6 pegs per square metre in drainage structures. Adjust pattern as directed by Departmental Representative.
  - .4 Drive pegs to 20 mm above soil surface of sod sections.

### **3.5 FERTILIZING PROGRAM**

- .1 Fertilize during establishment and warranty periods.

### **3.6 CLEANING**

- .1 Progress Cleaning:
  - .1 Leave Work area clean at end of each day.
  - .2 Keep pavement and area adjacent to site clean and free from mud, dirt, and debris at all times.

- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

### **3.7 MAINTENANCE DURING ESTABLISHMENT PERIOD**

- .1 Sod shall be maintained during the establishment period until acceptance.
- .2 During this period, the placed sod shall be kept healthy, actively growing, and green in leaf colour. This includes a minimum of 2 cuts no sooner than 7 days after laying and no less than 7 days in between cuts except where drier conditions require a longer period between cuts.
- .3 Perform following operations from time of installation until acceptance.
  - .1 Water sodded areas in sufficient quantities and at frequency required to maintain optimum soil moisture condition to depth of 75 to 100 mm.
  - .2 Cut grass to 50 mm when it reaches height of 75 mm.
  - .3 Maintain sodded areas weed free 95%.
  - .4 Temporary barriers or signage to be maintained where required to protect newly established sod.

### **3.8 ACCEPTANCE**

- .1 Sodded Commercial Grade Turf Grass Nursery Sod areas will be accepted by Departmental Representative provided that:
  - .1 Sodded areas are properly established.
  - .2 Extent of surface soil visible when grass has been cut to height of 60 mm is acceptable.
  - .3 Sod is free of bare or dead spots and extent of weeds apparent in grass is acceptable.
  - .4 Sodded areas have been cut minimum 2 times prior to acceptance.
- .2 Areas sodded in fall will be accepted in following spring one month after start of growing season provided acceptance conditions are fulfilled.
- .3 When environmental conditions allow, all sodded areas showing shrinkage cracks shall be top-dressed and seeded with a seed mix matching the original.
- .4 Areas sodded in fall will be accepted in following spring one month after start of growing season provided acceptance conditions are fulfilled.

### **3.9 MAINTENANCE DURING WARRANTY PERIOD**

- .1 Repair and re-sod dead or bare spots to satisfaction of Departmental Representative.

**END OF SECTION**



**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 33 00- Submittal Procedures
- .2 Section 31 05 16- Aggregate Materials
- .3 Section 31 23 33.01- Excavating, Trenching and Backfilling

**1.2 PRICE AND PAYMENT PROCEDURES**

- .1 Item – Install New Weholite Outlet Pipe between Wharf and Existing Catch Basin: There will be no measurement for payment for this Item. All work associated with the repair of the catch basin and replacement of the outlet pipe, and connection to the outlet pipe assembly within the new wharf structure (as shown in the contract drawings) shall be included in the price for the contract item. The outlet pipe assembly within the wharf structure shall be paid for under separate item.

**1.3 REFERENCE STANDARDS**

- .1 ASTM International
  - .1 ASTM C136-06, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.
- .3 ASTM F667-06, Standard Specification for Large Diameter Corrugated Polyethylene Tubing and Fittings.

**1.4 SCHEDULING**

- .1 Schedule Work to minimize interruptions to existing services and to maintain existing flow during construction.

**1.5 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00- Submittal Procedures.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for pipes, and backfill and include product characteristics, performance criteria, physical size, finish and limitations.

**1.6 DELIVERY, STORAGE AND HANDLING**

- .1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions.
- .2 Storage and Handling Requirements:
  - .1 Store materials in accordance with manufacturer's recommendations.
  - .2 Store and protect pipes from damage.

- .3 Replace defective or damaged materials with new.

## **Part 2 Products**

### **2.1 WEHOLITE PIPE**

- .1 Corrugated polyethylene pipe: high density to ASTM F667.

### **2.2 PIPE BEDDING AND SURROUND MATERIAL**

- .1 When located underwater (below groundwater level or level of waterway), all bedding and surround material shall be 19mm clear stone.
- .2 When located above water level, Granular A bedding and surround material shall be used in accordance with Section 31 05 16 - Aggregate Materials, and as shown in the Contract Drawings.

### **2.3 BACKFILL MATERIAL**

- .1 When located underwater (below groundwater level or level of waterway), all backfill material shall be 19mm clear stone.
- .2 When located above water level, Granular A backfill material shall be used in accordance with Section 31 23 33.01- Excavating, Trenching and Backfilling.

## **Part 3 Execution**

### **3.1 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 sediment and erosion control plan, specific to site, that complies with requirements of authorities having jurisdiction.
  - .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
  - .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- .2 Clean pipes and fittings of debris and water before installation, and remove defective materials from site to approval of Departmental Representative.

### **3.2 TRENCHING**

- .1 Do trenching Work in accordance with Section 31 23 33.01- Excavating, Trenching and Backfilling.
- .2 Trench alignment and depth to approval of Departmental Representative prior to placing bedding material and pipe.

### **3.3 GRANULAR BEDDING**

- .1 Place bedding in unfrozen condition.

- .2 Place granular bedding material in uniform layers not exceeding 150mm compacted thickness to depth as indicated.
- .3 Shape bed true to grade and to provide continuous, uniform bearing surface for pipe.
  - .1 Do not use blocks when bedding pipes.
- .4 Shape transverse depressions as required to suit joints.
- .5 When above water level and not using clear stone bedding, compact each layer full width of bed to at least 95% maximum density to ASTM D698.

### **3.4 INSTALLATION**

- .1 Lay and join pipe in accordance with manufacturer's recommendations and to approval of Departmental Representative.
- .2 Handle pipe using methods approved by Departmental Representative.
  - .1 Do not use chains or cables passed through rigid pipe bore so that weight of pipe bears upon pipe ends.
- .3 Lay pipes on prepared bed, true to line and grade with pipe inverts smooth and free of sags or high points.
  - .1 Ensure barrel of each pipe is in contact with shaped bed throughout its full length.
- .4 Lay pipe:
  - .1 With outside circumferential laps facing upgrade and longitudinal laps or seams at side or quarter points.
- .5 Joint deflection permitted within limits recommended by pipe manufacturer.
- .6 Cut pipes as required for special inserts, fittings or closure pieces, as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.
- .7 Make watertight connections to manholes and catch basins.
  - .1 Use shrinkage compensating grout when suitable gaskets are not available.
- .8 Use prefabricated saddles or approved field connections for connecting pipes to existing sewer pipes.
  - .1 Joint to be structurally sound and watertight.
- .9 Temporarily plug open upstream ends of pipes with removable watertight concrete, steel or plastic bulkheads.

### **3.5 PIPE SURROUND**

- .1 Place surround material in unfrozen condition.
- .2 Upon completion of pipe laying, and after Departmental Representative has inspected pipe joints, surround and cover pipes as indicated.
  - .1 Leave joints and fittings exposed until field testing is completed.
- .3 Hand place surround material in uniform layers not exceeding 150mm compacted thickness as indicated.

- .4 Place layers uniformly and simultaneously on each side of pipe.
- .5 When above water level and not using clear stone bedding, compact each layer from pipe invert to mid height of pipe to at least 95% maximum density to ASTM D698.
- .6 Compact each layer from mid height of pipe to underside of backfill to at least 90% maximum density to ASTM D698.
- .7 When field test results are acceptable to Departmental Representative, place surround material at pipe joints.

### **3.6 BACKFILL**

- .1 Place backfill material in unfrozen condition.
- .2 Place backfill material, above pipe surround, in uniform layers not exceeding 150mm compacted thickness up to grades as indicated.
- .3 Place backfill in accordance with Section 31 23 33.01- Excavating, Trenching and Backfilling.

### **3.7 FIELD TESTS AND INSPECTIONS**

- .1 Repair or replace pipe, pipe joint or bedding found defective.
- .2 Remove foreign material from sewers and related appurtenances by flushing with water.

### **3.8 CLEANING**

- .1 Progress Cleaning: Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

**END OF SECTION**

## **Part 1            General**

### **1.1            ENVIRONMENTAL REQUIREMENTS**

- .1    Ensure a dewatered condition for operation of equipment within watercourses.
- .2    Install stabilized entrances at equipment access points to dewatered watercourses.
- .3    Use rubber tracked machinery when working on watercourse bed material.
- .4    Dumping excavated fill, waste material, or debris in watercourse or wetland is prohibited.
- .5    Construct settling ponds sufficiently deep and wide to retain runoff long enough to permit suspended sediments to settle to the bottom.
- .6    Operation of construction equipment in water is prohibited.
- .7    Prevent debris from entering the watercourse.

### **1.2            PERMITS**

- .1    Obtain work permits from governing Federal, Provincial and/or Municipal Conservation authority.

## **Part 2            Products**

### **2.1            MATERIALS**

- .1    Sediment Fencing:
  - .1    Consisting of non-woven geotextile with manufactured seams as resistant as the geotextile material itself. The geotextile shall be in one piece.
  - .2    Stakes to be natural wood, minimum 1.5metres in length, sized to withstand peak flows.
- .2    Turbidity Curtain:
  - .1    Consisting of a heavy duty woven fabric with top loops connected to floats and bottom loops woven through a 5mm diameter heavy metal chain.
  - .2    Length of curtain to be sufficient to fully contain the work area.
  - .3    Height of curtain to be sufficient to adjust to variable water levels while maintaining continuous contact with the watercourse bed.
  - .4    Mark floating surface of curtain with yellow buoys and/or yellow lights to alert boaters as determined by Departmental Representative.
- .3    Pumps:
  - .1    The inlet and outlet of pumps and hoses for use in-water to be screened to prevent aquatic fauna from entering the equipment.
  - .2    Ensure DFO guidelines are complied with.

**Part 3            Execution**

**3.1            EXISTING CONDITIONS**

- .1      Maintain existing flow pattern in waterway.

**3.2            SITE CLEARING AND PLANT PROTECTION**

- .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 sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.
  - .2          Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
  - .3          Remove erosion and sedimentation controls once disturbed areas have been restored and stabilized.
- .2      Minimize disturbance to vegetated buffer zones and protect trees and plants on site and adjacent properties where indicated.
- .3      Trees and shrubs not designated for removal should be isolated and protected from rest of work area.
- .4      Protect roots of designated trees to dripline or as instructed by Departmental Representative during excavation and site grading to prevent disturbance or damage.
  - .1          Avoid unnecessary traffic, dumping and storage of materials over root zones.
- .5      Leave roots mass and stumps in place.
- .6      Maintain temporary erosion and pollution control features installed under this contract.

**3.3            RECOVERY OF AQUATIC FAUNA**

- .1      See site specific BIA for specific details
- .2      To minimize impacts on aquatic fauna, during installation of water isolation techniques, use a combination of netting and loud noises or vibrations to scare any trapped fish, reptiles or amphibians towards a temporary opening. Once completed, close off the opening.
- .3      Once the aquatic work area is secured, the isolated area of water is to be electro-fished to remove any remaining aquatic fauna. Fish rescue to be complete by a certified professional.
- .4      Captured aquatic fauna to be placed back in the waterbody, outside work area.
- .5      Protect edges of work area to prevent the reintroduction of reptiles and amphibians to the work area.

**3.4            DRAINAGE**

- .1      Pumping water containing suspended materials into watercourse is prohibited.

### **3.5 REMOVAL OF SEDIMENT CONTROL MEASURES**

- .1 Sediment control measures to remain in place at all times during the work in order to catch and filter any run-off from the worksite before it reaches the watercourse.
- .2 Measures to remain in place until the growth of seed, sod or other surface cover is sufficient to retain sediments from being mobilized in runoff.
- .3 Method of removal of sediment control measures to be submitted for approval by PCA Environmental Authority.

### **3.6 SITE RESTORATION**

- .1 Restore the original watercourse bed grades and materials upon completion of in-water works.
- .2 Establish vegetated buffer zones with suitable vegetation to minimum 3 m along edge of watercourse banks as determined by Departmental Representative.
- .3 Plant non-invasive, locally native or naturalized vegetation natural to area, suitable for application without requirement for fertilizers, pesticides and other chemicals.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 33 00- Submittal Procedures

**1.2 DEFINITIONS**

- .1 Class A Material: solid rock requiring drilling and blasting to loosen, and boulders or rock fragments of individual volumes 1.5m<sup>3</sup> or more.
- .2 Class B Material: loose rock, silt, sand, quick sand, mud, shingle, gravel, clay, sand, gumbo, boulders, hardpan and debris of individual volumes less than 1.5m<sup>3</sup>.
- .3 Cleared Area: area of dredging accepted as complying with plans and specifications.
- .4 Debris: pieces of wood, wire rope, scrap steel, pieces of concrete and other waste materials.
- .5 Dredging: excavating, transporting and disposing of underwater materials.
- .6 Grade: plane above which material is to be dredged.
- .7 Mechanical Dredging Plant: equipment comprising of the following: clamshell, dragline, dipper or backhoe dredge with dump scows.
- .8 Obstructions: material other than class A, having individual volumes of 1.5m<sup>3</sup> or more.

**1.3 ADMINISTRATIVE REQUIREMENTS**

- .1 Navigation co-ordination:
  - .1 Departmental Representative will not be responsible for loss of time, equipment, material or any other cost related to interference due to other Contractor's operations.

**1.4 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submit in accordance with Section 01 33 00- Submittal Procedures.
- .2 Submit information as follows for dredging operation:
  - .1 Description of processes to be implemented including, but not limited to, site plan, and available equipment specifications.
  - .2 Detailed operating procedures for proposed excavation method.
  - .3 Detailed description and specifications for environmental controls including, but not limited to, control of sediment migration.
  - .4 Shoring/Protection System:
    - .1 Contractor shall design, implement and remove when no longer required a shoring/protection system for the open excavation/dredging which is required for removal and replacement of the wharf.
    - .2 Contractor is hereby informed that the soil behind the existing wharf is considered Class 4. Contractor shall review provided geotechnical report for the site when designing the shoring/protection measures.



**1.5 QUALITY ASSURANCE**

- .1 Regulatory agency sustainability approvals:
  - .1 Comply with municipal, provincial and national codes and regulations relating to project.

**1.6 SITE CONDITIONS**

- .1 Contractor to visit and inspect work site and become thoroughly familiar with extent and nature of Work and conditions affecting Work before tendering.
- .2 Material to be dredged consists of Class B material.
- .3 Borehole descriptions are provided in the geotechnical report to indicate general bedrock elevations only.

**1.7 DREDGING SEQUENCE**

- .1 Supply Departmental Representative with plan of dredging sequence and stages.
- .2 Departmental Representative may direct Contractor to alter sequence of dredging areas.

**1.8 MEASUREMENT PROCEDURES**

- .1 No additional payment will be made for mobilization and demobilization of dredging equipment as this will be considered part of the dredging work.
- .2 Dredging: To be measured in cubic metres, determined from soundings taken by Departmental Representative before and after dredging.
- .3 Include in the dredging payment item, costs for disposal of dredged material at locations specified; maintenance of disposal site; site clean-up and mechanical sweeping of dredged areas.
- .4 Obstructions:
  - .1 Removal of obstructions, authorized by Departmental Representative, will be measured in hours actually used in removal.
- .5 Operations in connection with field positioning of dredging equipment, Contractor's survey vessel, equipment and crew or diving services will not be measured separately for payment but will be considered included in dredging item.
- .6 Removal of infilling material will not be measured for payment but will be considered included in dredging item.
- .7 Design, installation and removal of temporary shoring/protection systems for carrying out work shall not be paid separately and shall be included in the price for Dredging.

**1.9 DREDGING PLANT**

- .1 Dredging plant used for work to be mechanical type of sufficient capacity and in good operating condition to satisfactory complete Work within time schedule and in accordance with specifications.

**Part 2 Products**

**2.1 DREDGING EQUIPMENT**

- .1 Contractor to determine required equipment necessary to dredge material specified and to dispose of dredged material at location to be approved by the Departmental Representative.

**Part 3 Execution**

**3.1 EXAMINATION**

- .1 Verification of location:
  - .1 Work comprises dredging of areas as indicated in the Contract Drawings.
- .2 Surveys and acceptance of work:
  - .1 As soon as practical after Contract award, Contractor will complete pre-dredge survey of dredge area locations. This survey will define actual pre-dredge riverbed areas.
  - .2 No area will be dredged prior to Departmental Representative's and Contractor's mutual acceptance of pre-dredge survey for that area.
  - .3 Post-dredge survey will be undertaken by Contractor in presence of Departmental Representative upon completion of dredging. Survey will confirm if dredging is completed as specified and will confirm the volume of material removed.
  - .4 Contractor to redredge as necessary to remove all material within dredge areas which is found to be above grade (bedrock).

**3.2 LAYOUT OF WORK**

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

**3.3 DREDGING**

- .1 Excavation of fill material behind the existing wharf structure will be considered dredging when excavation occurs below the water level.
- .2 Dredge areas to sound bedrock as indicated on contract drawings. Boreholes showing approximate bedrock elevations have been provided on drawings.
- .3 Remove infilling in dredge areas which occurs prior to acceptance by Departmental Representative.
- .4 Immediately notify Departmental Representative upon encountering object which might be classified as obstruction. By-pass object after clearly marking its location and continue Work.

**3.4 SOUNDING SURVEYS**

- .1 Contract drawings are based on soundings taken by Departmental Representative. Contract quantity shown on Unit Price Table are based on this survey.
- .2 Final pay quantity will be calculated on basis of pre-dredge survey and post dredging surveys carried out by Contractor in presence of Departmental Representative.

**3.5 DISPOSAL OF DREDGED MATERIALS**

- .1 Dispose of dredged material in manner approved by Departmental Representative.
- .2 Truck boxes to be tightly closed to prevent spillage of material during transit. Clean up spillage as directed and take necessary action to prevent reoccurrence.

**3.6 DISPOSAL OF DEBRIS**

- .1 Do not dispose of debris in open lakes or streams.
- .2 Dispose of debris in containment facility identified or at approved land disposal site.

**3.7 DREDGING IN VICINITY OF STRUCTURES**

- .1 Care shall be taken when dredging directly adjacent to masonry lock station walls. Contractor will be responsible for all repair costs associated with damage caused to any components of the lock structure.

**3.8 RE-DREDGING**

- .1 Re-dredge unsatisfactory work and verify depths with additional sounding to approval of Departmental Representative.

**3.9 SITE QUALITY CONTROL**

- .1 Site test and inspections: Co-operate with Departmental Representative on inspection of Work and provide assistance requested.
- .2 Non-conforming work:
  - .1 If, as result of incomplete Work, additional verification of depths by sounding becomes necessary, additional costs involved shall be paid by Contractor.

**3.10 CLEANING**

- .1 Progress Cleaning: Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

**END OF SECTION**

**Part 1 General**

**1.1 RELATED REQUIREMENTS**

- .1 Section 01 33 00- Submittal Procedures

**1.2 MEASUREMENT PROCEDURES**

- .1 Bollards: No measurement for payment for bollards as these will be paid by Lump Sum.

**1.3 REFERENCE STANDARDS**

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM A27/A27M-[05], Standard Specification for Steel Castings, Carbon, for General Application.
  - .2 ASTM A48/A148M-[05], Standard Specification for Steel Castings, High-Strength, for Structural Purposes.
- .2 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-1.61-[2004], Exterior and Interior Marine Alkyd Enamel.
  - .2 CAN/CGSB-1.212-[04], Chromate and Lead Free Marine Primer for Steel and Light Alloy Surfaces.
- .3 Canadian Standards Association (CSA International)
  - .1 CSA G40.20/G40.21-[2004], General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  - .2 CSA C22.1-[06], Canadian Electrical Code, Part 1 (20th Edition), Safety Standard for Electrical Installations.

**1.4 DESCRIPTION**

- .1 Design Requirements:
  - .1 All new bollards shall match the geometry and overall appearance of the existing bollards located on the concrete deck portions of the existing wharfs (not the timber deck wharf where small steel cleat bollards are currently used).

**1.5 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Provide submittals in accordance with Section 01 33 00- Submittal Procedures.
- .2 Product data: submit manufacturer's printed product literature, specifications and datasheet.
- .3 Submit shop drawings, indicating following items:
  - .1 Dimensions and direction of assemblies as installed on structures.
  - .2 Locations, sizes and installation tolerances of anchor bolts.

**Part 2 Products**

**2.1 MATERIALS**

- .1 Bollards: carbon steel casting.
  - .1 Type: To match existing bollards located on concrete deck portion of existing wharfs
- .2 Paint:
  - .1 Shop prime coat: to CAN/CGSB-1.212.
  - .2 Two finish coats: to CAN/CGSB-1.61, colour as directed by Departmental Representative.
- .3 Grout: shrinkage compensating non-metallic.
- .4 Anchorage:
  - .1 All anchors for bollards to be stainless steel

**Part 3 Execution**

**3.1 SETTING AND GROUTING**

- .1 Set mooring devices at locations and elevations as indicated.
  - .1 After tightening of anchor bolts, grout under base.
  - .2 Ensure that temperatures of foundation, air, base and grout are within range specified by grout manufacturer.
- .2 Do not grout until location of anchor bolts and bollards have been approved by Departmental Representative.

**3.2 CLEANING**

- .1 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**