

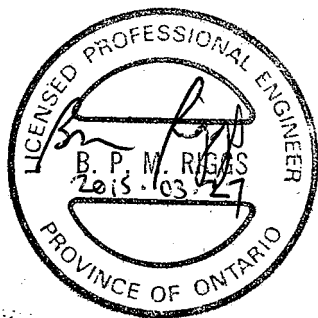
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Number R.050927.001		2015-03-27

Project Title HAMILTON, ONTARIO
RANDLE REEF SEDIMENT REMEDIATION PROJECT (STAGE 1)

Project Number R.050927.001

Project Date 2015-03-27

Design Engineer: Brian Riggs, P. Eng.



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October 30, 2012

APPENDIX G - Test Pile Program

PART 1 - GENERAL

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|-----------------------------|----|--|
| <u>1.1 SECTION INCLUDES</u> | .1 | This Section provides a general description and summary of the various Contract work elements intended to be informative and is not inclusive of the Contract's complete scope of work. This summary does not provide the technical detail for particular work activities, but describes the work as a whole, providing overall perspective to the separate tasks and their interrelationships. The complete Contract package provides the intent of the design, including proper execution and completion of the work as provided in all other sections and the attachment thereto. |
| | .2 | Title and description of Work. |
| | .3 | Contract Method. |
| | .4 | Work sequence. |
| | .5 | Contractor use of premises. |
| | .6 | Owner Furnished Items. |
| <u>1.2 PRECEDENCE</u> | .1 | Division 1 Sections take precedence over technical specification sections in other Divisions of this Project Manual. |
| <u>1.3 DEFINITIONS</u> | .1 | The Work Area is defined as the area within the Limits of Work as shown on the Drawings. |
| | .2 | Anchor wall: The interior Engineered Containment Facility (ECF) steel sheet pile wall. |
| | .3 | Face wall: The exterior ECF steel sheet pile wall. |
| <u>1.4 DESCRIPTION</u> | .1 | The Randle Reef Sediment Remediation Project Stage 1 is to construct an ECF for future use. |
| | .2 | Generally, without limiting the scope of the Contract, work under this Contract shall be performed at the designated locations in |
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- 1.4 DESCRIPTION (Cont'd)
- .2 (Cont'd)
Hamilton Harbour in Hamilton, Ontario, in the following general sequence:
- .1 Initial mobilization, including: pre-construction submittals and taking custody of early procurement materials.
 - .2 Construction of an in-water steel sheet pile ECF connected to the HPA Pier 15 East Face adjacent to the U.S. Steel (formerly Stelco) property.
 - .1 Installation of ECF interior and exterior walls
 - .2 Dredging of the space between ECF containment walls.
 - .3 Backfilling between ECF containment walls.
 - .4 Construction of ECF internal cell wall.
 - .3 Other associated work as shown on the Contract Drawings and described in these specifications.
- .3 This project was tendered in a different form in 2014 but was not awarded. Do not rely on any documents from that solicitation. There are numerous changes to the specifications including changes to layout, steel supply, interlock sealant, backfill methods, sequencing and other items.
- 1.5 CONTRACT METHOD
- .1 Construct Work under a combined price contract. All costs for work not specifically identified as a unit price item shall be included in the lump sum arrangement.
- 1.6 COST BREAKDOWN
- .1 Within 48 hours of bid acceptance submit a list of subcontractors and a detailed breakdown of costs associated with the lump sum arrangement.
 - .2 Items measured for payment are in metric (SI) units.
 - .3 Submit requests for payment in metric units corresponding with items on the Unit Price Table.
 - .4 Submit supporting documents in metric units. Perform all necessary conversions required.

- 1.7 WORK BY OTHERS .1 The Contractor shall for the purpose of the Ontario Occupational Health and Safety Act and Regulations for Construction Projects, and for the duration of the Work of the Contract:
- .1 Assume the role of Constructor in accordance with the Authority Having Jurisdictions.
 - .2 Agree, in the event of two or more Contractors working at the same time and space at the work site, without limiting the General Conditions GC3.7, to the Departmental Representative's order to:
 - .3 Assume, as the Constructor, the responsibility for the Departmental Representative's other Contractors.
- 1.8 WORK SEQUENCE .1 Work of this Contract shall commence in a logical sequence in accordance with the approved construction schedule. The work shall be scheduled to meet construction windows identified by the regulatory and approval agencies.
- .2 Be responsible for the sequencing and schedule of the work. Allow for work restrictions, including inclement weather, and associated downtime for all construction activities, as well as downtime due to compliance with navigational requirements.
 - .3 Maintain fire access/control.
 - .4 Access to the staging area will not be granted until 30 calendar days after award.
- 1.9 CONTRACTOR USE OF PREMISES .1 Contractor has unrestricted use of site until Substantial Performance except in the Staging Area, Area 1.
- .2 Remove all materials and equipment from Area 1, by September 1, 2017.
 - .3 No access to Area 1 will be granted after this time.
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1.10 OWNER
FURNISHED ITEMS

- .1 These specifications include material specifications for items that are furnished by the owner. The quantity of material identified in Appendix A is the full extent of materials supplied by the owner. It may not be sufficient to complete all of the requirements of this contract. Provide additional materials as required to fulfill contract requirements. Provision of these additional materials will not be measured separately for payment.
 - .2 Steel sheet piling for the face wall (Type 1 and Type 2), the ECF anchor wall (Type 3), the cross walls and overflow structure (both Type 4) and the internal cell wall (Type 5) will be furnished by the owner excluding delivery to the site.
 - .3 Type 1 and Type 2 steel sheet piling will be available at the steel sheet piling supplier's facility by November 6, 2015. The pickup location is Iuka, Mississippi.
 - .4 Type 3, Type 4 and Type 5 steel sheet piling will be available at the steel sheet piling supplier's facility by September 25, 2015. The pick-up location is Cambridge, Ontario.
 - .4 Roll Form Group will provide information to bidders regarding pickup details and some Customs information. The contact person is John Mitchell, email jmitchell@rollformgroup.com.
 - .5 Departmental Representative Responsibilities:
 - .1 Deliver suppliers' bill of materials to Contractor.
 - .2 Inspect deliveries jointly with Contractor at the steel sheet pile supplier's facility for the face wall steel sheet piling and the steel sheet pile supplier's facility for the anchor wall steel sheet piling.
 - .3 Arrange for and deliver manufacturer's warranties to Contractor.
 - .6 Contractor Responsibilities:
 - .1 Designate submittals and delivery date for each product in progress schedule.
 - .2 Review shop drawings, product data, samples, and other submittals. Submit to Departmental Representative notification of any observed discrepancies due to non-conformance with Contract Documents.
 - .3 Pick up the face wall and anchor wall steel sheet piling at the sheet pile suppliers' facilities.
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| 1.10 OWNER
FURNISHED ITEMS
(Cont'd) | .6 | Contractor Responsibilities:(Cont'd) |
| | .4 | Inspect deliveries jointly with Departmental Representative at at the steel sheet pile supplier's facility for the face wall and anchor wall steel sheet piling. Record shortages, and damaged or defective items. Assume responsibility for all materials not identified as damaged, defective and or incomplete supply. This responsibility transfers to the Contractor at the time of the joint inspection with the Departmental Representative. |
| | .5 | Handle products at site, including uncrating and storage. |
| | .6 | Protect products from damage, and from exposure to elements. |
| | .7 | Assemble, install, connect, adjust, and finish products. |
| | .8 | Repair or replace items damaged by Contractor or subcontractor on site. |
| | .7 | Schedule of Owner furnished items is presented in Appendix A. |

PART 2 - PRODUCTS

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| 2.1 NOT USED | .1 | Not used. |
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PART 3 - EXECUTION

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|--------------|----|-----------|
| 3.1 NOT USED | .1 | Not used. |
|--------------|----|-----------|

PART 1 - GENERAL

- 1.1 TAXES .1 Pay applicable Federal, Provincial and Municipal taxes.
- 1.2 EXAMINATION .1 Before submitting bid, examine existing site conditions and determine conditions affecting work, including potential inclement weather and lake conditions.
- .2 Obtain all information which may be necessary for proper execution of Contract.
- 1.3 EXISTING CONDITIONS .1 A compilation from previous site investigations regarding the geotechnical and chemical properties of the sediments and subsurface soils is bound with these specifications in Appendix B - Geotechnical Investigations and Appendix C - Sediment Chemistry. Sediment sample locations are shown on Drawing MA-1.4.
- .2 The results of a geophysical investigation regarding debris in the work area is bound with these specifications in Appendix D - Debris Survey.
- .3 Be familiarized with all available data and scope, and price accordingly.
- 1.4 SITE .1 Confine work, including temporary structures, plant, equipment and materials to established limits of site.
- .2 Locate temporary buildings, roads, walks, drainage facilities, services as directed and maintain in clean and orderly manner.
- .3 Contact HPA regarding availability and charges for use of on site railway line.
- .4 Access to Hamilton Harbour from Lake Ontario is through the Burlington Canal. There is a lift bridge at this canal that closes seasonally and access to the harbour from lake Ontario is blocked. Contact PWGSC for details on operating schedule.
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- 1.5 CONSTRUCTION & STORAGE AREA
- .1 The limits of the Construction and Storage Area will be designated by the Departmental Representative prior to commencement of work unless otherwise shown on the Drawings.
 - .2 Confine work including temporary structures, plant, equipment, and materials to established limits.
- 1.6 DOCUMENTS
- .1 Keep on site one copy of contract documents and reviewed shop drawings.
- 1.7 LAYOUT OF WORK
- .1 Vertical and horizontal benchmark are established from benchmark number 60-U-3327, located on the southeast abutment of the Burlington Ship Canal Lift Bridge.
 - .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 Mark floating equipment with lights in accordance with International Rules of Road and maintain radio watch on board.
 - .4 Place and maintain buoys, ranges, markers and light required to define work areas.
 - .5 Departmental Representative will meet with Contractor and his survey staff to identify the established horizontal control consisting of a baseline, buoys and coordinate system with reference control monuments and vertical control consisting of water level gauges, and benchmark to define the work areas.
 - .6 Maintain the established horizontal and vertical control and lay out the work from these established references. Be responsible for the accuracy of work relative to established references. Provide, at own expense, survey vessel, equipment and crew to set up and maintain control for location of dredge limits.
 - .7 Install and maintain water level gauges in vicinity of worksite in order that proper depth of dredging can be determined. Locate gauges so as to be clearly visible.
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- 1.7 LAYOUT OF WORK .8
(Cont'd)
- Establish and maintain additional on-land temporary targets, markers and buoys for location and definition of designated dredge area limits as required. Remove on completion of work.
- 1.8 CO-OPERATION & PROTECTION .1
- Execute work with minimum disturbance to normal use of site. Make arrangements with Departmental Representative to facilitate execution of work.
- .2 Maintain access and exits.
- .3 Provide necessary barriers, warning lights and signs. Protect work from damage. Replace damaged existing work with material and finish to match original.
- .4 Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Performance.
- .5 Install ECF steel sheet piling in a manner that avoids resuspension and redistribution of sediment.
- .6 Use equipment and procedures that prevent damage to ECF steel sheet pile walls.
- .7 Pre-construction Site Inspection: Jointly inspect all HPA properties with Departmental Representative. The inspection shall be completed:
- .1 Prior to the start of any Work.
- .2 Immediately after the Work in the area of the structure is completed.
- .8 Contractor and Departmental Representative shall review and verify condition of existing structures adjacent to the Contract Work Area prior to beginning work to ascertain existing conditions. Any damage documented as a result of the Contractor's activities will be assessed to the Contractor for repair at no additional cost to Departmental Representative.
- .9 Work shall be conducted in a manner to protect the stability of structures on or adjacent to the Contract Work Area. Repair and clean existing structures, roads or other facilities damaged or fouled by the work. Complete repairs and clean up at no additional expense to
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1.8 CO-OPERATION & .9
PROTECTION
(Cont'd)

(Cont'd)
Contract. Repairs made to damaged existing work to equal or better.

- .10 Be responsible for any damage sustained to the ECF steel sheet pile wall during dredging operations. Upon completion of dredging, Departmental Representative reserves the right, and shall be granted unfettered access, to perform structural inspections of the interior and exterior sheet pile walls to determine whether damage to the walls has occurred as a result of dredging operations. Repair or replace damaged components to the satisfaction of the Departmental Representative.
- .11 Non-HPA Owned Docks and Structures: Under no circumstances will the Contractor be allowed to dock, anchor or fender at privately owned structures or including but not limited to the U.S. Steel (Stelco) docks without the expressed written consent of the property owner and from the HPA. Damaged docks and private structures shall be repaired or replaced to pre-damaged condition as determined by the Departmental Representative, at the Contractor's sole expense.
- .12 Departmental Representative will have a small boat for its own purposes weighing nominally 1000kg. Lift boat in and out of cells between anchor wall and facewall as requested by the Departmental Representative. The frequency will be no more than an average of every second day.

1.9 PROJECT
MEETINGS

- .1 Departmental Representative will arrange project meetings, set times, record and distribute minutes. Attend these meetings.

1.10 OVERLOADING

- .1 No part of Work shall be loaded with load which will endanger its safety or will cause permanent deformation.
 - .2 Repair to original condition any part of work damaged due to overloading at no cost to Departmental Representative.
 - .3 The allowable load limit on the existing Pier 15 East adjacent to U.S. Steel (Stelco) is 20 kPa.
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| 1.11 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. |
| 1.12 MISPLACED MATERIAL AND EQUIPMENT | .1 | Notify Departmental Representative immediately of misplaced materials or equipment, including a description and location of the misplaced materials or equipment and when required, mark buoys until removed. If misplacement of equipment or materials reduces the available water depth in the harbour, notify Departmental Representative and HPA Harbour Master's Office. |
| | .2 | Submit report to the Departmental Representative within 72 hours documenting what happened, where, what was done to remove or mitigate the misplaced materials or equipment, and what was done to prevent misplacement of equipment or materials in the future. |
| | .3 | If any dredged material, backfill material, cap material, or other fill material is deposited elsewhere than in places designated or approved by the Departmental Representative, remove such misplaced material and deposit it where directed by the Departmental Representative at the Contractor's sole expense. Provide Environmental Protection as directed by Departmental Representative. |
| | .4 | Do not dump, throw overboard, sink, or misplace any material, plant machinery, or appliances. |
| | .5 | In the event of misplaced equipment or material which may cause environmental pollution as specified in Section 01 35 43, follow the spill response procedures documented in the Contractor's Environmental Protection Plan. Contractor activities resulting from negligence, as specified herein will be at the sole expense of the Contractor at no additional cost to Departmental Representative. During the progress of the Work, Contractor shall not deposit the |

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| 1.12 MISPLACED MATERIAL AND EQUIPMENT
(Cont'd) | .5 | (Cont'd)
following, including, but not limited to, pipe, wire cable, rope, scrap metal, pilings, timbers, or any other such type of rubbish or obstructive material in any areas other than at locations approved by the Departmental Representative. |
| | .6 | Make no claims for delays associated with recovery or documentation to correct misplaced equipment and material. |
| 1.13 INSPECTION AND TESTING | .1 | The Departmental Representative may employ an Inspection and Testing company to ensure work conforms with Contract Documents. |
| | .2 | When initial tests and inspections reveal work not to contract requirements, pay for tests and inspections required by Departmental Representative on corrected work. |
| 1.14 EQUIPMENT DEMOBILIZATION | .1 | Complete demobilization of equipment no later than four weeks after receiving Departmental Representative's written release from the work. Do not leave any equipment on site. |
| 1.15 FLOATING PLANT REQUIREMENTS | .1 | Floating plant:
.1 Dredges or other floating plants to be employed on this Work, to be of Canadian registry, make or manufacture, or, must receive certificate of qualification from Industry Canada, Marine Directorate and this certificate to accompany Bid submission.
.2 Requests for certification in format of attached questionnaire to be directed to Director, Defense and Marine, Directorate, Industry Canada, 235 Queen Street, 7th Floor, East Tower, Ottawa, Ontario, K1A 0H5, and to be received there not less than 14 days prior to bid closing. |
| 1.16 MARINE SAFETY | .1 | Install, maintain, and operate private Aids to Navigations, inspect private Aids to Navigation daily, and repair and replace as necessary. The private Aids to Navigation shall be arranged to facilitate safe passage of both project-related and non-project-related vessels. |
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- 1.16 MARINE SAFETY (Cont'd) .2 Provide two marine VHF radios on every floating work vessel that are both capable of clearly receiving and transmitting radio communications to a distance of up to 3 kilometres away from the Work Area. Keep both radios operational throughout the duration of the work and monitor both radios on a 24-hour basis. For communications with the Contractor's own floating equipment and personnel in the Work Area, the Contractor shall use the Contractor's own radio frequency. Conform to all procedures of the Canada Shipping Act, 2001.
- .3 Provide the private Aids to Navigation necessary to complete the Work. These may include, but are not limited to, unlighted buoys, lighted buoys, day beacons, and lights on structures.
- 1.17 NOTIFICATIONS .1 Notice to Shipping shall be submitted to the Canadian Coast Guard (CCG) and Hamilton Port Authority Harbour Master's Office.
- 1.18 INTERFERENCE TO NAVIGATION .1 Do not impede navigation during progress of work in accordance with the Collision Regulation with Canadian Modifications 1983.
- .2 Relocation of Navigation Aids: Do not remove, change the location of, obstruct, willfully damage, make fast to, or interfere with any aid to navigation except in accordance with approval of the HPA Harbour Master's Office and the CCG.
- .3 Mark floating equipment with lights in accordance with Regulations for the Prevention of Collisions.
- .4 Ascertain schedule of vessel movements in area affected by dredging operations including movement of vessels at adjacent wharves.
- .5 Arrange operations to minimize interference with on-going shipping and navigation activities within the Work Area.
- .6 Shipping and navigation to be accommodated at all times except within 50 m of the ECF.
- .7 Make no claim for delays resulting from the above.
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- 1.18 INTERFERENCE TO NAVIGATION
(Cont'd)
- .8 Departmental Representative will not be responsible for loss of time, equipment, material or any other cost related to interference with moored vessels in harbour or due to other Contractor's operations.
- .9 Keep Marine Communications and Traffic services, Watchkeeper at 1-800-265-0237, Central and Arctic Region, Canadian Coast Guard(CCG), Prescott, Ontario informed of work operations in order that necessary Notices to Shipping and Notices to Mariners will be issued. Make arrangements with CCG to relocate and replace buoys for execution of work. Advise nearest Coast Guard Base of any requirements to relocate channel markers/buoys within work area.
- 1.19 NAVIGATION COORDINATION
- .1 Submit Marine Traffic Coordination Plan to Departmental Representative for written approval at least 30 days prior to initiation of the work, submit in accordance to Section 01 33 00. The plan must address the project specifications and items listed below:
- .1 The plan shall identify a single point of contact, the Marine Traffic Coordinator (MTC), who is responsible for coordinating all on-water work and coordinating on-water traffic with other non-project vessels. Qualifications and previous project experience of the MTC shall be included.
- .2 Proposed methods for coordinating the movements of Contract vessels with the movements of other commercial and recreational traffic and with HPA operations.
- .3 Plan shall describe communications protocols for very high frequency (VHF) radios among the Contractor's fleet and other related procedures including marine channels the Contractor will use for communication throughout the duration of the Work. The plan shall include MTC experience and qualifications for this duty.
- .4 The approach for placing, operating, maintaining, and moving marker buoys and lights constituting private Aids to Navigation.
- .2 Coordinate pile driving operations, dredging and related work with ongoing navigation and shipping navigation in Hamilton Harbour. Ongoing navigation and shipping navigation will take precedence over pile driving operations, dredging and other related operations. Coordinate with HPA Harbour Master's Office on a daily basis for shipping activity and to
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1.19 NAVIGATION
COORDINATION
(Cont'd)

- .2 (Cont'd)
accommodate accordingly. Coordinate with U.S. Steel (Stelco) on a daily basis for pile driving operations, dredging operations, and movements to be conducted in vicinity of U.S. Steel's wall and docks. Any concerns relative to Contractor's interactions with U.S. Steel shall be discussed with Departmental Representative rather than U.S. Steel directly unless approved by Departmental Representative.
- .3 Provide control of project vessels and coordination of non-project vessels and equipment in the Work Area. This includes communication with the HPA Harbour Master and CCG for daily work planning and preparation to stay in compliance with requirements that HPA vessel traffic is not impacted.
- .4 The MTC shall be the Contractor's single point of contact for coordinating the Contractor's vessels, vessel movement of non-project vessels, the HPA Harbour Master's Office, the CCG, and Departmental Representative.
- .5 Ensure that vessel operators are appropriately trained and certified, and are following appropriate regulations for safe operations of vessels.
- .6 The MTC shall maintain communication with the HPA Harbour Master's Office such that the MTC will know when non-project vessels are moving within the Work Area.
- .7 Prepare NOTSHIP's and distribute to the HPA Harbour Master, CCG, and Departmental Representative as required. Provide all NOTSHIPS's throughout the duration of the Work.

1.20 LIGHTS

- .1 All operations performed during the non-daylight hours shall be properly illuminated to allow for the safe and complete performance and inspection of the work and shall comply with all provincial and federal regulations. This shall consist of providing, installing, operating, maintaining, moving, and removing portable light towers and equipment-mounted lighting fixtures for night time construction operations, for the duration of night time work on the Contract. Lights for buoys that could endanger or obstruct navigation shall also be provided each work night, 30 minutes before

1.20 LIGHTS .1 (Cont'd)
(Cont'd)
sunset and 30 minutes after sunrise and during periods of restricted visibility, lights shall be illuminated for floating plants, ranges, and markers. Immediately repair any non-functioning light and shall perform a check of all lights at the start of each work shift.

1.21 DATUM .1 Elevations and soundings shown on Drawings are expressed in metres relative to chart datum.
.2 Chart datum for Lake Ontario is 74.2 metres I.G.L.D (1985).
.3 Drawing 1501, Water Level Chart, for Lake Ontario is bound together with these specifications.

1.22 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/bs/ops.nsf/OPSHomepage>.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not used.

PART 1 - GENERAL

1.1 SECTION INCLUDES	.1	Connecting to existing services.
	.2	Special scheduling requirements.
1.2 EXISTING UTILITIES	.1	Establish location, protect and maintain existing buried, submerged or above ground utility lines.
	.2	Notify, Departmental Representative and utility companies of intended interruption of services and obtain required permission.
	.3	Where Work involves breaking into or connecting to existing services, give Departmental Representative 48 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions to a minimum. Carry out interruptions after normal working hours, preferably on weekends.
	.4	Provide for personnel pedestrian and vehicular traffic.
	.5	Notify the Departmental Representative if a utility-related object is discovered during dredging operations that was not identified on the Drawings.
	.6	In the event that damage is caused to a utility(ies), notify both the utility and Departmental Representative immediately and coordinate the repair of the utility(ies) with the appropriate utility company(ies). Repairs shall occur in coordination with the utility company(ies) and at the Contractor's expense. Departmental Representative may stop all work on the project until such time that repairs acceptable to the Departmental Representative are completed at the Contractor's sole expense.
1.3 ALLOWABLE WORK PERIOD	.1	Allowable working hours shall be in accordance with local by-laws, and Provincial, and Federal regulations governing hours of work.
	.2	The Contractor may apply to the local municipal agencies for variance from work hours and work

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|---------------------------------------|----|---|
| 1.3 ALLOWABLE WORK PERIOD
(Cont'd) | .2 | (Cont'd)
restrictions and regulations, subject to the approval of Departmental Representative. Costs associated with applying for and receiving the variance shall be the responsibility of the Contractor and at no expense to the Departmental Representative. |
| | .3 | There is no in-water fishery related timing restriction. |
| 1.4 ACCESS AND COORDINATION | .1 | Access to the Work Area and available staging areas are shown on the Drawings. |
| | .2 | All Contractor access to the Work Area shall either be via existing roads and driveways, temporary access roads to be constructed by the Contractor, via water by barge or other vessel or by rail. Be responsible for verifying that existing roads, bridges, and rail providing access to the Work Area are safe and suitable for use by the Contractor's equipment. Provide traffic controls to assure maximum 30 kilometres per hour speeds or posted speed limits on access roads and in work zones. |
| | .3 | Upland Work Area access will be via Sherman Avenue North to the staging area shown on the Drawings. Provide and maintain in-water access to dredges, scows, tugs, and other related equipment. Ascertain conditions that can affect the access such as climate, winds, currents, waves, depths, shoaling, and scouring tendencies. Access to Hamilton Harbour from the HPA's piers must be approved by the HPA and coordinated with the HPA and HPA Harbour Master's Office. |
| | .4 | All work performed in the harbour, including launching of labor, materials, and equipment, shall be completed in accordance with the HPA Harbour Master's Office requirements and all applicable CCG rules and regulations. |
| | .5 | Fully cooperate and coordinate with other contractors and parties having business within the Work Area and with local authorities and their personnel. Cooperate and coordinate the execution of this work in such a manner as to minimize the effect of these activities on others having business within the Work Area. Such cooperation by the Contractor at no additional cost to Departmental Representative |
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1.4 ACCESS AND
COORDINATION
(Cont'd)

- .5 (Cont'd)
is an obligation under the terms of this Contract.
- .6 Construction personnel shall park vehicles and construction equipment in areas where they will not impede HPA or HPA tenant operations, or the public and must occur in a specifically designated area approved by Departmental Representative.
- .7 Be responsible for moving stored products or equipment that interfere with the operations of HPA or HPA's tenants, at no additional cost to Departmental Representative.
- .8 Section 01 35 43 provides additional requirements related to containment and restrictions.

1.5 WORK AREAS

- .1 Limit work activities to assigned Contract Work Areas as shown on the Drawings and other areas only as necessary for approved physical access to the assigned Contract Work Areas.
- .2 Fueling of work equipment shall be conducted as specified in Section 01 35 43.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

- .1 Not Used.

PART 1 - GENERAL

1.1 CONSTRUCTION ORGANIZATION AND START-UP

- .1 Organization chart of Key Persons proposed for the project including job management and field management, and resumes for the proposed Key Persons.
- .2 Do not delegate, reassign, transfer or replace the Key Person to other duties or positions such that the Key Person is no longer available to provide the project with the Key Person's Services unless the Departmental Representative provides prior written consent to such delegation, re-assignment, transfer or replacement. In the event Contractor requests the Departmental Representative to consent to a delegation, re-assignment, transfer or other replacement of the Key Person, the Departmental Representative may interview and review the qualifications of the proposed substitute personnel before providing its consent or rejecting such replacement. Any such replacement shall have equivalent or better qualifications than the Key Person being replaced. Any replacement personnel approved by the Departmental Representative will thereafter be deemed a Key Person for purposes of this Contract.
- .3 Within 15 days after award of Contract, Departmental Representative will schedule a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
- .4 Departmental Representative, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.
- .5 Departmental Representative will establish time and location of meeting and notify parties concerned minimum 5 days before meeting.
- .6 Agenda to include following:
 - .1 Appointment of official representative of participants in Work.
 - .2 Schedule of Work, progress scheduling in accordance with Section 01 32 16.07.
 - .3 Schedule of submission of shop drawings, samples, colour chips in accordance with Section 01 33 00.

1.1 CONSTRUCTION ORGANIZATION AND START-UP (Cont'd)	.6	Agenda to include following:(Cont'd)
		.4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00.
		.5 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, and administrative requirements (GC).
		.6 Departmental Representative provided Products.
		.7 Record drawings in accordance with Section 01 78 00.
		.8 Take-over procedures, acceptance, and warranties in accordance with Section 01 78 00.
		.9 Monthly progress claims, administrative procedures, photographs, and holdbacks (GC).
		.10 Appointment of inspection and testing agencies or firms in accordance with Section 01 45 00.
		.11 Insurances and transcript of policies (GC).
	.7	Comply with Departmental Representative's allocation of mobilization areas of site; for field offices and sheds, access, traffic, and parking facilities.
	.8	During construction coordinate use of site and facilities through Departmental Representative's procedures for intra-project communications: Submittals, reports and records, schedules, coordination of drawings, recommendations, and resolution of ambiguities and conflicts.
	.9	Comply with instructions of Departmental Representative for use of temporary utilities and construction facilities.
	.10	Coordinate field engineering and layout work with Departmental Representative.
1.2 ON-SITE DOCUMENTS	.1	Maintain at job site, one copy each of the following:
		.1 Contract drawings.
		.2 Specifications.
		.3 Amendments.
		.4 Reviewed shop drawings.
		.5 Change orders.
		.6 Other modifications to Contract.
		.7 Field test reports.
		.8 Copy of approved Work schedule.
		.9 Manufacturers' installation and application instructions.

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|---------------------------------------|-----|---|
| 1.2 ON-SITE
DOCUMENTS
(Cont'd) | .1 | (Cont'd) |
| | .10 | Labour conditions and wage schedules. |
| | .11 | Material Safety Data Sheets. |
| | .12 | Labour and Material Bonds. |
| | .13 | All applicable Municipal Permits. |
| 1.3 SCHEDULES | .1 | Submit preliminary construction progress schedule in accordance with Section 01 33 00. |
| | .2 | After review, revise and resubmit schedule to comply with revised project schedule. |
| | .3 | During progress of Work revise and resubmit as directed by Departmental Representative. |
| 1.4 CONSTRUCTION
PROGRESS MEETINGS | .1 | During course of Work Departmental Representative will schedule progress meetings on a bi-weekly basis. |
| | .2 | Contractor, major subcontractors involved in Work and Departmental Representative are to be in attendance. |
| | .3 | The Departmental Representative will notify parties minimum 4 days prior to meetings. |
| | .4 | The Departmental Representative will record minutes of meetings and circulate to attending parties within 3 days after meeting. |
| | .5 | Agenda to include following: |
| | .1 | Review, approval of minutes of previous meeting. |
| | .2 | Review of Work progress since previous meeting. |
| | .3 | Field observations, problems, conflicts. |
| | .4 | Problems which impede construction schedule. |
| | .5 | Review of off-site fabrication delivery schedules. |
| | .6 | Corrective measures and procedures to regain projected schedule. |
| | .7 | Revision to construction schedule. |
| | .8 | Progress schedule, during succeeding work period. |
| | .9 | Review submittal schedules: expedite as required. |
| | .10 | Maintenance of quality standards. |
| | .11 | Review proposed changes for affect on construction schedule and on completion date. |
| | .12 | Other business. |
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- 1.5 SUBMITTALS
- .1 Make submittal to Departmental Representative for review in accordance with Section 01 33 00.
 - .2 Submit preliminary shop drawings, product data and samples in accordance with Section 01 33 00 for review for compliance with Contract Documents; for field dimensions and clearances, for relation to available space, and for relation to Work of other contracts. After review, revise and resubmit for transmittal to Departmental Representative.
 - .3 Submit requests for payment for review, and for transmittal to Departmental Representative.
 - .4 Submit requests for interpretation of Contract Documents, and obtain instructions through Departmental Representative.
 - .5 Deliver closeout submittals for review and preliminary inspections, for transmittal to Departmental Representative.

- 1.6 COORDINATION DRAWINGS
- .1 Provide information required by Departmental Representative for preparation of coordination drawings.
 - .2 Review and approve revised drawings for submittal to Departmental Representative.

- 1.7 CLOSEOUT PROCEDURES
- .1 Perform closeout procedures in accordance with Section 01 77 00.

PART 2 - PRODUCTS

- 2.1 NOT USED
- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

PART 1 - GENERAL

- 1.1 DEFINITIONS
- .1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.
 - .2 Bar Chart (GANTT Chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally Bar Chart should be derived from commercially available computerized project management system.
 - .3 Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.
 - .4 Construction Work Week: Monday to Friday, inclusive, will provide five day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.
 - .5 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.
 - .6 Master Plan: summary-level schedule that identifies major activities and key milestones.
 - .7 Milestone: significant event in project, usually completion of major deliverable.
 - .8 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.
 - .9 Project Planning, Monitoring and Control System: overall system operated by Departmental Representative to enable monitoring of project work in relation to established milestones.

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| <u>1.2 REQUIREMENTS</u> | .1 | Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration. |
| | .2 | Plan to complete Work in accordance with prescribed milestones and time frame. |
| | .3 | Limit activity durations to maximum of approximately 10 working days, to allow for progress reporting. |
| | .4 | Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Certificate of Substantial Performance and Certificate of Completion as defined times of completion are of essence of this contract. |
| <u>1.3 SUBMITTALS</u> | .1 | Provide submittals in accordance with Section 01 33 00. |
| | .2 | Submit to Departmental Representative within 10 working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress. |
| | .3 | Submit Project Schedule to Departmental Representative within 10 working days of receipt of acceptance of Master Plan. |
| <u>1.4 PROJECT MILESTONES</u> | .1 | Project milestones form interim targets for Project Schedule. |
| | .1 | Certificate of Substantial Performance within 24 months of Award of Contract date. |
| <u>1.5 MASTER PLAN</u> | .1 | Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT). |
| | .2 | Departmental Representative will review and return revised schedules within 5 working days. |
| | .3 | Revise impractical schedule and resubmit within 5 working days. |
| | .4 | Accepted revised schedule will become Master Plan and be used as baseline for updates. |
| | .5 | Cash flow for the period ending March 31, 2016 will be estimated on October 1, 2015. Provide an |
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1.5 MASTER PLAN (Cont'd)	.5	(Cont'd) updated schedule on that date. Take all reasonable measures to follow that schedule to assist with satisfying the project's fiscal year spending targets.
1.6 PROJECT SCHEDULE	.1	Develop detailed Project Schedule derived from Master Plan.
	.2	Ensure detailed Project Schedule includes as minimum milestone and activity types as follows: <ul style="list-style-type: none"> .1 Award. .2 Shop Drawings, Samples. .3 Permits. .4 Mobilization. .5 ECF Face Wall. .6 ECF Anchor Wall. .7 ECF Internal Cell Wall. .8 ECF Interior Wall Interlock Sealing. .9 ECF Wale. .10 Class B Sediment Dredging. .11 Class B Clay Dredging. .12 ECF Tie Rod. .13 ECF Monitoring Well, Steel Pipe. .14 ECF Clear Stone. .15 ECF Rock Fill. .16 Demobilization
1.7 PROJECT SCHEDULE REPORTING	.1	Update Project Schedule on monthly basis reflecting activity changes and completions, as well as activities in progress.
	.2	Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.
1.8 PROJECT MEETINGS	.1	Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.
	.2	Weather related delays with their remedial measures will be discussed and negotiated.

PWGSC Ontario Region	CONSTRUCTION PROGRESS	Sect 01 32 16.07
Randle Reef Stage 1	SCHEDULE - BAR (GANTT)	Page 4
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PART 2 - PRODUCTS

2.1 NOT USED .1 Not used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not used.

PART 1 - GENERAL

1.1 SECTION
INCLUDES

- .1 Shop drawings and product data.
- .2 Samples.
- .3 Certificates and transcripts.
- .4 Fees and permits.

1.2 ADMINISTRATIVE

- .1 Submit to Departmental Representative submittals listed for review. Submit with reasonable promptness and in orderly sequence so as to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.
 - .2 Work affected by submittal shall not proceed until review is complete.
 - .3 Present shop drawings, product data, Commissioning documentation, 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 shall be 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 coordinated.
 - .8 Contractor's responsibility for errors and omissions in submission is not relieved by
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| 1.2 ADMINISTRATIVE
(Cont'd) | .8 | (Cont'd)
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. |
| | .11 | Submit number of hard copies specified for each type and format of submittal and also submit in electronic format as pdf files. Forward files on USB compatible with PWGSC encryption requirements or through email or alternate electronic files sharing service as directed by Departmental Representative. |
| 1.3 AS-BUILT
RECORD DRAWINGS | .1 | As-Built Record Drawings shall be submitted at the completion of the Work in accordance with Section 01 78 00. |
| 1.4 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 | Prior to submission check and certify as correct, shop drawings and product data sheets. Issue to Departmental Representative each submission at least 14 days before dates reviewed submission will be needed. |
| | .3 | Allow 10 days for Departmental Representative's review of each submission. |
| | .4 | 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 coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications. |
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1.4 SHOP DRAWINGS
AND PRODUCT DATA
(Cont'd)

- .5 Where technical sections specify, shop drawings must bear the stamp and signature of a Registered Professional Engineer, registered in the Province of Ontario.
 - .6 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.
 - .7 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of any revisions other than those requested.
 - .8 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.
 - .9 Submissions shall 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.
 - .10 After Departmental Representative's review, distribute copies.
 - .11 Submit 3 prints and 1 electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.
 - .12 Submit 3 prints and 1 electronic copy of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.
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1.4 SHOP DRAWINGS
AND PRODUCT DATA
(Cont'd)

- .13 Submit 3 prints and 1 electronic copy of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
 - .2 Testing must have been within 3 years of date of contract award for project.
 - .14 Submit 3 prints and 1 electronic copy of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
 - .2 Certificates must be dated after award of project contract complete with project name.
 - .15 Submit 3 prints and 1 electronic copy of manufacturers instructions for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
 - .16 Submit 3 prints and 1 electronic copy of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
 - .17 Submit 3 prints and 1 electronic copy of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.
 - .18 Delete information not applicable to project.
 - .19 Supplement standard information to provide details applicable to project.
 - .20 Shop drawings of structural items shall bear the stamp of a Registered Professional Engineer.
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1.4 SHOP DRAWINGS
AND PRODUCT DATA
(Cont'd)

- .21 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.
- .22 Responsibility for errors, omissions or deviations from requirements of Contract Documents is not relieved by Departmental Representative's review of submittals.
- .23 The review of shop drawings by Public Works and Government Services Canada (PWGSC) is for sole purpose of ascertaining conformance with general concept. This review shall not mean that PWGSC 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, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of all sub-trades.

1.5 ADDITIONAL
DRAWINGS

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

1.6 SAMPLES

- .1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.
- .2 Deliver samples prepaid to Departmental Representative's site office.
- .3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.

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| 1.6 SAMPLES
(Cont'd) | .4 | 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. |
| | .5 | Make changes in samples which Departmental Representative may require, consistent with Contract Documents. |
| | .6 | Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified. |

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| 1.7 CERTIFICATES
AND TRANSCRIPTS | .1 | Immediately after award of Contract, submit WSIB - Workplace Safety and Insurance Board Experience Report. |
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| 1.8 FEES, PERMITS
AND CERTIFICATES | .1 | Provide authorities having jurisdiction with information requested. |
| | .2 | Pay fees and obtain certificates and permits required. |
| | .3 | Furnish certificates and permits. |

PART 2 - PRODUCTS

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|--------------|----|-----------|
| 2.1 NOT USED | .1 | Not Used. |
|--------------|----|-----------|

PART 3 - EXECUTION

- | | | |
|--------------|----|-----------|
| 3.1 NOT USED | .1 | Not Used. |
|--------------|----|-----------|

PART 1 - GENERAL

1.1 SECTION INCLUDES

- .1 Decontaminate equipment and reusable materials prior to their relocation within the Work Area (if relocating to a clean area), prior to handling clean materials, and prior to their departure from the Work Area.
- .2 Decontamination shall be conducted to minimize environmental impacts of all affected equipment and reusable materials in accordance with Section 01 35 43.
- .3 Decontamination of equipment transporting metals and PAH-containing materials to the Engineered Containment Facility (ECF) is not required during the Work except for the removal of visible sediment from the outside of barges, tugs and accessible surfaces of spud anchors.
- .4 This section does not include personnel decontamination. Personnel decontamination requirements and procedures will be included in the Health and Safety Plan in accordance with Section 01 35 28.

1.2 REFERENCES

- .1 Transportation of Dangerous Goods Act (1999) including SOR/2012-245, November 16, 2012.
- .2 Canadian Council of Ministers of the Environment (CCME) Documentation.
- .3 Provincial Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario, and the Provincial Water Quality Objectives.

1.3 DEFINITIONS

- .1 Decontaminate: to remove all visible sediment from equipment and reusable materials
 - .2 Equipment: all equipment used by the Contractor that have come in contact with metals and PAH-containing materials during the performance of Work under this Contract, including, but not limited to, vessels (including barges), dredging equipment, appurtenances, accessories, tools, and vehicles.
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| 1.3 DEFINITIONS
(Cont'd) | .3 | Metals and PAH-containing materials: sediments in and around the dredge subareas shown on the Drawings. |
| | .4 | Surfactant: water-soluble compound that is used to enhance the removal of materials and includes, but is not limited to, detergents, foaming agents, and emulsifiers. |
| | .5 | Work Area: the area within the Limits of Work as shown on the Drawings. |
| 1.4 MEASUREMENT
PROCEDURES | .1 | All work under this section will be measured as part of the lump sum arrangement. |
| 1.5 SUBMITTALS | .1 | Submittals: in accordance with Section 01 33 00. |
| | .2 | Pre-Construction: <ul style="list-style-type: none"> .1 Submit equipment decontamination procedures, products, and materials utilized in the process, and proposed methods to document decontamination of equipment. .2 Documentation shall be provided that vessels and equipment being mobilized to and from the Work Area have been properly decontaminated and do not contain metals, PAHs, or other contaminants. |
| | .3 | Post-Construction: <ul style="list-style-type: none"> .1 Document the decontamination status of equipment. .2 Submit an Equipment Decontamination Documentation Report to the Departmental Representative for approval 72 hours prior to the demobilization of any equipment that have contacted metals and PAH-containing materials. Certify that all equipment being demobilized from the Work Area have been decontaminated in accordance with this Section. Demobilization may not occur until the Equipment Decontamination Documentation Report is reviewed and accepted by the Departmental Representative. This includes both periodic demobilization during construction, and final demobilization from the project. |
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| 1.6 REGULATORY REQUIREMENTS | .1 | Comply with federal, provincial, and local anti-pollution laws, ordinances, codes, and regulations when disposing of waste materials, debris, and rubbish. |
| 1.7 MATERIAL AND EQUIPMENT DECONTAMINATION AREA | .1 | Provide, operate, and maintain suitable portable, high-pressure, low-volume decontamination wash units equipped with self-contained water storage tank and pressurizing system and capable of heating and maintaining wash waters to 80°C and providing nozzle pressure of 1,035 kpa. Where adhered coal tar is present after high pressure wash, decontaminate equipment with steam cleaners. |
| | .2 | Provide, operate, and maintain necessary equipment, pumps, and piping required to collect and contain equipment decontamination wastewater and sediment and transfer materials to approved storage facilities. |
| 1.8 VEHICULAR ACCESS AND PARKING | .1 | Maintenance and Use:
.1 Prevent contamination of access roads. Immediately scrape up debris or material on access roads which is suspected to be contaminated as determined by Departmental Representative; transport and place into designated area approved by Departmental Representative. Clean access roads at least once per shift.
.2 Departmental Representative may collect soil samples for chemical analyses from traveling surfaces of constructed and existing access routes prior to, during, and upon completion of Work. Excavate and dispose of soil contaminated by Contractor's activities at no additional cost to Departmental Representative. |
| 1.9 EQUIPMENT DECONTAMINATION | .1 | Decontaminate all equipment and reusable material that come in contact with contaminated sediments. |
| | .2 | Decontaminate equipment and reusable materials prior to their relocation within the Work Area (if relocating to a clean area) prior to handling clean (non-PAH- and metals-containing) materials and prior to their departure from the Work Area. |
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1.9 EQUIPMENT
DECONTAMINATION
(Cont'd)

- .3 Decontamination of equipment transporting potential metal and PAH-containing materials to the ECF is not required during sediment dredging except for removal of visible sediment from outside of barges and tugs. Decontamination of equipment in contact with dredged sediments is required at the end of each work day if equipment departs from Work Area.
 - .4 Perform equipment decontamination on material and equipment decontamination area.
 - .5 At minimum, perform following steps during equipment decontamination: mechanically remove packed dirt, grit, and debris by scraping and brushing without using steam or high-pressure water to reduce amount of water needed and to reduce amount of contaminated rinsate generated. Use high-pressure, low-volume, hot water or steam. Pay particular attention to tire treads, equipment tracks, springs, joints, sprockets, and undercarriages. Air dry equipment in Clean Zone before removing from site or travelling on clean areas. Perform assessment as directed by Departmental Representative to determine effectiveness of decontamination.
 - .6 Do not use surfactants to decontaminate equipment in the waterway. Equipment decontamination that must be performed in-water shall be conducted using high-pressure washing or an alternate method approved by the Departmental Representative. Water shall be collected and treated prior to discharge.
 - .7 Do not clean equipment in locations where debris can gain access to sewers, watercourses or aquifers.
 - .8 Equipment engaged in handling of contaminated materials and/or debris, that will be departing from the Work Area for temporary storage or moorage/anchorage outside of the Work Area, shall be at a minimum, visibly free from contaminated material.
 - .9 Maintain inspection record on site which includes: equipment descriptions with identification numbers or license plates; time and date entering decontamination facility; time and date exiting decontamination facility; and name of inspector with comment stating that decontamination was performed and completed.
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1.9 EQUIPMENT
DECONTAMINATION
(Cont'd)

- .10 Each piece of equipment will be inspected by Departmental Representative after decontamination and prior to removal from site and/or travel on clean areas or entering public roadways. Departmental Representative will have right to require additional decontamination to be completed if deemed necessary.
- .11 Take appropriate measures necessary to minimize drift of mist and spray during decontamination including provision of wind screens.
- .12 Decontamination water, solids, and other materials generated during equipment decontamination must be contained and not released to Hamilton Harbour or contact native materials and existing facilities, and must be managed in accordance with this section and Section 01 74 20.
- .13 Collect decontamination wastewaters and sediments which accumulate on material and equipment decontamination area. Treat and dispose of water in accordance with the requirements specified herein.
- .14 Transfer sediments to ECF.
- .15 Personnel engaged in decontamination activities shall utilize Personal Protective Equipment (PPE), as appropriate, and in accordance with the Contractor's Health and Safety Plan (HASP). Contaminated PPE shall be bagged, placed in a designated container, and managed in accordance with Section 01 74 20.
- .16 Have on hand sufficient pumping equipment, of adequate pumping capacity and associated machinery and piping in good working condition for ordinary emergencies, including power outage, and competent workers for operation of pumping equipment. Maintain piping and connections in good condition and leak-free.

1.10 WATER CONTROL

- .1 Do not discharge decontaminated water, or surface water runoff, or groundwater which may have come in contact with potentially contaminated material, off site or to municipal sewers.
- .2 Prevent precipitation from infiltrating or from directly running off stockpiled waste materials. Cover stockpiled waste materials with an

1.10 WATER CONTROL (Cont'd) .2 (Cont'd)
impermeable liner during periods of work
stoppage including at end of each working day
and as directed by Departmental Representative.

.3 Contain water from stockpiled waste materials.
Transfer, treat and dispose in accordance with
requirements specified in this section.

.4 Disposal of contaminated sediments and
non-contaminated sediments into the ECF is
permitted.

1.11 FINAL DECONTAMINATION .1 Perform final decontamination of construction
facilities, equipment, and materials which may
have come in contact with potentially
contaminated materials prior to removal from
site.

.2 Perform decontamination as specified to
satisfaction of Departmental Representative.
Departmental Representative will direct
Contractor to perform additional decontamination
if required.

1.12 WATER TREATMENT FACILITY .1 Water treatment is not part of the defined work
in this contract except for equipment
decontamination . Specifications on water
treatment and discharge criteria are presented
for equipment decontamination or should a change
order be issued to treat water that comes in
contact with contaminated sediment.

.2 Design and Operating Criteria: design water
filtering plant capable of filtering water
generated from dewatering excavations and work
areas to meet discharge requirements of
specified in this section, capable of removing
oil, suspended solids, particulates, and filter
water through 5-micron particulate filter prior
to discharge.

.3 Ensure that discharges from site are in
compliance with applicable permit requirements
and limitations.

.4 Provide piping to transfer liquid/solid
mixtures generated by dewatering operations
which require water filtering to water filtering
plant.

1.12 WATER TREATMENT FACILITY (Cont'd)	.5	Design water filtering operations capable of receiving liquid/solid mixtures and not causing delay to dewatering operations.
1.13 WATER TREATMENT AND CRITERIA	.1	<p>The water treatment system shall not exceed the following effluent discharge requirements, which are based on PWQOs, CWQOs, and background water quality, as required for discharge to Hamilton Harbour:</p> <p>.1 pH discharge limit: 6.0 to 9.0.</p> <p>.2 Total suspended solids (TSS) discharge limit: 15 mg/L.</p> <p>.3 Polynuclear aromatic hydrocarbons (PAHs) discharge limits are follows:</p> <p>.1 Acenaphthene: 5.8 µg/L.</p> <p>.2 Acenaphthylene: not available.</p> <p>.3 Anthracene: 0.05 µg/L.</p> <p>.4 Benzo (a) anthracene: 0.05 µg/L.</p> <p>.5 Benzo (a) pyrene: 0.015 µg/L.</p> <p>.6 Benzo (b) fluoranthene: not available.</p> <p>.7 Benzo (ghi) perylene: 0.1 µg/L.</p> <p>.8 Benzo (k) fluoranthene: 0.05 µg/L.</p> <p>.9 Chrysene: 0.05 µg/L.</p> <p>.10 Dibenzo (a,h) anthracene: 0.1 µg/L.</p> <p>.11 Fluoranthene: 0.05 µg/L.</p> <p>.12 Fluorene: 0.2 µg/L.</p> <p>.13 Indeno (1,2,3-cd) pyrene: not available.</p> <p>.14 Naphthalene: 7 µg/L.</p> <p>.15 Phenanthrene: 0.05 µg/L.</p> <p>.16 Pyrene: 0.05 µg/L.</p> <p>.17 Total PAHs: not available.</p> <p>.18 If laboratory reporting limits are greater than the discharge limits for a PAH, then the discharge limit shall be non-detect at lowest attainable reporting limits for that PAH.</p> <p>.4 Total metals discharge limits are as follows:</p> <p>.1 Aluminum: 75 µg/L.</p> <p>.2 Arsenic: 100 µg/L.</p> <p>.3 Beryllium: 1,100 µg/L.</p> <p>.4 Boron: 200 µg/L.</p> <p>.5 Cadmium: 0.5 µg/L.</p> <p>.6 Chromium: 8.9 µg/L.</p> <p>.7 Cobalt: 0.9 µg/L.</p> <p>.8 Copper: 5 µg/L.</p> <p>.9 Iron: 300 µg/L.</p> <p>.10 Lead: 25 µg/L.</p> <p>.11 Molybdenum: 40 µg/L.</p> <p>.12 Nickel: 25 µg/L.</p> <p>.13 Silver: 0.1 µg/L.</p>

1.13 WATER TREATMENT AND CRITERIA (Cont'd)	.1 (Cont'd) .4 (Cont'd) .14 Vanadium: 6 µg/L. .15 Zinc: 30 µg/L.
	.2 Compliance with discharge limits shall be at the pipe that discharges treated water to the harbour.

1.14 RECORD KEEPING	.1 Maintain adequate records to support information provided to Departmental Representative regarding exception reports, annual reports, and biennial reports.
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PART 2 - PRODUCTS

2.1 NOT USED	.1 Not Used.
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PART 3 - EXECUTION

3.1 WASTE MANAGEMENT AND DISPOSAL	.1 Solid wastes: .1 Dispose of all waste generated by Contractor and provide for containers and offsite disposal of solid wastes. Locate containers in an area approved by the Departmental Representative. Provide sufficient suitable refuse containers throughout the Work Area to receive and control construction wastes. Keep containers closed to prevent contents from blowing and littering site. Transport solid waste offsite and dispose of all waste materials and debris in a safe and legal manner at an offsite facility approved by governing authorities. Verify that the selected transporters and disposal facilities have the necessary permits and licenses to operate. .2 Segregation measures shall be employed so that no hazardous or toxic waste shall become co-mingled with the solid waste. .3 Debris removed from dredging areas shall be disposed of in accordance with Section 35 20 34. .4 Do not dispose of waste, volatile materials or debris into waterways, storm or sanitary sewers and shall not allow deleterious substances to enter the waterway.
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3.1 WASTE
MANAGEMENT AND
DISPOSAL
(Cont'd)

- .1 Solid wastes:(Cont'd)
 - .5 Work performed in and around waterways shall comply with laws and regulations having jurisdiction.
 - .2 Chemical and chemical wastes:
 - .1 Provide containers and offsite disposal of chemicals and chemical wastes generated by Contractor. Waste storage shall be in compliance with applicable regulations and shall be stored in an area approved by the Departmental Representative. Chemicals shall be dispensed over paved or lined areas within the staging area and shall be performed in a prudent manner that minimizes risk of spillage to the ground or water. Weekly inspections of dispensing areas to identify leakage and initiate corrective action shall be performed and documented in accordance with the Environmental Protection Plan. If leaks or spills are identified, then a description of the spill or leak and the corrective action taken shall also be reported in the daily report.
 - .2 Chemical waste shall be collected in corrosion-resistant, compatible containers. Collection drums shall be monitored and removed to a staging or storage area when contents are within 15 cm of the top. Wastes shall be classified, managed, stored, labeled, and disposed of in accordance with Local, Provincial, and Federal laws and regulations.
 - .3 Contractor-generated hazardous wastes/excess hazardous materials:
 - .1 During construction and operation activities, provide for containers and offsite disposal of contractor-generated hazardous wastes/excess hazardous materials. Hazardous wastes and materials are as defined by applicable Federal, Provincial, and local regulations. None of these materials shall be placed in the ECF.
 - .2 Take sufficient measures to prevent spillage of hazardous and toxic materials during dispensing. Segregate hazardous waste from other materials and wastes; protect it from the weather by placing it in a safe covered location; and take precautionary measures such as providing secondary containment, berming, and other appropriate measures against accidental spillage in accordance with Section 01 35 43.
 - .3 Be responsible for storage, describing, packaging, labeling, marking, and placarding of hazardous waste and hazardous material in
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3.1 WASTE
MANAGEMENT AND
DISPOSAL
(Cont'd)

- .3 (Cont'd)
 - .3 (Cont'd)
accordance with Federal, Provincial, and local laws and regulations.
 - .4 Hazardous materials shall be removed from the site and handled in accordance with MOE Regulations current at the time of construction, and shall be transported and disposed of in a safe, legal manner to minimize danger at the site and during disposal.
 - .5 Comply with the governing Ministry of Labour Regulations respecting protection of works, remedial handling and disposition of the Designated Substances encountered.
 - .6 In the event that the Departmental Representative has concerns with any proposed disposal location, further information shall be provided until Departmental Representative's concerns have been addressed or Departmental Representative may require use of an alternate disposal location.
 - .7 Do not empty lubricants, herbicides, pesticides, fungicides or other chemicals into sewers or watercourses.
- .4 Wastewater disposal during construction:
 - .1 Wastewater from construction activities, such as onsite material processing, concrete curing, foundation and concrete clean-up, water pumped or drained from excavations, water pumped or drained from any sewers, drains, or water courses, water used in concrete trucks, forms, and similar uses shall not be allowed to enter water-ways or to be discharged prior to treatment. If it is not treated, dispose of the construction-related wastewater offsite in accordance with applicable regulations.
 - .2 Discharge of stormwater shall be in accordance with Section 31 25 00.
 - .3 Water generated from the flushing of lines after testing and other start-up activities shall be treated and discharged or disposed of in accordance with regulations.
 - .4 Wastewater from operating activities, such as wash down water and other sources must be disposed of offsite.

PART 1 - GENERAL

- 1.1 REFERENCES
- .1 Canadian Standards Association (CSA): Canada
 - .1 CSA-S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.
 - .2 CAN/CSA-Z275.4-04(R2008), Competency Standard for Diving Operations.
 - .2 National Building Code 2010 (NBC):
 - .1 NBC 2010, Division B, Part 8 Safety Measures at Construction and Demolition Sites.
 - .3 Province of Ontario:
 - .1 Occupational Health and Safety Act Revised Statutes of Ontario 1990, Chapter O.1 as amended, and Regulations for Construction Projects, O. Reg. 213/91 as amended.
 - .2 Workplace Safety and Insurance Act, 1997.
 - .3 Municipal statutes and authorities.
- 1.2 SUBMITTALS
- .1 Make submittals in accordance with Section 01 33 00.
 - .2 Submit site-specific Health and Safety Plan, within 7 days after date of Notice to Proceed and prior to mobilization to site. Address following items:
 - .3 Safety and health risk or hazard analysis for each site task and operation found in work plan.
 - .4 Develop checklist for items to be inspected on a daily basis. Document actions taken.
 - .5 Personnel training requirements including:
 - .1 Names of personnel and alternates responsible for site safety and health, hazards present on site, and use of personal protective equipment.
 - .2 Work practices by which personnel can minimize risks from hazards, safe use of engineering controls and equipment on site, medical surveillance requirements, including recognition of symptoms and signs which might indicate overexposure to hazards, and elements of site-specific Health and Safety Plan.
 - .6 Personal protective equipment (PPE) program addressing:
 - .1 Donning and doffing procedures.
 - .2 PPE selection based upon site hazards.
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1.2 SUBMITTALS
(Cont'd)

- .6 (Cont'd)
- .3 PPE use and limitations of equipment.
 - .4 Work mission duration, PPE maintenance and storage.
 - .5 PPE decontamination and disposal.
 - .6 PPE inspection procedures prior to, during, and after use.
 - .7 Evaluation of effectiveness of PPE program, and limitations during temperature extremes, and other appropriate medical considerations.
 - .8 Site control measures employed at site including site map, site work zones, use of 'buddy system', site communications including site security, alerting means for emergencies, standard operating procedures or safe work practices, and identification of nearest medical assistance.
 - .9 Decontamination procedures for both personnel and equipment.
 - .10 Emergency response requirements addressing: pre-emergency planning, personnel roles, lines of authority and communication, emergency recognition and prevention, safe distances and places of refuge, site security and control, evacuation routes and procedures, decontamination procedures not covered under decontamination section, emergency medical treatment and first aid, emergency alerting and response procedures, critique of response and follow-up, PPE and emergency equipment, site topography, layout, prevailing weather conditions, and procedures for reporting incidents to local, provincial, or federal agencies.
 - .11 Written respiratory protection program for project activities.
 - .12 Procedures dealing with heat and/or cold stress.
- .7 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 10 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 5 days after receipt of comments from Departmental Representative.
- .8 Departmental Representatives review of Contractor's final Health and Safety Plan shall not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.
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1.2 SUBMITTALS (Cont'd)

- .9 Respirator Fit Testing: submit proof of respirator fit testing for site personnel, within 21 days after date of Notice to Proceed and prior to mobilization to site.
- .10 Submit records of Contractor's Health and Safety meetings when requested.
- .11 Submit 2 copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative, weekly.
- .12 Submit copies of orders, directions or reports issued by health and safety inspectors of the authorities having jurisdiction.
- .13 Submit copies of incident and accident reports.
- .14 Submit Material Safety Data Sheets (MSDS).
- .15 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.
- .16 Off-site Contingency and Emergency Response Plan:
 - .1 Prior to commencing Work involving handling of hazardous materials, develop off-site Contingency and Emergency Response Plan.
 - .2 Plan must provide immediate response to serious site occurrence such as explosion, fire, or migration of significant quantities of toxic or hazardous material from site.

1.3 REGULATORY REQUIREMENTS

- .1 Comply with Acts and regulations of the Province of Ontario.
- .2 Comply with specified standards and regulations to ensure safe operations at site.
- .3 In event of conflict between any provisions of specified standards and regulations, the most stringent provision governs.

1.4 SITE CONDITIONS

- .1 Work at site will involve contact with:
 - .1 Sediment contaminated (primarily) with Polynuclear Aromatic Hydrocarbons.
 - .2 Silica in concrete.
 - .3 Work at or near water.
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1.5 GENERAL REQUIREMENTS

- .1 Develop written site-specific Health and Safety Plan prior to commencing site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.
- .2 Ensure Health and Safety guidelines provide for safe and minimal risk working environment for site personnel and minimize impact of activities involving contact with hazardous materials or hazardous wastes on general public and surrounding environment.
- .3 Relief from or substitution for portion or provision of minimum Health and Safety Guidelines specified or reviewed site-specific Health and Safety Plan must submitted to Departmental Representative in writing. Departmental Representative will respond in writing, either accepting or requesting improvements.

1.6 RESPONSIBILITY

- .1 Be responsible for safety of persons and property on site and for protection of persons off site and environment to extent that they may be affected by conduct of Work.
- .2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.
- .3 Where applicable the Contractor shall be designated "Constructor", as defined by Ontario Act.

1.7 HAZARD COMMUNICATION REQUIREMENTS

- .1 Comply with Workplace Hazardous Materials Information System (WHMIS) Regulation, R.R.O.
 - .2 Provide Departmental Representative with Material Safety Data Sheets (MSDS) and documentation on any "hazardous" chemical that Contractor or Contractor Representatives plan to bring onto site.
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| 1.8 WORK STOPPAGE | .1 | Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work. |
| | .2 | Assign responsibility and obligation to Health and Safety Officer where required to stop or start Work when, at Health and Safety Officer's discretion, it is necessary or advisable for reasons of health or safety. Departmental Representative may also stop Work for health and safety considerations. |
| 1.9 UNFORESEEN HAZARDS | .1 | Should unforeseen or peculiar safety-related factor, hazard, or condition become evident during performance of Work, stop work and immediately advise Departmental Representative verbally and in writing. |
| | .2 | Follow procedures in place for Employees Right to Refuse Work as specified in the Act for the Province of Ontario. |
| 1.10 HEALTH AND SAFETY OFFICER AND REGISTERED OCCUPATIONAL HYGIENIST / CERTIFIED INDUSTRIAL HYGIENIST | .1 | Employ and assign to Work competent and authorized representative as Health and Safety Adviser. Health and Safety Adviser must: <ul style="list-style-type: none"> .1 Have minimum 2 years' site-related working experience specific to activities associated with air emissions. .2 Have basic working knowledge of specified occupational safety and health regulations. .3 Be responsible for completing Health and Safety Training Session. .4 Be responsible for implementing, enforcing daily and monitoring site-specific Health and Safety Plan. .5 Be on site during execution of Work. |
| 1.11 PERSONNEL HEALTH, SAFETY, AND HYGIENE | .1 | Training: ensure personnel entering site are trained in accordance with specified personnel training requirements. Training session must be completed by Health and Safety Officer. |
| | .2 | Levels of Protection: establish levels of protection for each Work area based on planned activity and location of activity. Minimum PPE required for each level of protection as follows: |
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1.11 PERSONNEL
HEALTH, SAFETY, AND
HYGIENE
(Cont'd)

- .2 Levels of Protection:(Cont'd)
 - .1 Level D Modified:
 - .1 Head, Eye, Ear Protection: hard hat, goggles, safety glasses with sideshields, ear muffs or plugs.
 - .2 Foot Protection: Safety shoes.
 - .3 Clothing: High visibility vest.
 - .4 Marine Work: personal flotation devise(PFD).
 - .5 Work on Elevated Structures: Fall protection.
- .3 Develop protective equipment usage procedures and ensure that procedures are strictly followed by site personnel; include following procedures as minimum:
 - .1 Ensure prescription eyeglasses worn are safety glasses and do not permit contact lenses on site within work zones.
 - .2 Ensure footwear is steel-toed safety shoes or boots and is covered by rubber over shoes when entering or working in potentially contaminated work areas.
 - .3 Dispose of or decontaminate PPE worn on site at end of each workday.
 - .4 Decontaminate reusable PPE before reissuing.
 - .5 Ensure site personnel have passed respirator fit test prior to entering potentially contaminated work areas.
 - .6 Ensure facial hair does not interfere with proper respirator fit.
- .4 Respiratory Protection:
 - .1 Provide site personnel with extensive training in usage and limitations of, and qualitative fit testing for, air purifying and supplied-air respirators in accordance with specified regulations.
 - .2 Develop, implement, and maintain respirator program.
 - .3 Monitor, evaluate, and provide respiratory protection for site personnel.
 - .4 Ensure levels of protection as listed have been chosen consistent with site-specific potential airborne hazards associated with major contaminants identified on site.
 - .5 Ensure appropriate respiratory protection during work activities. As minimum requirement, ensure that persons entering potentially contaminated work areas are supplied with and use appropriate respiratory protection.
 - .6 Assess ability for site personnel to wear respiratory protection.

1.11 PERSONNEL HEALTH, SAFETY, AND HYGIENE (Cont'd)	.4	Respiratory Protection:(Cont'd) .7 Ensure site personnel are able to pass respirator fit test prior to entering potentially contaminated work areas.
	.5	Heat Stress/Cold Stress: implement heat stress and or cold stress monitoring program as applicable and include in site-specific Health and Safety Plan.
	.6	Personnel Hygiene and Personnel Decontamination Procedures. Provide minimum as follows: .1 Suitable containers for storage and disposal of used disposable PPE. .2 Potable water and suitable sanitation facility.
	.7	Emergency and First-Aid Equipment: .1 Locate and maintain emergency and first-aid equipment in appropriate location on site including first-aid kit to accommodate number of site personnel; portable emergency eye wash; two 9 kg ABC type dry chemical fire extinguishers.
	.8	Site Communications: .1 Post emergency numbers near site telephones. .2 Ensure personnel use of "buddy" system and develop hand signal system appropriate for site activities. .3 Provide employee alarm system to notify employees of site emergency situations or to stop Work activities if necessary. .4 Furnish selected personnel with 2-way radios. .5 Safety Meetings: conduct mandatory daily safety meetings for personnel, and additionally as required by special or work-related conditions; include refresher training for existing equipment and protocols, review ongoing safety issues and protocols, and examine new site conditions as encountered. Hold additional safety meetings on as-needed basis.
1.12 CONTINGENCY AND EMERGENCY RESPONSE	.1	Meet specified requirements.
	.2	Arrange and attend co-ordination meeting held with appropriate authorities including City, Fire, Hospital, Provincial and City Police, Ministry of Transportation, Ministry of Health, and Community Emergency Co-ordinator; meeting will identify off-site Emergency Response

1.12 CONTINGENCY AND EMERGENCY RESPONSE (Cont'd)	.2	(Cont'd) Co-ordinator through whom information and co-ordination will occur in event of incident.
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1.13 POSTING OF DOCUMENTS	.1	Ensure applicable items, articles, notices and orders are posted in a conspicuous location on site in accordance with Acts and Regulations of Province of Ontario and in consultation with Departmental Representative. .1 Contractor's Safety Policy. .2 Contractor's name. .3 Notice of Project. .4 Name, trade, and employer of Health and Safety Representative or Joint Health and Safety Committee members (if applicable). .5 Ministry of Labour orders and reports. .6 Occupational Health and Safety Act and Regulations for Contructution Projects for Province of Ontario. .7 Address and phone number of nearest Ministry of Labour office. .8 Material Safety Data Sheets. .9 Written Emergency Response Plan. .10 Site Specific Safety Plan. .11 Valid certificate of first aider on duty. .12 WSIB 'In Case of Injury at Work' poster. .13 Location of toilet and clean-up facilities. .14 Training certificates. .15 Site log book including sign-in and sign-out.
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1.14 COMPLIANCE REQUIREMENTS	.1	Comply with Ontario Occupational Health and Safety Act, R.S.O. 1990, chapter 0.1 as amended.
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PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

PART 1 - GENERAL

- 1.1 REFERENCES
- .1 Provincial Water Quality Objectives (PWQOs).
 - .2 Canadian Water Quality Guidelines (CWQGs).
 - .3 Ambient Air Quality Criteria (AAQC).
 - .4 International Organization for Standardization (ISO) 7027 Methodology.
- 1.2 DEFINITIONS
- .1 Sheen: sheen occurs when visible droplets of non-aqueous phase liquid (NAPL) form a visibly separate layer or film on the surface of the water.
 - .2 Background turbidity: refers to the turbidity measured in the harbour at a location sufficiently distant from the in-water work as determined by the Departmental Representative. The background turbidity measurements is to be taken at the same time as the in-work work.
- 1.3 SUBMITTALS
- .1 Submittals in accordance with Section 01 33 00.
 - .2 Address topics at level of detail commensurate with environmental issue and required construction tasks.
 - .3 Submit an Environmental Protection Plan (EPP) to the Departmental Representative 30 calendar days prior to the start of work. The EPP shall set forth the procedures by which the Contractor shall establish and maintain quality control for environmental protection of all items set forth herein. If unsatisfactory, the EPP will be returned for resubmission. No physical work at the Work Area shall be started until this Plan has been approved or specific authorization is obtained to start a phase of the work. The EPP shall contain separate sections addressing spill and contamination prevention, containment, response and cleanup, erosion and turbidity control (water intake), noise control, air pollution and dust control, and water quality control. At a minimum, the spill and contamination prevention and the spill
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1.3 SUBMITTALS
(Cont'd)

- .3 (Cont'd)
containment, response, and cleanup sections shall include the following:
- .1 Environmental protection plan includes:
- .1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.
- .2 Names and qualifications of persons responsible for manifesting hazardous waste to be removed from site.
- .3 Names and qualifications of persons responsible for training site personnel.
- .4 Descriptions of environmental protection personnel training program.
- .2 A Spill and Contamination Prevention section shall include the following:
- .1 List of potentially hazardous products, such as petroleum and toxic materials within the Work Area and corresponding provisions to be taken to prevent accidental introduction of such materials into any waterway, the air, or the ground.
- .2 Material safety data sheets (MSDSs) for each of the items on the list of potentially hazardous products.
- .3 Plans for preventing polluted runoff from the Work Area from entering local water bodies or impacting air quality.
- .3 A Spill and Contamination Response and Cleanup section shall include the procedures, instructions, and reports to be used in the event that a spill occurs during the execution of the work. At a minimum, this section shall include:
- .1 The name of the individual on each shift who shall be responsible for implementing and supervising the containment and cleanup.
- .2 A list of materials and equipment to be immediately available. For all work in or adjacent to water, a 61-metre-long, minimum containment boom, and a cleanup kit, consisting of absorptive pads and other materials necessary to remove and dispose of the spill material safely, shall be available at the job site. Materials and equipment for other cleanup work shall be tailored to the potential hazards associated with the work in accordance with Section 01 35 28.
- .3 The names and locations of suppliers of containment materials and names and locations of additional fuel oil recovery, cleanup, restoration, and disposal

1.3 SUBMITTALS
(Cont'd)

.3 (Cont'd)
.3 (Cont'd)

equipment available due to an unforeseen spill emergency.

.4 The methods and procedures to be used for expeditious cleanup.

.5 The name of the individual on each shift who shall report any spills and who shall follow up with complete documentation if different from that specified in part a, above.

.6 A list of agencies, individuals and telephone numbers of agencies to be contacted on a 24-hour basis in the event of a spill.

.4 Waste water management plan that identifies methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water and decontamination water.

.5 Prepare a Fish Salvage Plan, submitted as an appendix to the EPP, to detail the fish protection strategy, including details and methods that will be employed to minimize the potential for fish to be trapped inside the ECF, consistent with the Fish Protection subsection of this Section. The fish salvage plan will apply to fish species of concern, according to the Department of Fisheries and Oceans (DFO). This plan shall be submitted to DFO for review and approval 45 days prior to initiation of closure of the ECF sheet pile wall.

.6 Submit a Sheet Pile Wall Closure Report to the Departmental Representative 30 calendar days after the closure of the ECF sheet pile wall. This report shall contain a summary of the sheet pile wall construction activities and fish salvage activities.

1.4 ENVIRONMENTAL
MEASURES

.1 Meet or exceed the requirements of all environmental legislation and regulations, including all amendments in force for the duration of the work, provided that in case of conflict or discrepancy, the most stringent requirements apply.

.2 Removal of any contaminated materials from the site as defined by authorities having jurisdiction relating to environmental protection shall be transported and disposed of

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| 1.4 ENVIRONMENTAL MEASURES
(Cont'd) | .2 | (Cont'd)
in a safe, legal manner to minimize danger at the site and during disposal. |
| | .3 | Environmental mitigation measures from the CEAA Comprehensive Study are bound in Appendix E - Environmental Mitigation Measures. Comply with these measures. Excerpt from the Randle Reef Sediment Remediation Project, Comprehensive Study Report, October 30, 2012, related to air dispersion modelling during mechanical dredging operations are bound in Appendix F - Air Dispersion Modelling - Exerpts from Randle Reef Sediment Remediation Project, Comprehensive Study Report. |
| 1.5 FIRES | .1 | Fires and burning of rubbish or materials on site or adjacent to site is not permitted. |
| 1.6 HANDLING OF DREDGE MATERIALS | .1 | Dispose of dredge materials in designated areas in accordance with Section 35 20 34. |
| | .2 | Excavation, filling, pumping, towing, hauling, disposal and dumping operations for dredging shall employ such methods and equipment to ensure minimum loss of materials into the waterway. |
| 1.7 DISPOSAL OF WASTE | .1 | To Section 01 74 20. |
| 1.8 DRAINAGE | .1 | Provide erosion and sediment control plan that identifies type and location of erosion and sediment controls to be provided. Plan: 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 | Provide temporary drainage and pumping as necessary to keep excavations and site free from water. |
| | .3 | Do not pump water containing suspended materials into waterways, sewer or drainage systems. |
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1.8 DRAINAGE (Cont'd)	.4	Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.
1.9 SITE CLEARING AND PLANT PROTECTION	.1	Protect trees and plants on site and adjacent properties.
	.2	Wrap in burlap, trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2 m.
	.3	Minimize stripping of topsoil and vegetation.
1.10 WORK ADJACENT TO WATERWAYS	.1	Do not use waterway beds for borrow material.
	.2	Do not allow any debris, fill, deleterious material or other foreign material to enter the waterway.
1.11 POLLUTION CONTROL	.1	Maintain temporary erosion and pollution control features installed under this contract.
	.2	Control emissions from equipment and plant to local authorities' emission requirements.
	.3	Abide by local noise by-laws and regulations.
	.4	Conduct refueling and maintenance of vehicles and machinery on paved surfaces at least 30 metres away from the waterway. Areas of equipment refueling and maintenance shall be equipped with adequate containers for the disposal of wastes produced from upkeep and repair. Use non-spill facilities for marine plant.
	.5	Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.
	.6	Spills of deleterious substances: <ul style="list-style-type: none"> .1 Be prepared at all times to intercept, clean-up and dispose of any spillage that may occur whether on land or water or air. .2 Keep all materials required for clean-up of spillages readily accessible on site. .3 Immediately contain, limit spread and clean up spills of oil, fuel, dredged sediment,

1.11 POLLUTION CONTROL (Cont'd)	.6	<p>Spills of deleterious substances:(Cont'd)</p> <p>.3 (Cont'd)</p> <p>sheen, and other deleterious substances promptly at own cost in accordance with provincial regulatory requirements.</p> <p>.4 Report immediately to Ontario Spills Action Centre: 1-800-268-6060.</p> <p>.5 Further information on dangerous goods emergency cleanup and precautions including a list of companies performing this work can be obtained from the Transport Canada 24-hour number (613) 996-6666 collect.</p>
1.12 FISH PROTECTION	.1	<p>Meet the following specific requirements for the protection of fish during closure of the sheet pile wall.</p> <p>.1 Protection of Adult or Juvenile Fish only applies to fish species of concern as identified in the Comprehensive Study Report. Once the sheet pile driving begins, it is unlikely that significant numbers of fish will enter the construction area. Once the sheet pile wall closure occurs, purse seine fishing will be conducted to attempt to remove fish. Attempt to remove all fish. Captured fish shall be released outside of the ECF.</p> <p>.2 All fish captured shall be counted, identified, and transported for release outside of the ECF. Removal of fish may be stopped when all fish have been removed and with approval of Departmental Representative.</p> <p>.3 Alternative method for fish capture, must be submitted to Departmental Representative for approval.</p>
1.13 SPECIAL PROTECTION AND PRECAUTIONS	.1	<p>Comply with the requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials and regarding labelling and the provision of material safety data sheets acceptable to Labour Canada.</p>
1.14 WATER QUALITY PERFORMANCE CRITERIA	.1	<p>Turbidity:</p> <p>.1 Turbidity requirements are based on an existing correlation between turbidity and total suspended solids measured at this site. The turbidity requirements are based on a requirement that the increase in total suspended solids is less than 25 mg per litre. The</p>

1.14 WATER QUALITY .1 Turbidity:(Cont'd)

PERFORMANCE .1 (Cont'd)

CRITERIA Departmental Representative will measure total

(Cont'd) suspended solids at intervals throughout the

project. The correlation between turbidity and

total suspended solids may be updated as a

result of these measurements.

.2 Turbidity will be measured for compliance

with specified maximum values 100 m away from

the in-water work.

.3 When the background turbidity is less than

26 NTUs the maximum increase in turbidity is

12 NTUs.

.4 When the background turbidity is above

26 NTUs the maximum total turbidity is 36NTUs.

.5 Turbidity measurements will be taken 1 m

below water surface and 1 m above lakebed.

.2 Sheen: Any visible sheen shall be contained and

subsequently removed.

1.15 AIR MONITORING .1 Air monitoring will be conducted at locations

PERFORMANCE along the perimeter of the US Steel wharf and

CRITERIA various locations on Pier 12, Pier 14 and

Pier 15. Napthalene has been identified and the

most likely air emissions. The maximum allowable

concentration of naphthalene at any of the

monitoring stations is 24-Hour AAQC: 22.5 µg/m3.

Air monitoring undertaken by the Departmental

Representative is not intended to be used for

the contractor's health and safety purposes.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

- 3.1 NOTIFICATION
- .1 Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.
 - .2 After receipt of such notice, inform Departmental Representative of proposed corrective action for approval by Departmental Representative.
 - .3 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.
 - .4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.
- 3.2 CORRECTIVE ACTIONS FOR WATER
- .1 When water quality is not in compliance with the required water quality performance criteria limits based on hourly samples for a 4 hour rolling average of both upper and lower samples, stop in-water work and adjust operations to minimize turbidity. Make no claims for delays or adjustment to operations resulting from water quality exceedances.
 - .2 Cessation of in-water work:
 - .1 Cease all in-water work at the first indication of a significant oil sheen or distressed or dying fish in the vicinity of the Work Area.
- 3.3 CORRECTIVE ACTIONS FOR AIR
- .1 If the air quality is not in compliance with the required air monitoring performance criteria limits, the Departmental Representative may stop the work. The Departmental Representative will investigate the cause of the exceedance of the naphthalene criteria. If the cause of the exceedance relates to non-comformance with specifications then make no claim for delay.

PART 1 - GENERAL

1.1 ABBREVIATIONS AND ACRONYMS	.1	<p>The following abbreviations and acronyms are commonly found in the Contract Documents and represent the associated organizations or terms:</p> <p>.1 AAQC: Ambient Air Quality Criteria</p> <p>.2 AIS: Automatic Identification System</p> <p>.3 ANSI: American National Standards Institute</p> <p>.4 ASTM: American Society for Testing and Materials</p> <p>.5 BEAST: Benthic Assessment of Sediment</p> <p>.6 BHP: Break Horse Power</p> <p>.7 BMP: Best Management Practice</p> <p>.8 CCG: Canadian Coast Guard</p> <p>.9 CDF: Controlled Density Fill</p> <p>.10 CHS: Canadian Hydrographic Service</p> <p>.11 COFI: Council of Forest Industries of British Columbia</p> <p>.12 CPR: Cardiopulmonary resuscitation</p> <p>.13 CQA: Construction Quality Assurance</p> <p>.14 CQC: Construction Quality Control</p> <p>.15 CWQG: Canadian Water Quality Guidelines</p> <p>.16 CWQO: Canadian Water Quality Objectives</p> <p>.17 DGPS: Differential Global Positioning System</p> <p>.18 DFO: Department of Fisheries and Oceans</p> <p>.19 DR: Dimension Ratio</p> <p>.20 DU: Dredge Unit</p> <p>.21 EC: Environment Canada</p> <p>.22 ECF: Engineered Containment Facility</p> <p>.23 EPA: Environmental Protection Agency</p> <p>.24 EPP: Environmental Protection Plan</p> <p>.25 EPS: Engineering Performance Standards</p> <p>.26 FRP: Fiberglass Reinforced Plastic</p> <p>.27 FSP: Field Sampling Plan</p> <p>.28 GC: General Conditions</p> <p>.29 HASP: Health and Safety Plan</p> <p>.30 HDPE: High-density Polyethylene</p> <p>.31 HPA: Hamilton Port Authority</p> <p>.32 HSO: Health and Safety Officer</p> <p>.33 HSTS: Hydrogen Stormwater Treatment System</p> <p>.34 IGLD: International Great Lakes Datum</p> <p>.35 ISO: International Organization for Standardization</p> <p>.36 LLDPE: Linear Low-Density Polyethylene</p> <p>.37 LTI: Lost Time Injury</p> <p>.38 LS: lump sum</p> <p>.39 MARV: Minimum Average Roll Value</p> <p>.40 MOE: Ministry of the Environment</p> <p>.41 MOHS: Marine Occupational Health and Safety</p> <p>.42 MOL: Ministry of Labour</p>
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1.1 ABBREVIATIONS AND ACRONYMS (Cont'd)	.1	(Cont'd)
		.43 MSDS: Material Safety Data Sheet
		.44 MSSP: Materials Source Separation Program
		.45 MTC: Marine Traffic Coordinator
		.46 NAD: North American Datum
		.47 NAPL: non-aqueous phase liquid
		.48 NEMA: National Electrical Manufacturers Association
		.49 NFC: National Fire Code
		.50 NOTSHIP: Notice to Shipping
		.51 NTU: Nephelometric turbidity units
		.52 O&M: Operations and Maintenance
		.53 OHS: Occupational Health and Safety
		.54 OHSA: Occupational Health and Safety Act
		.55 OPSS: Ontario Provincial Standard Specifications
		.56 PAH: Polynuclear Aromatic Hydrocarbons
		.57 PFD: Personal Flotation Device
		.58 PP: Polypropylene
		.59 PPE: Personal Protective Equipment
		.60 PVC: Polyvinyl Chloride
		.61 PVDF: Polyvinylidene Fluoride
		.62 PWQO: Provincial Water Quality Objective
		.63 QAPP: Quality Assurance Project Plan
		.64 QA/QC: Quality Assurance/Quality Control
		.65 QCAP: Quality Control Assurance Plan
		.66 RTK: Real-Time Kinematic
		.67 SP: Surface Preparation
		.68 SSP: Steel Sheet Piles
		.69 SSPC: Steel Structure Painting Council
		.70 TCP: Turbidity Control Plan
		.71 TSS: total suspended solids
		.72 UTM: Universal Transverse Mercator
		.73 USEPA: United States Environmental Protection Agency
		.74 VHF: Very High Frequency
		.75 WA: Waste Audit
		.76 WHMIS: Workplace Hazardous Materials Information System
		.77 WMC: Waste Management Coordination
		.78 WMP: Waste Management Plan
		.79 WRW: Waste Reduction Workplan
		.80 WSIB: Workplace Safety and Insurance Board
		.81 WTP: Water Treatment Plant
		.82 US: United States
1.2 UNITS OF MEASURE	.1	The following abbreviations of units of measure are commonly found in the Contract Documents:
		.1 C: Celsius
		.2 cm: centimetre
		.3 kg: kilogram
		.4 kPa: kilopascals
		.5 kw: kilowatts

1.2 UNITS OF
MEASURE
(Cont'd)

- .1 (Cont'd)
.6 l/s: litre per second
.7 m: metres
.8 m³: cubic metres
.9 mg/kg: milligrams per kilogram
.10 mg/L: milligrams per litre
.11 mm: millimetres
.12 NTU: nephelometric turbidity unit
.13 ppm: parts per million
.14 ug/L: micrograms per litre
.15 sec: second
.16 ug/m³: micrograms per cubic metre

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

PART 1 - GENERAL

1.1 SECTION
INCLUDES

- .1 This Section describes the Contractor's quality control requirements, duties, and responsibilities during execution of the Work. Contractor quality control is the means by which the Contractor furnishes the independent resources necessary to control the Work and provide documentation to confirm that completed Work complies with the requirements of the Contract Documents.
- .2 Inspection and testing, administrative and enforcement requirements.
- .3 Tests and mix designs.
- .4 Mill tests.

1.2 SUBMITTALS

- .1 Submit a Construction Quality Control (CQC) Plan to the Departmental Representative for review and acceptance. The plan shall identify personnel, procedures, methods, instructions, records, and forms to be used by the CQC team to control the work and verify that the work conforms to the Contract Documents.
 - .2 The CQC Plan shall include the following:
 - .1 A description of the quality control organization including an organization chart showing the various CQC team members along with their designated responsibilities and lines of authority.
 - .2 Acknowledgement that the CQC staff will conduct inspections for all aspects of the work specified and shall report to a CQC Supervisor, or someone of higher authority, in the Contractor's organization.
 - .3 The name, qualifications, duties, responsibilities, and authorities of each person assigned a primary CQC function.
 - .4 A summary of the delegated responsibilities of the CQC Supervisor, signed by an authorized official of the firm.
 - .5 Procedures for scheduling and managing submittals including those of subcontractors, off-site fabricators, and material suppliers.
 - .6 Testing methods, schedules, and procedures used to report quality control information to the Departmental Representative including samples of the various reporting forms.
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| 1.2 SUBMITTALS
(Cont'd) | .3 | Obtain the Departmental Representative's acceptance of the CQC Plan prior to the start of work. The Departmental Representative's acceptance is conditional, based on satisfactory performance during execution of the work. The Departmental Representative reserves the right to require the Contractor to adjust the CQC Plan and/or operations as necessary to comply with the provisions of the Contract documents at no extra cost. |
| | .4 | After the Departmental Representative's acceptance of the CQC Plan, notify Departmental Representative in writing of any proposed change to the CQC Plan. Proposed changes are also subject to acceptance by the Departmental Representative. |
| 1.3 CQC
ORGANIZATION | .1 | CQC Supervisor: Identify an individual within its organization, located at the Work Area, who shall be responsible to the Contractor for overall management of CQC and have the authority to act in all CQC matters for the Contractor. CQC Supervisor subject to the approval of the Departmental Representative. |
| | .2 | Personnel: Staff shall be maintained under the direction of the CQC Supervisor to perform all CQC activities on behalf of the Contractor. The actual number of the staff during any specific work period may vary to cover shift needs and rates of performance. The personnel of this staff shall be fully qualified by experience and technical training to perform their assigned responsibilities and shall be directly hired for the work by the Contractor. |
| 1.4 COORDINATION
MEETING | .1 | During the pre-construction meeting (discussed in Section 01 31 16) meet with the Departmental Representative and appropriate agencies to discuss the CQC system. During the meeting, a mutual understanding of the system details shall be developed including the approval of forms for recording the CQC operations, control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's inspection and control with the Departmental Representative's inspection. |
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| 1.4 COORDINATION MEETING
(Cont'd) | .2 | Allow for occasions when subsequent conferences will be called to reconfirm mutual understanding. |
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| 1.5 ACCESS TO WORK | .1 | Allow the Departmental Representative access to the Work Area, staging areas, and offsite manufacturing and fabrication plants as required. 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 | Provide clear access to work areas to be inspected and assist as required by providing safety equipment, ladders, materials, and other items necessary for these inspections, including but not necessarily limited to, dredge inspections, welding X-ray inspections, and compaction tests. |
| | .3 | Cooperate to provide reasonable facilities for such access. |
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| 1.6 INSPECTION | .1 | Contractor quality control shall be adequate to cover all construction operations, including both onsite and offsite fabrication, and shall be keyed to the proposed construction sequence. Quality control shall include the following levels of inspection for all definitive features of work. |
| | .2 | Preparatory Inspection: This shall be performed prior to beginning any work or any definable feature of work. Such inspection shall be made a matter of record in the CQC documentation as required herein. Subsequent to the preparatory inspection and prior to commencement of work, instruct each applicable worker as to the acceptable level of workmanship specified by the CQC Plan as necessary to meet the requirements of the Contract Documents. The preparatory inspection shall include: <ul style="list-style-type: none"> .1 A review of Contract requirements. .2 A check to ensure that all materials and/or equipment have been tested, submitted, and approved. .3 A check to ensure that provisions have been made to provide required control testing. .4 An examination of the Work Area to ascertain that all preliminary or previous Work has been completed. |
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1.6 INSPECTION
(Cont'd)

- .2 Preparatory Inspection:(Cont'd)
 - .5 A physical examination of materials, equipment, and sample Work to ensure that they conform to approved shop drawings or submittal data.
 - .6 A check to ensure that all materials and/or equipment are on hand.
- .3 Initial Inspection: This inspection shall be performed as soon as a representative portion of the particular feature of Work has been accomplished and shall include examination of the quality of workmanship and a review of control testing for compliance with contract requirements, use of defective or damaged materials, omissions, and dimensional requirements. Such inspection shall be made a matter of record in the CQC documentation as required herein.
- .4 Follow-up Inspections: Inspections shall be performed daily to ensure continuing compliance with contract requirements, including control testing, until completion of the particular feature of Work. Such inspections shall be made a matter of record in the CQC documentation as required herein. Follow-up inspections shall be conducted and test deficiencies corrected prior to the addition of new features of Work.
- .5 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.
- .6 Pre-Final and Final Inspections: to Section 01 77 00.
- .7 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.
- .8 Departmental Representative may order any 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.

- 1.7 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 Provide equipment required for executing inspection and testing by appointed agencies.
 - .3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
 - .4 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 reinspection.
- 1.8 NOTICE OF NONCOMPLIANCE
- .1 Departmental Representative will notify the Contractor of any noncompliance with the foregoing requirements. After receipt of such notice, take corrective action immediately. Such notice, when delivered to the Contractor or its representative at the Work Area, shall be deemed sufficient for the purpose of notification.
 - .2 If the Contractor fails or refuses to comply promptly, Departmental Representative may issue an order stopping all or any part of the work until satisfactory corrective action has been taken.
 - .3 Designate, in writing, the individual on each shift of work having the ability and responsibility to correct conditions of noncompliance and accept such Stop Work Orders.
 - .4 Make no part of the time lost due to any such Stop Work Order the subject of a claim for extension of time or for excess costs or damages.
- 1.9 PROCEDURES
- .1 Notify appropriate agency and Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.
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- 1.9 PROCEDURES (Cont'd)
- .2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in an orderly sequence so as not to cause delay 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.
- 1.10 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.
- .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 may deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which shall be determined by Departmental Representative.
- 1.11 TESTS AND MIX DESIGNS
- .1 Furnish test results and mix designs as may be requested.
- .2 The cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work shall be appraised by Departmental Representative and may be authorized as recoverable.
- 1.12 MILL TESTS
- .1 Submit mill test certificates in accordance with Section 01 33 00 as requested.
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PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

PART 1 - GENERAL

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| <u>1.1 SUBMITTALS</u> | .1 | Provide submittals in accordance with Section 01 33 00. |
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| <u>1.2 REFERENCES</u> | .1 | Canadian General Standards Board (CGSB)
.1 CAN/CGSB-1.189-2000, Exterior Alkyd Primer for Wood.
.2 CAN/CGSB-1.59-97, Alkyd Exterior Gloss Enamel. |
| | .2 | Canadian Standards Association (CSA International)
.1 CSA-A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
.2 CSA-0121-08, Douglas Fir Plywood.
.3 CSA Z797-09, Code of practice for Access Scaffold.
.4 CAN/CSA-Z321-96(R2006), Signs and Symbols for the Occupational Environment, withdrawn but still available from CSA, CCOHS and Techstreet. |
| | .3 | U.S. Environmental Protection Agency (EPA)/ Office of Water
.1 EPA 833-R-06-004, May 2007, Developing Your Stormwater Pollution Prevention Plan - A Guide for Construction Sites. |
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| <u>1.3 INSTALLATION AND REMOVAL</u> | .1 | Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation for Departmental Representative approval. |
| | .2 | Identify areas which have to be gravelled to prevent tracking of mud. |
| | .3 | Indicate use of supplemental or other staging area. |
| | .4 | Provide construction facilities in order to execute work expeditiously. |
| | .5 | Remove from site all such work after use. |
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| <u>1.4 SCAFFOLDING</u> | .1 | Scaffolding in accordance with CSA Z797-09, Code of Practice for Access Scaffold. |
| <u>1.5 SITE</u> | .1 | Confine work, including temporary structures, plant, equipment and materials to established limits of site. |
| | .2 | Locate temporary buildings, roads, walks, drainage facilities, services as directed and maintain in clean and orderly manner. |
| <u>1.6 CONSTRUCTION & STORAGE AREA</u> | .1 | The limits of the Construction and Storage Area will be designated by the Departmental Representative prior to commencement of work unless otherwise shown on the Drawings. |
| <u>1.7 SITE STORAGE/LOADING</u> | .1 | Confine work and operations of employees to areas defined by Contract Documents. Do not unreasonably encumber premises with products. |
| | .2 | Do not load or permit to load any part of Work with a weight or force that will endanger the Work. |
| <u>1.8 CONSTRUCTION PARKING</u> | .1 | Parking will be permitted on site provided it does not disrupt performance of Work. |
| | .2 | Provide and maintain adequate access to project site. |
| <u>1.9 TEMPORARY UTILITIES</u> | .1 | Make arrangements for the supply of water, electrical power, gas, sanitary facilities, heat, and any other temporary services required during construction and for the lifetime of any temporary facility. |
| | .2 | Make all necessary applications, obtain permits and pay for all fees, charges for service and use for all temporary utilities and services required throughout construction period. |
| | .3 | Install temporary facilities for power system such as pole lines and underground cables to approval and inspection of the local authority and Departmental Representative. |
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| <u>1.10 SECURITY</u> | .1 | Pay for responsible security personnel to guard site and contents of site after working hours and during holidays. |
| | .2 | Entry and egress point shall be secured during non-working hours. |
| | .3 | The site enclosures shall be in accordance with local ordinances and by-laws. |
| <u>1.11 CONTRACTOR'S OFFICE</u> | .1 | Contractor shall provide a suitable furnished temporary office for its own use. |
| | .2 | Contractor's office shall be furnished with telephone, fax and email service. |
| <u>1.12 DEPARTMENTAL REPRESENTATIVES OFFICE</u> | .1 | Provide space for two sites trailers to be provided by Departmental Representative in Staging Area. Provide five parking spaces adjacent to trailers. Provide 10 metre berthing area for Departmental Representative's boat on Pier 15 East in close proximity to site trailers. |
| | .2 | Arrange and pay for setup and removal of Departmental Representative's site offices, heating and power. Pay for heating and lighting costs for Departmental Representative's field office. |
| <u>1.13 EQUIPMENT, TOOL AND MATERIALS STORAGE</u> | .1 | Provide and maintain, in a clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials. |
| | .2 | Locate materials not required to be stored in weatherproof sheds on site in a manner to cause least interference with work activities. |
| <u>1.14 CONSTRUCTION SIGNAGE</u> | .1 | Provide project identification site sign comprising foundation, framing, and one 2400 x 2400 mm signboard as detailed and as described below. |
| | .1 | Foundations: 15 MPa concrete to CSA-A23.1/A23.2 minimum 200 mm x 900 mm deep. |
| | .2 | Framework and battens: SPF, pressure treated minimum 89 x 89 mm. |
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1.14 CONSTRUCTION
SIGNAGE
(Cont'd)

- .1 (Cont'd)
 - .3 Signboard: 19 mm Medium Density Overlaid Douglas Fir Plywood to CSA 0121.
 - .4 Paint: alkyd enamel to CAN/CGSB-1.59 over exterior alkyd primer to CGSB 1-GP-189.
 - .5 Fasteners: hot-dip galvanized steel nails and carriage bolts.
 - .6 Vinyl sign face: printed project identification, self adhesive, vinyl film overlay, supplied by Departmental Representative.
- .2 Locate project identification sign as directed by Departmental Representative and construct as follows:
 - .1 Build concrete foundation, erect framework, and attach signboard to framing.
 - .2 Paint all surfaces of signboard and framing with one coat primer and two coats enamel. Colour white on signboard face, black on other surfaces.
 - .3 Apply vinyl sign face overlay to painted signboard face in accordance with installation instruction supplied.
- .3 Direct requests for approval to erect a Consultant/Contractor signboard to Departmental Representative. For consideration general appearance of Consultant/Contractor signboard must conform to project identification site sign. Wording shall be in both official languages.
- .4 Signs and notices for safety and instruction shall be in both official languages. Graphic symbols shall conform to CAN/CSA-Z321.
- .5 Maintain approved signs and notices in good condition for duration of project, and dispose of off site on completion of project or earlier if directed by Departmental Representative.

1.15 SANITARY
FACILITIES

- .1 Provide and properly maintain a potable water supply and suitable sanitary facilities in convenient and clean condition for the Contractor's personnel as required by the Construction Safety Act and in accordance with Ministry of Labour requirements.
- .2 Sanitary facilities shall be subject to approval of type, size and location by the local health authorities, the Ontario Ministry of

1.15 SANITARY
FACILITIES
(Cont'd)

- .2 (Cont'd)
Environment (MOE) and Departmental Representative.
- .3 The facilities shall be maintained with all required toilet room supplies, including paper towels and toilet paper, in a clean and sanitary condition and disinfected frequently to the Departmental Representative's satisfaction, for the duration of the contract.
- .4 Post notices and take such precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.16 PROTECTION AND
MAINTENANCE OF
TRAFFIC

- .1 Provide access and temporary relocated roads as necessary to maintain traffic.
 - .2 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Departmental Representative.
 - .3 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs
 - .4 Protect travelling public from damage to person and property.
 - .5 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.
 - .6 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.
 - .7 Construct access and haul roads necessary.
 - .8 Haul roads: constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided.
 - .9 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
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- 1.16 PROTECTION AND MAINTENANCE OF TRAFFIC
(Cont'd)
- .10 Dust control: adequate to ensure safe operation at all times.
 - .11 Location, grade, width, and alignment of construction and hauling roads: subject to approval by Departmental Representative.
 - .12 Lighting: to assure full and clear visibility for full width of haul road and work areas during night work operations.
 - .13 Provide snow removal during period of Work.
 - .14 Remove, upon completion of work, haul roads designated by Departmental Representative.

- 1.17 CLEAN-UP
- .1 Remove construction debris, waste materials, packaging material from work site daily and in accordance with Section 01 74 20.
 - .2 Clean dirt or mud tracked onto paved or surfaced roadways.
 - .3 Store materials resulting from demolition activities that are salvageable.
 - .4 Stack stored new or salvaged material.

PART 2 - PRODUCTS

- 2.1 NOT USED
- .1 Not Used.

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 sediment and erosion control drawings 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.
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| 3.1 TEMPORARY
EROSION AND
SEDIMENTATION
CONTROL
(Cont'd) | .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. |

PART 1 - GENERAL

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| 1.1 CONSTRUCTION & DEMOLITION WASTE | .1 | Carefully deconstruct and source separate materials/equipment and divert, from D&C waste destined for landfill to maximum extent possible. Target for this project is 75% diversion from landfill. Reuse, recycle, compost, anaerobic digest or sell material for reuse except where indicated otherwise. On site sales are not permitted. |
| | .2 | Source separate waste and maintain waste audits in accordance with the Environmental Protection Act, Ontario Regulation 102/94 and Ontario Regulation 103/94. |
| | .1 | Provide facilities for collection, handling and storage of source separated wastes. |
| | .2 | Source separate the following waste: |
| | .1 | Brick and portland cement concrete. |
| | .2 | Corrugated cardboard. |
| | .3 | Wood. |
| | .4 | Steel. |
| | .5 | Asphalt pavement. |
| | .3 | Submit proof that all waste is being disposed of at a licensed land fill site or waste transfer site. A copy of the disposal/waste transfer site's license and a letter verifying that said landfill site will accept the waste must be supplied to Departmental Representative prior to removal of waste from the demolition site. |
| 1.2 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 | Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility. |
| | .5 | Protect structural components not removed for demolition from movement or damage. |

1.2 STORAGE,
HANDLING AND
PROTECTION
(Cont'd)

- .6 Support affected structures. If safety of building is endangered, cease operations and immediately notify Departmental Representative.
- .7 Protect surface drainage, mechanical and electrical from damage and blockage.
- .8 Separate and store materials produced during dismantling of structures in designated areas.
- .9 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated facilities.
 - .1 On-site source separation is recommended.
 - .2 Remove co-mingled materials to off-site processing facility for separation.
 - .3 Provide waybills for separated materials.

1.3 WASTE
MANAGEMENT AND
DISPOSAL

- .1 Do not bury rubbish and waste materials on site.
 - .2 Do not dispose of waste, volatile materials, mineral spirits, oil, paint thinner, into waterways, onto ground, storm, or sanitary sewers, or in other location where it will pose health or environmental hazard.
 - .3 Provide acceptable containers for collection and disposal of waste materials, debris and rubbish.
 - .4 Do not allow deleterious substances to enter the waterway.
 - .5 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 Reused or recycled waste destination.
 - .6 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
 - .7 Remove materials from deconstruction as deconstruction/disassembly Work progresses.
 - .8 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
-

1.3 WASTE
MANAGEMENT AND
DISPOSAL
(Cont'd)

- .9 Fold up metal banding, flatten and place in designated area for recycling.
- .10 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
- .11 All waste materials including containers and waste fluids associated with vehicle maintenance shall be disposed of in a legal manner at a site approved by Local Authorities.
- .12 Dispose of dredged material in the designated Engineered Containment Facility as specified and indicated.

1.4 USE OF SITE
AND FACILITIES

- .1 Execute work with least possible interference or disturbance to normal use of premises.

1.5 SCHEDULING

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

1.6 WASTE
PROCESSING SITES

- .1 Province of: Ontario.
 - .1 Ministry of Environment, Public Information Centre, 2nd Floor - Macdonal Block, Suite M2-22 - 900 Bay Street, Toronto, ON, M7A 1N3.
 - .2 General Inquiry: 416-325-4000 or 1-800-565-4923 TTY (for persons who are deaf, deafened or hard of hearing).
 - .3 Telephone: 416-326-9236 or 1-800-515-2759
 - .4 Fax: 416-325-3159.
- .2 Recycling Council of Ontario: 215 Spadina Avenue, #225, Toronto, ON, M5T 2C7.
 - .1 Telephone: 416-657-2797
 - .2 Fax: 416-960-8053
 - .3 Email: rco@rco.on.ca.
 - .4 Internet: <http://www.rco.on.ca/>.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 APPLICATION .1 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

3.2 CLEANING .1 Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.
.2 Clean-up work area as work progresses.
.3 Source separate materials to be reused/recycled into specified sort areas.

3.3 DIVERSION OF MATERIALS .1 Separate materials from general waste stream and stockpile in separate piles or containers, as reviewed by Departmental Representative, and consistent with applicable fire regulations.
.1 Mark containers or stockpile areas.
.2 Provide instruction on disposal practices.
.2 On-site sale of salvaged, recovered, reusable and recyclable materials is not permitted.
.3 Divert unused paint/coating materials from landfill to official hazardous material collections site approved by Departmental Representative.
.4 Divert unused metal and wiring materials from landfill to metal recycling facility approved by Departmental Representative.

3.4 CANADIAN
GOVERNMENTAL
DEPARTMENTS CHIEF
RESPONSIBILITY FOR
THE ENVIRONMENT

.1 Government Chief Responsibility for the
Environment.

Province	Address	General Inquiries	Fax
Ontario	Ministry of Environment, Public Information Centre 2nd Floor - Macdonald Block, Suite M2-22 900 Bay St, Toronto, ON M7A 1N3	(416) 325-4000 (800) 565-4923 (416) 326-9236 (800) 515-2759	(416) 325-3159

PART 1 - GENERAL

<u>1.1 SECTION INCLUDES</u>	.1	Administrative procedures preceding preliminary and final inspections of Work.
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<u>1.2 INSPECTION AND DECLARATION</u>	.1	Contractor's Inspection: Contractor and all Subcontractors shall conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents. .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's Inspection and that corrections have been made. .2 Request Departmental Representative's Inspection.
	.2	Departmental Representative's Inspection: Departmental Representative and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor shall correct Work accordingly.
	.3	Completion: submit written certificate that following have been performed: .1 Work has been completed and inspected for compliance with Contract Documents. .2 Defects have been corrected and deficiencies have been completed. .3 Work is complete and ready for Final Inspection.
	.4	Final Inspection: when items noted above are completed, request final inspection of Work by Departmental Representative and Contractor. If Work is deemed incomplete by Departmental Representative, complete outstanding items and request reinspection.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

PART 1 - GENERAL

- | | | |
|----------------------|----|--|
| 1.1 SECTION INCLUDES | .1 | As-built, samples, and specifications. |
| | .2 | Final site survey. |
-
- | | | |
|---------------------------|----|--|
| 1.2 AS-BUILTS AND SAMPLES | .1 | In addition to requirements in General Conditions, maintain at the site for Departmental Representative one record copy of: <ul style="list-style-type: none">.1 Contract Drawings..2 Specifications..3 Amendments and addenda..4 Change Orders and other modifications to the Contract..5 Reviewed shop drawings, product data, and samples..6 Field test records..7 Inspection certificates..8 Manufacturer's certificates. |
| | .2 | Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage. |
| | .3 | Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters. |
| | .4 | Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes. |
| | .5 | Keep record documents and samples available for inspection by Departmental Representative. |
| | .6 | Turn one set, paper copy and electronic copy, of AS-BUILT drawings and specifications over to Departmental Representative on completion of work. Submit files on USB compatible with PWGSC encryption requirements or through email or alternate electronic file sharing service such as ftp, as directed by Departmental Representative. |
| | .7 | If project is completed without significant deviations from Contract drawings and specifications submit to Departmental |
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1.2 AS-BUILTS AND SAMPLES (Cont'd)	.7	(Cont'd) Representative one set of drawings and specifications marked "AS-BUILT".
1.3 RECORDING ACTUAL SITE CONDITIONS	.1	Record information on set of black line opaque drawings, and in copy of Project Manual, provided by Departmental Representative.
	.2	Provide felt tip marking pens, maintaining separate colours for each major system, for recording information.
	.3	Record information concurrently with construction progress. Do not conceal Work until required information is recorded.
	.4	Contract Drawings and shop drawings: legibly mark each item to record actual construction, including: <ul style="list-style-type: none"> .1 Measured depths of elements of foundation in relation to finish first floor datum. .2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements. .3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction. .4 Field changes of dimension and detail. .5 Changes made by change orders. .6 Details not on original Contract Drawings. .7 References to related shop drawings and modifications.
	.5	Specifications: legibly mark each item to record actual construction, including: <ul style="list-style-type: none"> .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items. .2 Changes made by amendments, addenda and change orders.
	.6	Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.
1.4 FINAL SURVEY	.1	Submit final site survey certificate in accordance with Section 01 33 00, certifying that elevations and locations of ECF are in conformance with Contract Documents.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

PART 1 - GENERAL

<u>1.1 SECTION INCLUDES</u>	.1	Materials and installation for concrete underwater by tremie, pumped concrete, bottom dump bucket, or bagged concrete method.
<u>1.2 MEASUREMENT PROCEDURES</u>	.1	Underwater placed concrete will not be measured under this Section but shall be considered included under Section 31 62 16.13.
<u>1.3 REFERENCES</u>	.1	Canadian Standards Association (CSA International): .1 CSA A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.
<u>1.4 DEFINITIONS</u>	.1	Tremie concrete is placed underwater through tube called tremie pipe. .1 Tremie pipe has a hopper at upper end and may be open ended or may have foot valve, plug or travelling plug to control flow of concrete. .2 Concrete is placed in hopper and sufficient head of concrete is maintained in tremie pipe to provide desired rate of flow.
	.2	Pumped concrete method of placing concrete underwater uses concrete pump with discharge line used in similar manner to a tremie pipe.
	.3	Bottom-dump bucket method of placing concrete underwater requires use of bucket designed to discharge from bottom after it has contacted foundation or surface of previously placed concrete.
	.4	Bagged concrete method of placing underwater concrete consists of diver placing bags partially filled with dry concrete mix.
<u>1.5 WASTE MANAGEMENT AND</u>	.1	Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Use type GU cement.
- .2 Minimum compressive strength at 28 days: 35 MPa.
- .3 Class of exposure: C-1.
- .4 Maximum water cement ratio by mass: 0.40.
- .5 Nominal size of coarse aggregate: 10 mm.
- .6 Fine aggregate content: 45% of total aggregate mass.
- .7 Slump at point and time of submergence discharge: 80 mm.
- .8 Admixtures:
 - .1 Provide anti-washout cellulose or polymeric admixtures for underwater concrete placement.
 - .2 Provide certification that the admixture is compatible with the cementitious materials and other chemical admixtures in the proposed concrete mixture.
 - .3 Anti-washout admixture to be approved by Departmental Representative and have a proven record of performance with a minimum of five similar projects.
 - .4 Admixture supplier shall provide certification that the base concrete mixture as specified in C.O.E. CRD-C661-06, Level 1 acceptance to Table 1 is met or exceeded. Admixture dosage shall be adjusted on specified mix in Clause 2.2.

PART 3 - EXECUTION

3.1 PREPARATION

- .1 Where concrete must bond to existing surfaces, clean surfaces just prior to starting concrete placement.
 - .1 Use water jets, mechanical scrapers or other means, and when quantities of mud or rock cuttings are present, remove by air lift.

3.2 INSTALLATION

- .1 Do concrete work in accordance with Section 03 30 00. Testing for concrete to CSA A23.1/A23.2, except where specified otherwise.
- .2 Place concrete in one continuous operation to full depth required at location indicated on Drawings.
 - .1 Supply complete equipment for every phase of operation.
 - .2 Provide sufficient supply of concrete to complete pour without interruption.
- .3 Tremie method.
 - .1 Provide water-tight tremie pipe sized to allow free flow of concrete. Diameter of tremie pipe to be minimum 100 mm and minimum eight times maximum size of coarse aggregate.
 - .2 Provide hopper at top of tremie pipe and means to raise and lower tremie pipe.
 - .3 Provide plug or foot valve at bottom of tremie pipe to permit filling pipe with concrete initially.
 - .4 Start placement with tremie pipe full of concrete. Keep bottom of pipe buried minimum 300 mm in freshly placed concrete. Control rate of flow by varying depth of pipe bottom in concrete.
 - .5 If seal is lost, allowing water to enter pipe, withdraw pipe immediately. Refill pipe, and continue placing as specified.
 - .6 If tremie operation is interrupted so that horizontal construction joint has to be made, cut surface laitance by jetting, within 24 to 36 hours and remove loose material by pumping or air lifting before placing next lift.
- .4 Pumped concrete method.
 - .1 Follow procedures as for tremie method in placing concrete using discharge line from concrete pump as tremie pipe.
 - .2 Pump discharge line to have minimum diameter of 75 mm.

PART 1 - GENERAL

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|-----------------------------------|----|--|
| <u>1.1 REFERENCES</u> | .1 | Canadian Standards Association (CSA International):
.1 CSA W47.1-09 (R2014), Certification of Companies for Fusion Welding of Steel.
.2 CSA W59-13, Welded Steel Construction (Metal Arc Welding). |
| <u>1.2 WELDER QUALIFICATIONS</u> | .1 | Use only welders qualified under CSA W47.1. |
| | .2 | Make available to Departmental Representative currently valid Canadian Welding Bureau Qualification Certificate for each welder employed on the work. |
| <u>1.3 MEASUREMENT PROCEDURES</u> | .1 | Welding will not be measured separately for payment but is considered included in the paid items as specified and indicated. |

PART 2 - PRODUCTS

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|----------------------|----|-------------------------------|
| <u>2.1 MATERIALS</u> | .1 | Welding materials to CSA W59. |
| | .2 | Weld electrodes: E49XX. |

PART 3 - EXECUTION

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|----------------------------|----|--|
| <u>3.1 WELDING GENERAL</u> | .1 | Welding: to CSA W59. |
| | .2 | Do not deviate the size, length and location of welds from the design or from details shown on reviewed shop drawings without approval of Departmental Representative. |
| | .3 | Grind flush all butt welds. |
| <u>3.2 PREPARATION</u> | .1 | Surfaces to be welded shall be smooth, uniform and free from fins, tears and other defects which would adversely affect the quality of the weld. |
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- 3.2 PREPARATION
(Cont'd)
- .2 Ensure areas within 50 mm of the weld are free from loose scale, slag, rust, grease, moisture, paint or other matter which would impair the quality of the weld.
 - .3 Remove slag before welding over previously deposited metal and brush clean weld and adjacent base. This requirement applies to successive layers, successive beads and to crater area when welding is resumed after any interruption.
 - .4 Before welding is started from the second side remove to sound metal the root of the initial weld of all butt welds except when produced with the aid of backing. Thoroughly fuse the weld metal with the backing in all butt welds made with the use of backing of the same material as the base metal.
- 3.3 ASSEMBLY
- .1 Bring members to be welded into correct alignment and hold securely in position until the joint has been welded.
 - .2 Carefully align abutting parts joined by butt welds.
 - .3 Weld in a sequence that will balance the effects of applied heat of welding on various sides as the welding progresses.
- 3.4 WELD QUALITY
- .1 Weld metal to be sound throughout with no porosity or cracks on the surface of any weld or weld pass.
 - .2 Ensure complete fusion between the weld metal and the base metal and between successive passes throughout the joint.
 - .3 Welds shall be free from overlap and the base metal free from undercutting.
 - .4 Fill all craters to the full cross section of the welds.
 - .5 Fill and grind to profile any craters at the extreme ends of fillet welds.
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- 3.5 TESTING
- .1 Give Departmental Representative 48 hours notice of when work is ready for inspection.
 - .2 All welds will be subject to visual inspection requirements of CSA W59.
- 3.6 ACCEPTANCE REQUIREMENTS
- .1 Repair defective welds by chipping, air-arc gouging or grinding out from one side or both sides. Remove all traces of defects before rewelding. Remove all traces of oxidation after air arc gouging.

PART 1 - GENERAL

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|---|----|--|
| <u>1.1 MEASUREMENT PROCEDURES</u> | .1 | Touch up painting on steel sheet piling will not be measured separately for payment. Include costs in lump sum arrangement. |
| <u>1.2 REQUIREMENT</u> | .1 | The exterior face of the ECF facewall steel sheet piling furnished by the owner is painted for a vertical distance of 6 metres commencing at the elevation of the underside of the concrete parapet. Touch up of paint is required for damages incurred during handling and installation. No touch up is required after installation below water. |
| <u>1.3 REFERENCES</u> | .1 | American Society for Testing and Materials (ASTM) International:
.1 ASTM D2697-03(2008), Standard Test Method for Volume Nonvolatile Matter in Clear or Pigmented Coatings. |
| | .2 | The Master Painters Institute (MPI)
.1 Exterior Structural Steel and Metal Fabrications, 07.
.1 MPI EXT 5.1G (modified). |
| | .3 | The Society for Protective Coatings (SSPC)
.1 SSPC-SP 10/NACE No. 2-07, Near White Blast Cleaning.
.2 SSPC-VIS 1-89, Visual Standard for Abrasive Blast Cleaned Steel (Standard Reference Photographs) Editorial Changes September 1, 2000 (Steel Structures Painting Manual, Chapter 2 - Surface Preparation Specs.).
.3 SSPC-PA 2-04, Measurement of Dry Coat Thickness with Magnetic Gauges.
.4 SSPC Good Painting Manual, Volume 1, 4th Edition. |
| <u>1.4 DELIVERY, STORAGE AND HANDLING</u> | .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. |
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PART 2 - PRODUCTS

- 2.1 MATERIALS
- .1 Paint system applied by steel mill is:
 - .1 Prime coat: MPI EXT 5.1G zinc rich epoxy primer, suitable for severe weathering condition.
 - .1 VOC: 301 g/L when mixed or less.
 - .2 Coats: 1.
 - .3 Dry film thickness: 50-100 microns.
 - .4 Theoretical coverage: 9.2 m²/L at 75 microns DFT or better.
 - .5 Volume of solids: 70% ± 3% or greater, to ASTM D2697.
 - .6 Colour: grey.
 - .2 Middle and top coat: MPI EXT 5.1G (modified) fast dry, high build epoxy suitable for corrosive environments.
 - .1 VOC: 221 g/L or less when mixed.
 - .2 Middle coats: 1.
 - .3 Top coats: 1
 - .4 Dry film thickness: 100-200 microns per coat.
 - .5 Theoretical coverage: 6.3 g/L at 125 microns or better.
 - .6 Volume of solids: 80% ± 2% or greater, to ASTM D2697.
 - .7 Colour:
 - .1 Middle coat: grey.
 - .2 Top coat: black.

PART 3 - EXECUTION

- 3.1 PREPARATION
- .1 Apply paint after prepared surfaces have been accepted by Departmental Representative.
 - .2 Prior to starting paint application ensure degree of cleanliness of surfaces is to SSPC-VIS 1.
 - .1 Apply primer, paint, or pretreatment after surface has been cleaned and before deterioration of surface occurs.
 - .2 Clean surfaces again if rusting occurs after completion of surface preparation.
 - .3 Mixing paint:
 - .1 Do not dilute or thin paint for brush application.
 - .2 Mix ingredients in container before and during use and ensure breaking up of lumps,
-

- 3.1 PREPARATION (Cont'd)
- .3 Mixing paint:(Cont'd)
 - .2 (Cont'd)
complete dispersion of settled pigment, and uniform composition.
 - .3 Do not mix or keep paint in suspension by means of air bubbling through paint.
 - .4 Thin paint for spraying according to manufacturer's written instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Departmental Representative.
 - .4 Number of paint coats:
 - .1 1 primer coats to minimum dry film thickness of 75 microns.
 - .2 1 middle coat and 1 top coat to minimum dry film thickness of 100 microns per coat.
- 3.2 APPLICATION
- .1 Manufacturer's Instructions: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
 - .2 Notify Departmental Representative 48 hours in advance to mixing and applying a coating or coating system.
 - .3 Apply paint by spraying equipment in accordance with the paint manufacture's recommendations.
 - .4 Where surface to be painted is not under cover, do not apply paint when:
 - .1 Air temperature is below 5°C or when temperature is expected to drop to 0°C before paint has dried.
 - .2 Temperature of surface is over 50°C unless paint is specifically formulated for application at high temperatures.
 - .3 Fog or mist occur at site; it is raining or snowing; there is danger of rain or snow; relative humidity is above 85%.
 - .4 Surface to be painted is wet, damp or frosted.
 - .5 Previous coat is not dry.
 - .5 Supply cover when paint must be applied in damp or cold weather. Supply, shelter, or heat surface and surrounding air to comply with temperature and humidity conditions specified. Protect until paint is dry or until weather conditions are suitable.
-

- 3.2 APPLICATION (Cont'd)
- .6 Remove paint from areas which have been exposed to freezing, excess humidity, rain, snow or condensation. Prepare surface again and repaint.
 - .7 Apply each coat of paint as continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.
 - .8 Spray application:
 - .1 Provide and maintain equipment that is suitable for intended purpose, capable of properly atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
 - .2 Provide traps or separators to remove oil and water from compressed air and drain periodically during operations.
 - .3 Keep paint ingredients properly mixed in spray pots or containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.
 - .4 Apply paint in uniform layer, with overlapping at edges of spray pattern.
 - .5 Brush out immediately runs and sags.
 - .6 Use brushes to work paint into cracks, crevices and places which are not adequately painted by spray. In areas not accessible to spray gun, use brushes, daubers or sheepskins.
 - .7 Remove runs, sags and brush marks from finished work and repaint.
 - .9 Handling painted metal:
 - .1 Handle painted metal after paint has dried, or when necessary for handling for painting or stacking for drying.
 - .2 Scrape off and touch up paint which is damaged in handling, with same number of coats and kinds of paint as were previously applied to metal.
 - .10 Upon completion of the painting procedures test for dry film reading and evaluate the results as per SSPC-PA 2.
- 3.3 MAINTENANCE
- .1 Field painting:
 - .1 Touch up metal which has been shop coated with same type of paint and to same thickness as shop coat. This touch-up to include cleaning and painting of field connections, welds, rivets, nuts, washers, bolts, and damaged or defective paint and rusted areas.
-

- 3.4 CLEANING
- .1 Upon completion remove surplus materials, rubbish, tools and equipment.
 - .2 Waste Management and disposal: in accordance with Section 01 74 20.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
- 3.5 PROTECTION
- .1 Protect painted surfaces from damage during construction.
 - .2 Protection of surfaces:
 - .1 Protect surfaces not to receive paint.
 - .2 Prevent contamination of cleaned surfaces by salts, acids, alkalis, corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats of paint. Remove contaminants from surface and apply paint immediately.
 - .3 Protect cleaned and freshly painted surfaces from dust to approval of Departmental Representative.
 - .3 Repair damage to adjacent materials caused by painting exterior metal surface application installation.

PART 1 - GENERAL

- 1.1 REFERENCES .1 American Society for Testing and Materials International (ASTM)
- .1 ASTM C127-12, Standard Test Method for Density, Relative Density (Specific Gravity) and Absorption of Coarse Aggregate.
 - .2 ASTM D1557-12, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
 - .3 ASTM D4253-00(2006), Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
- 1.2 DEFINITIONS .1 Corrected maximum dry density is defined as:
- .1 $D = (D1 \times D2) / ((F1 \times D2) + (F2 \times D1))$.
 - .2 Where: D = corrected maximum dry density kg/m³.
 - .1 F1 = fraction (decimal) of total field sample passing 4.75 mm sieve.
 - .2 F2 = fraction (decimal) of total field sample retained on 4.75 mm sieve (equal to 1.00 - F1).
 - .3 D1 = maximum dry density, kg/m³ of material passing 4.75 mm sieve determined in accordance with Method A of ASTM D1557.
 - .4 D2 = bulk density, kg/m³, of material retained on 4.75 mm sieve, equal to 1000G where G is bulk specific gravity (dry basis) of material when tested to ASTM C127.
 - .3 For free draining aggregates, determine D1 (maximum dry density) to ASTM D4253 dry method when directed by Departmental Representative.

PART 2 - PRODUCTS

- 2.1 NOT USED .1 Not Used.
-

PWGSC Ontario Region	CORRECTED MAXIMUM DRY	Section 31 05 10
Randle Reef Stage 1	DENSITY FOR FILL	Page 2
Number R.050927.001		2015-03-27

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

PART 1 - GENERAL

1.1 MEASUREMENT PROCEDURES

- .1 Rock fill will be measured in tonnes of material placed and accepted in the work and shall include all labour, materials and equipment necessary to complete the work.
- .2 19 mm clear stone will be measured in tonnes of material placed and accepted in the work for above and below water locations as indicated on the unit price table and shall include all labour, materials and equipment necessary to complete the work.
- .3 22-50mm clear stone fill will be measured in tonnes of material placed and accepted in the work and shall include all labour, materials and equipment necessary to complete the work.
- .4 75-150mm clear stone fill will be measured in tonnes of material placed and accepted in the work and shall include all labour, materials and equipment necessary to complete the work.
- .5 Material specifications allow for three different gradations of rock fill. If rock fill, uniformly graded between 20 mm and 100 mm is used then 19 mm clear stone, 22-50 mm clear stone and 75-150 mm clear stone can be replaced with rock fill, uniformly graded between 20 mm and 100 mm. Payment for the 19 mm clear stone, 22-50 mm clear stone and 75-150 clear stone will be based on the theoretical tonnage from the neat line volume. The theoretical tonnage will be subtracted from the weigh bill quantities for rock fill.
- .6 Granular A fill shall be measured under Section 32 11 23.
- .7 Geotextile shall be measured under Section 31 32 19.01.
- .8 All remaining Work under this Section will be measured as part of the Lump Sum Arrangement.

1.2 REFERENCES

- .1 Ontario Provincial Standard Specifications (OPSS)/Ontario Ministry of Transportation
.1 OPSS.PROV 1004 November 2012, Ontario Provincial Standard Specification, Material Specification for Aggregates - Miscellaneous.

<u>1.2 REFERENCES</u> (Cont'd)	.1	(Cont'd)
	.2	OPSS.PROV 1010 April 2013, Ontario Provincial Standard Specification, Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Material.
<u>1.3 SUBMITTALS</u>	.1	Make submittals in accordance with Section 01 33 00.
	.2	Quality Control: in accordance with Section 01 45 00:
	.1	Submit for review by Departmental Representative proposed dewatering methods as described in PART 3 of this Section.
	.2	Submit to Departmental Representative written notice when bottom of excavation is reached.
	.3	Preconstruction Submittals:
	.1	Submit construction equipment list for major equipment to be used in this section prior to start of Work.
<u>1.4 WASTE MANAGEMENT AND DISPOSAL</u>	.2	Submit records of underground utility locates, indicating: location plan of existing utilities as found in field, clearance record from utility authority, and location plan of relocated and abandoned services, as required.
	.1	Separate waste materials for reuse and recycling in accordance with Section 01 74 20.
<u>1.5 EXISTING CONDITIONS</u>	.1	Examine soil report bound with specifications.
	.2	Buried services:
	.1	Before commencing work establish location of buried services on and adjacent to site.
	.2	Arrange with appropriate authority for relocation of buried services that interfere with execution of work: pay costs of relocating services.
	.3	Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
	.4	Prior to beginning excavation Work, notify Departmental Representative and applicable authorities having jurisdiction establish location and state of use of buried utilities

1.5 EXISTING
CONDITIONS
(Cont'd)

- .2 Buried services:(Cont'd)
- .4 (Cont'd)
and structures. Departmental Representative and
authorities having jurisdiction to clearly mark
such locations to prevent disturbance during
Work.
- .5 Confirm locations of buried utilities by
careful test excavations.
- .6 Record location of maintained, re-routed
and abandoned underground lines.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Rock Fill: shall be screened rock, clean, hard,
durable, angular non-friable limestone or
igneous rock free from cracks, seams or other
defects which may impair durability. Material to
be free from clay, silt, vegetable or other
foreign matter. Material must be uniformly
graded. Acceptable gradation limits are:
- .1 minimum size of 20 mm and a maximum
size of 100 mm.
- .2 minimum size of 50 mm and a maximum
size of 150 mm.
- .3 minimum size of 75 mm and a maximum
size of 300 mm.
- .2 19 mm Clear Stone: to Ontario Provincial
Standard Specification OPSS.PROV 1004, maximum
19.0 mm Type 2.
- .3 22-50mm Clear Stone Fill: to Ontario Provincial
Standard Specification OPSS.PROV 1004, uniformly
graded with modified minimum size of 22 mm and a
maximum size of 50 mm.
- .4 75-150mm Clear Stone Fill: to Ontario
Provincial Standard Specification OPSS.PROV
1004, uniformly graded with modified minimum
size of 75 mm and a maximum size of 150 mm.
- .5 Granular material: to OPSS.PROV 1010:
- .1 Granular A fill, to Section 32 11 23.
- .6 Geotextiles: to Section 31 32 19.01.

PART 3 - EXECUTION

<u>3.1 SITE PREPARATION</u>	.1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.
<u>3.2 PREPARATION/ PROTECTION</u>	.1 Protect existing features from damage during Work. Make good of all damages at no extra costs to Departmental Representative. .2 Keep excavations clean, free of standing water, and loose soil. .3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Departmental Representative approval. .4 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage. .5 Protect buried services that are required to remain undisturbed.
<u>3.3 EXCAVATION</u>	.1 Advise Departmental Representative at least 7 days in advance of excavation operations. .2 Excavate to lines, grades, elevations and dimensions as indicated on drawings. .3 Remove and dispose of excavated material within the staging area adjacent to the material and equipment decontamination area. .4 Keep excavated and stockpiled materials safe distance away from edge of trench location approved by Departmental Representative. .5 Restrict vehicle operations directly adjacent to open excavation. .6 Notify Departmental Representative when bottom of excavation is reached. .7 Obtain Departmental Representative approval of completed excavation.

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| 3.3 EXCAVATION
(Cont'd) | .8 | Correct unauthorized excavation at no extra cost to Departmental Representative. |
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| 3.4 BEDDING AND
SURROUND OF
UNDERGROUND
SERVICES | .1 | Place and compact granular material for bedding and surround of underground services as indicated and as specified. |
| | .2 | Place bedding and surround material in unfrozen condition. |
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| 3.5 BACKFILLING | .1 | Do not proceed with backfilling operations until completion of following:
.1 Departmental Representative has inspected and approved installations.
.2 Departmental Representative has inspected and approved of construction below finish grade.
.3 Inspection, testing, approval, and recording location of underground utilities.
.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 | Rock backfill is to be placed. End dumping and free-fall of rock fill is not permitted. |
| | .5 | Place backfill material (excluding rock fill placement at ECF)once above lake level in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer. Compact to density not less than 100% corrected maximum dry density to Section 31 05 10.
.1 Place rock fill in uniform layers not exceeding 1 m at ECF (below lake level).
.2 Place backfill uniformly between anchor wall and face wall of ECF to equalize loading. If backfilling operations result in piles outside of tolerance specified in Section 31 61 13, take corrective action and restore piling to specified tolerances. |
| | .6 | Install geotextiles in accordance with Section 31 32 19.01. |
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- 3.6 RESTORATION
- .1 Upon completion of Work, remove waste materials and debris in accordance to Section 01 74 20, trim slopes, and correct defects as directed by Departmental Representative.
 - .2 Reinstate pavements and sidewalks disturbed by excavation to thickness, structure and elevation which existed before excavation.
 - .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.

PART 1 - GENERAL

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| 1.1 SECTION INCLUDES | .1 | Work under this Contract shall include furnishing, installing and maintaining temporary water pollution and erosion and sediment control measures specified herein, proposed by the Contractor and reviewed by the Departmental Representative, or ordered by the Departmental Representative as work proceeds. This work is intended to prevent water pollution or erosion within the project, thereby protecting the work, nearby lands, nearby bodies of water. |
| 1.2 MEASUREMENT PROCEDURES | .1 | No measurement will be made under this Section. Include costs for work of this Section under the Lump Sum arrangement. |
| 1.3 SUBMITTALS | .1 | <p>Submit to the Departmental Representative for review a site specific Erosion and Sediment Control Plan detailing methods to be used to prevent and control onsite erosion and sediment migration from the Work Area during construction activities.</p> <p>.1 The plan shall describe measures to be taken that protect adjacent properties and waterways. At a minimum, the plan shall indicate the location and details of construction entrances and methods to be used to prevent tracking of mud onto public streets by construction traffic, disposal of stormwater from the site during phases of work, and temporary erosion and sediment control methods.</p> <p>.2 The plan shall provide an implementation schedule for temporary erosion and sediment control practices, including the timing of initial placement and the duration that each practice should remain in place.</p> <p>.3 The plan shall cover the extent of the Work Area, including disposal sites, haul roads, and all nearby land, streams, and other bodies of water.</p> <p>.4 The plan shall describe pollution prevention measures that will be used to control contaminated materials, litter, construction chemicals, soil stockpiles, and construction debris from becoming a pollutant source in stormwater discharges from the Work Area.</p> <p>.5 The plan shall include a role for an Environmental Monitor to inspect and maintain</p> |
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- 1.3 SUBMITTALS .1 (Cont'd)
- .5 (Cont'd)
- erosion and sediment control measures through the duration of the work. The role shall be in accordance with the "Erosion and Sediment Control Guideline for Urban Construction", published by the Greater Golden Horseshoe Area Conservation Authorities in December 2006.
- .6 The plan shall include an inspection form to be completed by the Environmental Monitor. Inspection forms kept onsite and provided to the Departmental Representative upon request.
- .7 No earthwork shall be started before this plan is approved in writing by the Departmental Representative.
- .2 Prior to ordering erosion and sediment control materials, submit to the Departmental Representative for review, product data for all erosion control materials.

- 1.4 REFERENCES .1 Greater Golden Horseshoe Area Conservation Authorities. "Erosion and Sediment Control Guideline for Urban Construction." December, 2006.

PART 2 - PRODUCTS

- 2.1 PRODUCTS .1 Straw Bales: shall consist of wheat or oat straw, be dry and firm and tied tightly in at least two places, sized and dimensions as indicated on Drawings.
- .2 Silt fence: to OPSS 805, November 2010, Ontario Provincial Standard Specification, Construction Specification for Temporary Erosion and Sediment Control Measures.
- .3 Concrete barrier: shall new or used with minimum dimensions as indicated on Drawings and a minimum compressive strength of 10 MPa.

PART 3 - EXECUTION

3.1 EROSION AND SEDIMENT CONTROL MEASURES

- .1 Construction of temporary erosion and sediment control measures along the perimeter of proposed Work Areas shall be completed prior to the initiation of any work in those areas that could result in erosion or the generation of suspended sediments. To the degrees possible, coordinate this temporary work with permanent drainage and erosion control work required by the Contract documents.
- .2 Install and maintain all temporary erosion control measures throughout the duration of the construction activities in accordance with the Contractor's site-specific Erosion and Sediment Control Plan. If exposed areas erode, repair the damage, with eroded material where possible, and clean up any remaining material in downstream drainage facilities.
- .3 If the Departmental Representative anticipates water pollution or erosion problems, schedule the work so that grading and permanent erosion controls immediately follow grading work. If conditions prevent such scheduling, the Departmental Representative may require temporary erosion control measures between work stages.
- .4 The Departmental Representative may require temporary water pollution and erosion control measures if it appears pollution or erosion may result from weather, the nature of the materials, or progress of the work. The Departmental Representative may also require permanent erosion control work to be done during or immediately after grading.
- .5 Remove temporary control devices when no longer needed, and restore any disturbance of the area associated with the controls or their removal, as directed by the Departmental Representative.
- .6 Bear full responsibility for temporary water pollution/erosion control measures for all sources of material, disposal sites, and haul roads the Contractor provides.
- .7 The Departmental Representative may direct additional erosion and sediment controls to be installed. Comply with the Departmental

3.1 EROSION AND SEDIMENT CONTROL MEASURES (Cont'd)	.7 (Cont'd) Representative's request and immediately install the required controls.
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3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL	.1 Provide straw bales and silt fence for temporary erosion and sedimentation control measures along the perimeter of the staging area to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties, roads and lake, according to OPSS 805, November 2010, Ontario Provincial Standard Specification, Construction Specification for Temporary Erosion and Sediment Control Measures. Place concrete barrier along straw bales.
	.2 Inspect straw bales and silt fence on a regular basis and remove and manage accumulated sediment.
	.3 Remove sediment accumulated by the temporary erosion and sedimentation control once it reaches half the height of the straw bales.
	.4 Repair and replace temporary erosion and sedimentation control materials as needed.
	.5 Temporary erosion and sedimentation measures shall remain in place after completion of this Contract.

PART 1 - GENERAL

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| <u>1.1 SECTION INCLUDES</u> | .1 | Materials and installation of polymeric geotextiles used in revetments, breakwaters, retaining wall structures, filtration, drainage structures, roadbeds and railroad beds purpose of which is to:
.1 Separate and prevent mixing of granular materials of different grading.
.2 Act as hydraulic filters permitting passage of water while retaining soil strength of granular structure. |
| <u>1.2 MEASUREMENT PROCEDURES</u> | .1 | Geotextile placed in the ECF will be measured in square metres of horizontal surface covered by material and shall include all labour, materials and equipment necessary to complete the work. No allowance will be made for seams, overlaps or vertical laps. |
| | .2 | Geotextile placed in the staging area will not be measured separately for payment. It is considered incidental to Section 32 11 15. |
| <u>1.3 REFERENCES</u> | .1 | American Society for Testing and Materials International, (ASTM):
.1 ASTM D3786/D3786M-13, Standard Test Method for Bursting Strength of Textile Fabrics-Diaphragm Bursting Strength Tester Method.
.2 ASTM D4491-99a(2009), Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
.3 ASTM D4632-08, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
.4 ASTM D4751-12, Standard Test Method for Determining Apparent Opening Size of a Geotextile.
.5 ASTM D5261-10, Standard Test Method for Measuring Mass per Unit Geotextiles. |
| <u>1.4 SUBMITTALS</u> | .1 | Submit in accordance with Section 01 33 00. |
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| 1.4 SUBMITTALS
(Cont'd) | .2 | Submit to Departmental Representative following samples at least 4 weeks prior to beginning Work. |
| | .1 | Minimum length of 2 m of roll width of geotextile. |
| | .3 | Submit manufacturer's data for geotextile including, at a minimum: physical properties, packaging and installation techniques |
| | .4 | Submit to Departmental Representative 3 copies of mill test data and certificate at least 4 weeks prior to start of Work, and in accordance with Section 01 33 00. |

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| 1.5 DELIVERY,
STORAGE AND
HANDLING | .1 | During delivery and storage, protect geotextiles from direct sunlight, ultraviolet rays, excessive heat, mud, dirt, dust, debris and rodents. |
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| 1.6 WASTE
MANAGEMENT AND
DISPOSAL | .1 | Separate waste materials for reuse and recycling in accordance with Section 01 74 20. |
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PART 2 - PRODUCTS

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| 2.1 MATERIAL | .1 | Geotextile: non-woven synthetic fibre fabric, supplied in rolls. |
| | .1 | Width: 3.5 m minimum. |
| | .2 | Length: 100 m minimum. |
| | .3 | Composed of: minimum 85% by mass of polypropylene with inhibitors added to base plastic to resist deterioration by ultra-violet and heat exposure for 60 days. |
| | .4 | Physical properties: |
| | .1 | Mass per unit area: to ASTM D5261, minimum 320 g/m ² . |
| | .2 | Grab tensile strength and elongation: to ASTM D4632. |
| | .1 | Grab Tensile Strength: minimum 1050 N, wet condition. |
| | .2 | Elongation at break: minimum 50%. |
| | .3 | Mullen Burst: to ASTM D3786/D3786M, minimum 3.2 MPa. |
| | .5 | Hydraulic properties: |
| | .1 | Apparent opening size (AOS): 0.15 mm (Max ARV) to ATSM D4751. |
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| 2.1 MATERIAL
(Cont'd) | .1 | Geotextile:(Cont'd) |
| | .5 | Hydraulic properties:(Cont'd) |
| | .2 | Permittivity: to ASTM D4491, minimum |
| | 1.2 | sec ⁻¹ . |

PART 3 - EXECUTION

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| 3.1 INSTALLATION | .1 | Place geotextile material by unrolling onto graded surface in locations indicated and retain in position. |
| | .2 | Place geotextile material smooth and free of tension stress, folds, wrinkles and creases. |
| | .3 | Overlap each successive strip of geotextile 600 mm over previously laid strip. |
| | .4 | Verify placement of geotextiles between face wall and anchor wall with divers. Ensure 2 m vertical lap on sheetpiling is secure prior to commencement of backfilling. |
| | .5 | Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers. |
| | .6 | Replace damaged or deteriorated geotextile to approval of Departmental Representative. |
| | .7 | Place fill in accordance with Section 31 23 33. |

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| 3.2 GEOTEXTILE
REPAIR PROCEDURES | .1 | Repair of tears or holes in the geotextile shall require the following procedures: |
| | .1 | On slopes: A patch made from the same geotextile shall be double seamed into place; with each seam 6 to 19 mm apart and no closer than 25 mm from any edge. Should any tear exceed 10 percent of the width of the roll, that roll shall be removed from the slope and replaced. |
| | .2 | Non-slopes: A patch made from the same geotextile shall be spot-seamed in place with a minimum 610 mm overlap in all directions. |

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| 3.3 INSPECTION | .1 | Departmental Representative may randomly inspect geotextiles before or during installation. |
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3.4 CLEANING .1 Remove construction debris from Project site
and dispose of debris in an environmentally
responsible and legal manner.

3.5 PROTECTION .1 Vehicular traffic not permitted directly on
geotextile.

PART 1 - GENERAL

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| <u>1.1 SECTION INCLUDES</u> | <p>.1 Materials and installation of geomembranes for use in waste water ponds, sewage lagoons, landfill and other containment structures as an impermeable membrane.</p> <p>.2 Be responsible for all Quality Assurance/Quality Control (QA/QC) testing specified herein and as indicated on the Drawings. All QA/QC testing, with the exception of non-destructive tests, shall be conducted by an independent laboratory at the Contractor's expense.</p> |
| <u>1.2 REFERENCES</u> | <p>.1 American Society for Testing and Materials International (ASTM):</p> <p>.1 ASTM D792-08, Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.</p> <p>.2 ASTM D1004-09, Standard Test Method for Tear Resistance (Graves Tear) of Plastic Film and Sheet.</p> <p>.3 ASTM D1505-10, Standard Test Method for Density of Plastics by the Density-Gradient Technique.</p> <p>.4 ASTM D1603-12, Standard Test Method for Carbon Black Content in Olefin Plastics.</p> <p>.5 ASTM D1693-13, Standard Test Method for Environmental Stress-Cracking of Ethylene Plastics.</p> <p>.6 ASTM D4218-96(2008), Standard Test Method for Determination of Carbon Black Content in Polyethylene Compounds By the Muffle-Furnace Technique.</p> <p>.7 ASTM D4833-07, Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products.</p> <p>.8 ASTM D5199-12, Standard Test Method for Measuring the Nominal Thickness of Geosynthetics.</p> <p>.9 ASTM D5397-07(2012), Standard Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test.</p> <p>.10 ASTM D5596-03(2009), Standard Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics.</p> <p>.11 ASTM D6392-12, Standard Test Method for Determining the Integrity of Nonreinforced</p> |
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| 1.2 REFERENCES | .1 | (Cont'd) |
| (Cont'd) | .11 | (Cont'd) |
| | | Geomembrane Seams Produced Using Thermo-Fusion Methods. |
| | .12 | ASTM D6693-04(2010), Standard Test Method for Determining Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polypropylene Geomembranes. |
| | .13 | ASTM D6747-12, Standard Guide for Selection of Techniques for Electrical Detection of Potential Leak Paths in Geomembrane. |
| | .14 | ASTM D7007-09, Standard Practices for Electrical Methods for Locating Leaks in Geomembranes Covered with Water or Earth Materials. |
| | .2 | Geosynthetic Research Institute (GRI): |
| | .1 | GRI Test Method GM 17 (Revision 8, December 2012), Test Methods, Test Properties and Testing Frequency for Linear Low Density Polyethylene (LLDPE) Smooth and Textured Geomembranes. |
| 1.3 MEASUREMENT PROCEDURES | .1 | LLDPE Geomembrane will not be measured separately for payment but is considered incidental to Section 32 11 15. |
| 1.4 SUBMITTALS | .1 | Submit in accordance with Section 01 33 00. |
| | .2 | Submit to Departmental Representative following samples at least 4 weeks prior to beginning Work. |
| | .1 | Minimum 2 m length of standard width membrane. |
| | .2 | Minimum of 1 m seam with at least 300 mm of membrane on both sides of seam. |
| | .3 | Submit shop drawings in accordance with Section 01 33 00. |
| | .4 | Indicate installation layout, dimensions and details, including fabricated and field seams, anchor trenches and protrusion details. |
| 1.5 CERTIFICATES | .1 | Submit to Departmental Representative copies of manufacturer's mill test data at least 4 weeks prior to start of work. |
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1.5 CERTIFICATES (Cont'd)	.2	Submit to Departmental Representative certificates, including test results, at least 2 weeks prior to delivery to job site.
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1.6 DELIVERY, STORAGE AND HANDLING	.1	During delivery and storage, protect geo-membranes from direct sunlight, ultraviolet rays, excessive heat, mud, dirt, dust, debris and rodents. Make good of all damages at no extra cost to Departmental Representative.
	.2	Notify Departmental Representative of anticipated delivery time.

1.7 WASTE MANAGEMENT AND DISPOSAL	.1	Separate waste materials for reuse and recycling in accordance with Section 01 74 20.
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PART 2 - PRODUCTS

2.1 MATERIALS	.1	LLDPE Geomembrane Smooth Properties: to meet the following minimum specification values and as listed in GRI GM17: <ul style="list-style-type: none"> .1 LLDPE Geomembrane Resin: <ul style="list-style-type: none"> .1 Carbon Black Content: to ASTM D1603/D4218, 2.0-3.0%. .2 Carbon Black Dispersion: to ASTM D5596, 9 views in Categories 1 or 2 and 1 view in Category 3. .2 LLDPE Geomembrane Rolls: <ul style="list-style-type: none"> .1 Thickness: to ASTM D5199, minimum average 1 mm. .2 Density: to ASTM D1505/D792, maximum 0.92 g/cm³. .3 Tensile Strength and Elongation Properties to ASTM D6693: <ul style="list-style-type: none"> .1 Tensile Strength at Break: minimum 29 N/mm. .2 Elongation at Break: minimum 800%. .4 Tear Resistance: to ASTM D1004, minimum 97 N. .5 Puncture Resistance: to ASTM D4833, minimum 311 N.
	.2	Labeling geomembrane rolls or factory panel shall identify the following: <ul style="list-style-type: none"> .1 Thickness of material.

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| 2.1 MATERIALS
(Cont'd) | .2 | (Cont'd) |
| | .2 | Length and width of the roll or factory panel. |
| | .3 | Manufacturer. |
| | .4 | Directions to unroll the material. |
| | .5 | Product identification. |
| | .6 | Lot number. |
| | .7 | Roll or field panel number. |
| 2.2 CONFORMANCE TESTING | .1 | Provide Departmental Representative with manufacturer factory conformance test results. |
| | .2 | At a minimum, material conformance tests to determine the following characteristics shall be performed on the geomembrane: |
| | .1 | Density, ASTM D1505. |
| | .2 | Carbon black content, ASTM D1603. |
| | .3 | Carbon black dispersion, ASTM D5596. |
| | .4 | Thickness, ASTM D5199. |
| | .5 | Tensile characteristics, ASTM D6693. |
| | .3 | The Departmental Representative will review the results of the manufacturer factory conformance test results and the material conformance testing. Deployment of the geomembrane shall not commence until the Departmental Representative has determined that the material is acceptable. |

PART 3 - EXECUTION

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| 3.1 INSTALLATION | .1 | Installation of geomembrane shall be performed on surfaces that have been made as smooth and horizontal as practical. |
| | .2 | All surfaces on which the geomembrane is to be installed shall be acceptable to Departmental Representative prior to installation. |
| | .3 | The prepared surface underlying the geomembrane must not be allowed to deteriorate after acceptance, and must remain acceptable up to the time of geomembrane placement and until completion of the project. |
| | .4 | Install geomembrane at locations shown on Drawings in accordance with manufacturer's recommendations. |
| | .5 | Do not proceed with panel placement when ambient temperatures are below 0°C or above |
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| <u>3.1 INSTALLATION</u>
(Cont'd) | .5 | (Cont'd)
40°C, during precipitation, in presence of excessive moisture (eg. fog, dew), nor in presence of high winds in excess of 32 km/hr. |
| | .6 | Protect installed membrane from displacement, damage or deterioration before, during and after placement. |
| | .7 | Replace damaged, torn or permanently twisted panels to approval of Departmental Representative. Remove rejected damaged panels from site. Replacement and or repaired geomembrane at no extra cost to Departmental Representative. |
| <u>3.2 PROTECTION</u> | .1 | No equipment used shall damage geomembrane by handling, trafficking, leakage of hydrocarbons, or other means. |
| | .2 | Do not smoke, wear damaging shoes, or engage in other activities that could damage the geomembrane. |
| | .3 | Do not permit vehicular traffic directly on membrane. |
| <u>3.3 WARRANTY</u> | .1 | Obtain and submit to Departmental Representative from the Manufacturer a standard warranty provided for the geomembrane. |

PART 1 - GENERAL

<u>1.1 DELIVERY, STORAGE AND HANDLING</u>	.1	Protect piles from damage due to excessive bending stresses, impact, abrasion or other causes during delivery, storage and handling.
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	.2	Replace damaged piles as directed by Departmental Representative.
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<u>1.2 WASTE MANAGEMENT AND DISPOSAL</u>	.1	Separate and recycle waste materials in accordance with Section 01 74 20.
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<u>1.3 EXISTING CONDITIONS</u>	.1	A test pile driving program has been carried out, the results of test pile driving is bound with these specifications in Appendix G - Test Pile Program.
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	.2	Notify Departmental Representative in writing if subsurface conditions at site differ from those indicated and await further instructions from Departmental Representative.
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PART 2 - PRODUCTS

<u>2.1 MATERIALS</u>	.1	Material requirements for piles are specified in Section 31 62 16.13.
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	.2	Fabricate full length corner piles as indicated and provide equipment to handle full length piles without cutting and splicing.
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	.3	Do not splice piles without written approval of Departmental Representative. When permitted, provide details for Departmental Representative review. Design details of splice to bear dated signature stamp of professional engineer registered or licensed in Ontario, Canada.
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PART 3 - EXECUTION

3.1 EQUIPMENT

- .1 Prior to pile installation, submit to Departmental Representative for review, details of equipment for installation of piles.
 - .1 Impact hammers: provide manufacturer's name, type, rated energy per blow at normal working rate, mass of striking parts of hammer, mass of driving cap and type and elastic properties of hammer and pile cushions.
 - .2 Non-impact methods of installation such as augering, jacking, vibratory hammers or other means: provide full details of characteristics necessary to evaluate performance.
 - .2 Hammer:
 - .1 Hammers to be selected on basis of driveability analysis using wave equation theory, performed to show that piles can be driven to levels indicated.
 - .2 Driveability analysis to include, but not be limited to, following: hammer, cushion, and cap block details; static soil parameters; quake and damping factors, total soil resistance, blow count, pile stresses and energy throughput at representative penetrations.
 - .3 When required criteria can not be achieved with the proposed hammer, use larger hammer and take other measures as required.
 - .3 Leads:
 - .1 Construct pile driver leads to provide free movement of hammer. Hold leads in position at top and bottom, with guys, stiff braces, or other means reviewed by Departmental Representative to ensure support to pile while being driven. Inclined leads to be used for battered piles.
 - .4 Followers:
 - .1 Obtain approval from Departmental Representative prior to using followers. Provide followers of such size, shape, length and mass to permit driving pile in desired location to required depth and resistance. Provide followers with socket or hood carefully fitted to top of pile to minimize loss of energy and prevent damage to pile.
 - .2 Drive applicable load test piles using similar follower.
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3.2 FIELD MEASUREMENT

- .1 Maintain accurate records of driving for each pile, including:
 - .1 Type and make of hammer, stroke or related energy.
 - .2 Other driving equipment including water jet, driving cap, cushion.
 - .3 Pile size and length, location of pile in pile group, location or designation of pile group.
 - .4 Sequence of driving piles in group.
 - .5 Number of blows per metre for entire length of pile and number of blows per 100 mm for last 1000 mm.
 - .6 Final tip and cut-off elevations.
 - .7 Other pertinent information such as interruption of continuous driving, pile damage.
 - .8 Record elevation taken on adjacent piles during before and after driving of each pile.
- .2 Provide Departmental Representative with three copies of records.

3.3 DRIVING

- .1 Use driving caps and cushions to protect piles. Reinforce pile heads as required. Piles with damaged heads as determined by Departmental Representative will be rejected.
 - .2 Hold piles securely and accurately in position while driving.
 - .3 Deliver hammer blows along axis of pile.
 - .4 Restrike already driven piles lifted during driving of adjacent piles to assure set.
 - .5 Drive each piles to pile tip elevations as indicated.
 - .6 Cut off piles neatly and squarely at elevations as indicated to tolerance of plus or minus 6 mm. Type 1 piles include 0.6 m length above cut-off elevation so that part damaged during driving is cut off. Type 2 piles include 0.5 m length above cut-off elevation so that part damaged during driving is cut off.
 - .7 Remove cut-off lengths from site on completion of work.
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| 3.4 <u>DRIVING TOLERANCES</u> | .1 | Pile heads to be within 25 mm of locations as indicated. |
| | .2 | Piles not to be more than 0.4% of length out of vertical alignment. |
| 3.5 <u>OBSTRUCTIONS</u> | .1 | If obstruction less than 2 m below existing grade is encountered during pile driving, side cast obstruction/debris within the ECF footprint without bringing the material to the surface. |
| | .2 | If obstruction deeper than 2 m below existing harbour bottom is encountered that impedes the pile driving, leave obstructed pile and proceed to drive remaining piles. Return and attempt to complete driving of obstructed pile later. |
| | .3 | Advise Departmental Representative immediately if impossible to drive pile to full penetration, and obtain direction from Departmental Representative on further steps required to complete Work. |
| 3.6 <u>REPAIR/RESTORATION</u> | .1 | Pull out rejected piles and replace with new piles. |
| | .2 | Remove rejected pile and replace with a new, and if necessary, a longer pile. |
| | .3 | No extra compensation will be made for removing and replacing or other work made necessary through rejection of defective piles. |
| 3.7 <u>PROTECTION</u> | .1 | Protect adjacent structures, services and work of other sections from hazards due to pile driving operations. |
| | .2 | Arrange sequencing of pile driving operations and methods to avoid damages to adjacent existing structures. When damages occur, remedy damaged items to restore to original or better condition at contractor's own expense. |

PART 1 - GENERAL

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| 1.1 SECTION INCLUDES | .1 | Materials and installation for continuous interlocking steel sheet piles. Steel sheet piles for the ECF face wall and anchor wall are furnished by the owner. The quantity is identified in Appendix A. |
| 1.2 MEASUREMENT PROCEDURES | .1 | Installation of sheet piling for the Type 1 and 2 identified in the Unit Price Table will be measured in square metres of piling remaining in place after cut-off. Installation of sheet piling for the Type 3, 4 and 5 identified in the Unit Price Table will be measured in square metres of piling remaining in place after installation. There is no cut-off for Type 3,4 or 5 piling.
.1 Piling will be measured in plane of bulkhead, calculated by multiplying straight horizontal centre line length of bulkhead measured at top of piles by average vertical length of piles installed and left in work. |
| | .2 | Supply and installation of wale for the type identified in the Unit Price Table will be measured by the linear metre by measuring the straight horizontal centreline length of wale and shall include all labour, materials and equipment necessary to complete the work, including splices, welding, wale bolts, plates, nuts and washers. |
| | .3 | Supply and installation of tie rods for the type identified in the Unit Price Table will be measured by each unit installed and shall include all labour, materials and equipment necessary to complete the work, including corrosion protection, nuts, sleeve nuts, turnbuckles, pipe sleeves, bearing plates, washers and other associated hardware supplied and incorporated in Work, as indicated. |
| | .4 | Pile toe reinforcement will not be measured separately. Include costs in the unit price for installation of steel sheet piles for each type identified in the unit price table. |
| | .5 | Where steel sheet pile has been damaged during driving remove piling and replace with new piling and where piling is replaced as specified |

1.2 MEASUREMENT PROCEDURES (Cont'd)

- .5 (Cont'd)
in Section 31 62 16.17, it will not be measured separately for payment.
- .6 Overflow structures frame will not be measured separately. Include costs in lump sum arrangement.
- .7 Steel sheet pile closure including underwater placed concrete will be not be measured separately for payment. Include costs in lump sum arrangement.
- .8 Inclinator casings will be measured by the unit installed and shall include all labour, materials and equipment necessary to complete the work as indicated and specified.
- .9 Backfill materials shall be measured under Section 31 23 33 and Section 32 11 23.
- .10 All remaining Work under this Section will be measured under the Lump Sum Arrangement.

1.3 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM):
 - .1 ASTM A6/A6M-12a, Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
 - .2 ASTM A53/A53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - .3 ASTM A775/A775M-07b, Standard Specification for Epoxy-Coated Reinforcing Steel Bars.
 - .2 Canadian Standards Association (CSA International).
 - .1 CSA G40.20-04/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel.
 - .3 Society of Automotive Engineers (SAE).
 - .1 SAE J429-2013, Mechanical and Material Requirements for Externally Threaded Fasteners.
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- 1.4 SUBMITTALS
- .1 Submit shop drawings in accordance with Section 01 33 00.
 - .2 Submit shop drawings for following items:
 - .1 Exterior wall pile layout.
 - .2 Interior wall pile layout if amended from contract documents.
 - .3 Corner piles.
 - .4 Temporary bracing.
 - .5 Internal cell wall connection.
 - .3 At least 2 weeks prior to fabrication, submit to Departmental Representative, two copies of mill test reports in accordance with CSA G40.20/G40.21.
 - .4 Provide Departmental Representative with copy of certification for fusion welding in accordance with CSA W47.1.
- 1.5 QUALITY ASSURANCE
- .1 Materials inspected or tested by Departmental Representative which fail to meet contract requirements will be rejected.
 - .2 Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, Contractor to pay costs for additional tests or inspections. Departmental Representative to approve corrected work.
- 1.6 DELIVERY, STORAGE AND HANDLING
- .1 Steel sheet piles:
 - .1 Use slings for lifting piling so that mass is evenly distributed and piling is not subjected to excessive bending stresses.
 - .2 Pick up piling at steel sheet pile supplier's facility. Steel sheet pile supplier will load vehicles provided by contractor.
 - .3 Store sheet piling on level ground or provide supports so that sheet piling is level when stored.
 - .1 Provide blocking at spacing not exceeding 8 m so that there is no excessive sagging in piling.
 - .2 Overhang at ends not to exceed 2 m.
 - .3 Block between lifts directly above blocking in lower lift.
 - .2 Tie rods:
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| 1.6 DELIVERY,
STORAGE AND
HANDLING
(Cont'd) | .2 | Tie rods:(Cont'd) |
| | .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 and in accordance with manufacturer's recommendations in clean, well-ventilated area. |
| | .2 | Replace defective or damaged materials with new. |
| | .3 | If material is stock-piled on structure, ensure that structure is not overloaded. |

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| 1.7 WASTE
MANAGEMENT AND
DISPOSAL | .1 | Separate waste materials for reuse and recycling in accordance with Section 01 74 20. |
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PART 2 - PRODUCTS

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| 2.1 MATERIALS | .1 | Steel sheet piles : to CSA G40.20/G40.21, including chemical and mechanical requirements grade 350W, and with section modulus as specified on the drawings and as follows: |
| | .1 | Type 1 and 2 steel sheet piles: minimum pile thickness is 12.7 mm. |
| | .2 | Type 1 steel sheet piles have built-up plates. |
| | .3 | Special corners to be fabricated from individual piles furnished by owner: shop fabricate by welding as indicated provide fabricated special corners as specified by manufacturer for type of sheet piling supplied. |
| | .4 | Interlocks: to be such that section of interlock bar of 1 m minimum length will pass along full length of pile without binding. |
| | .5 | Mark each piece of sheet piling legibly by stencilling or die-and-stamping with following information. |
| | .1 | Heat Number. |
| | .2 | Manufacturer's Name. |
| | .3 | Length and Section Number. |
| | .6 | Do not precut lifting or slinging holes in sheet piles. |
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2.1 MATERIALS (Cont'd)

- .2 Tie rods, sleeve nuts and lock nuts:
 - .1 Tie rods: to ASTM A615, as follows:
 - .1 Type 1, Grade 552 MPa.
 - .2 Type 2, Grade 517 MPa.
 - .2 Tie rods: to continuously threaded bar.
 - .3 Sleeve nuts and lock nuts: to have load capacity in excess of capacity of tie rod.
 - .4 Wedge washer: to ASTM A536, minimum unfactored capacity 3465 kN.
 - .5 Preassembly, mark and test tie rod assemblies in shop. Align threaded connection to following tolerances at sleeve nut or connector sleeve: 1/80 of normal rod diameter, deviation of centre line, 1 in 160.
- .3 Steel for C-shapes, W-shapes, HP-shapes, hollow structural steel, plates, angles, steel bars, threaded rods and miscellaneous steel: to CSA G40.20/G40.21, Grade 350W.
- .4 Hollow structural steel: to CSA G40.20/G40.21, Grade 350W, Class H.
- .5 Steel for tie-rod pipe sleeves and overflow structure's pipes: to ASTM A53/A53M, Grade B.
- .6 Wale bolts, bolts, threaded rods, nuts and washers: to ASTM A325, minimum tensile strength of 830 MPa.
- .7 Weld: to Section 05 12 36.
- .8 Backfill material: to Section 31 23 33 and Section 32 11 23.
- .9 Turbidity curtain: to Section 35 49 25.
- .10 Oil booms: to Section 35 20 35.
- .11 Inclinator casings to be fibreglass with the following properties:
 - .1 Nominal outside diameter: 70 mm.
 - .2 Wall thickness: 3 mm.
 - .3 Coupling outside diameter: 76.5 mm.
 - .4 Collapsing pressure: 1.4 MPa.
 - .5 Material: fibreglass
- .12 Underwater concrete: to Section 03 37 26.
- .13 Bentonite based grout: to Section 31 62 16.17.

PART 3 - EXECUTION

- 3.1 OIL BOOMS .1 Prior to steel sheet pile installation, oil booms shall be installed in accordance with Section 35 20 35.
- 3.2 INSTALLATION .1 Do not begin pile installation until required quality control tests have been completed and test results approved by Departmental Representative.
- .2 Do welding to Section 05 12 36.
- .2 Do pile installation Work in accordance with Section 31 61 13 except where otherwise specified.
- .3 Submit full details of method and sequence of installation of piling to Departmental Representative for approval prior to start of pile installation work. Details must include templates, bracing, setting and driving sequence and number of piles in panels for driving.
- .4 When installing sheet piles, use following procedure:
- .1 Provide temporary templates or bracing to hold piles in alignment during setting and driving. Temporary templates or bracing shall be located at a minimum of 2 elevations.
- .2 Maximize the use of vibratory hammer before using impact hammers.
- .3 Drive piles two at a time. Drive first double pile to full depth, then place panel of five to eight double sheet piles in templates and secure last (end) double pile in location to prevent spreading of piles in panel.
- .4 Drive end double pile in panel sufficiently deep into ground to ensure that it will remain plumb, then, drive remaining double piles in panel to full depth beginning with double pile next to end double pile and finishing with double pile next to double pile first driven.
- .5 After one panel has been driven, place and drive succeeding panels in similar manner. Complete the driving of end double pile of first panel after double piles of second panel have been driven.
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3.2 INSTALLATION (Cont'd)

- .4 (Cont'd)
- .6 With every four pairs of piles driven: verify the verticality of the wall both in horizontal and perpendicular plane.
- .5 When installation is complete, ECF facewall at top of sheet piles to be within 75 mm of location as indicated and deviation from vertical not to exceed 1 in 100. No cutting or trimming of the ECF anchor wall is required.
- .6 Fabricate and install double channel wale, overflow structures frame and stop log shelves, and steel sheet pile closures to details indicated on drawings.
- .7 Place underwater concrete in steel sheet pile closure to Section 03 37 26.

3.3 HOLES

- .1 Patch holes in sheet pile wall, except where permanent holes are indicated.
 - .1 Use 12 mm thick plate of material equal to that of piling to patch holes and overlap not less than hole diameter.
 - .2 Weld to develop full strength of plate.
- .2 Drill any required holes in piling. Do not use flame cutting without permission of Departmental Representative.

3.4 CUTTING

- .1 When flame cutting tops of piles, and flame cutting holes in piles approved by Departmental Representative, use following procedure:
 - .1 When air temperature is above 0°C, no pre-heat is necessary.
 - .2 When air temperature is below 0°C, pre-heat until steel 25 mm on each side of line of cut has reached a temperature very warm to hand (approximately 35°C). Temperature indicating crayon marks may be used to measure temperature.
 - .3 Use torch guiding device to ensure smooth round holes or straight edges.
 - .4 Make cut smooth and free from notches throughout thickness. If grinding is employed to remove notch or crack, finished radius to be minimum 5 mm.
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3.5 SPLICING .1 Use full length piles.

3.6 TEMPORARY BRACING .1 Maintain ECF face walls and anchor walls in straight alignment during Class B dredging - Clay and rock fill placement by providing and installing temporary bracing.

.2 Temporary bracing shall be designed and shop drawings provided sealed by a Professional Engineer registered and practising in the Province of Ontario. Temporary bracing shall be installed prior to commencement of any Class B dredging - Clay and rock fill placement and maintained during Class B dredging - Clay and rock fill placement. Do not advance Class B dredging - Clay and rock fill placement ahead of temporary bracing. Design temporary bracing to facilitate safe removal.

.3 Remove the temporary bracing when the rock fill placement is 0.3 metres below the underside of the ECF wales, except between Stations 0+404E and 0+730E, when the rock fill is placed only to 2.5 metres below Chart Datum. Install permanent tie rods as specified and detailed prior to removal of the temporary bracing.

3.7 TIE ROD SPACING .1 Tie rod spacing is set to match profile of anchor wall. Spacing is indicated on the drawings.

.2 Tie rod to connect to centre of inpan on facewall at inpan closest to perpendicular line from anchor wall tie rod connection.

.3 Submit shop drawing based on facewall pile profile showing tie rod layout for approval by Departmental Representative. Submit to Section 01 33 00.

3.8 TIE ROD ANCHORAGE SYSTEM .1 Do not place backfill between exterior and interior wall of the ECF until piles have been completely driven, adjusted and secured in final position by temporary support system for the ECF.

.2 Fit and adjust tie rod systems so that connections at exterior and interior wall of the ECF end of tie rods are tight.

3.8 TIE ROD
ANCHORAGE SYSTEM
(Cont'd)

- .3 Exercise care and protect tie rods from damage during placement of rock fill to final fill levels indicated on drawings. Tie rods that are damaged during rock fill placement shall be replaced at no additional cost to Departmental Representative.
- .4 Place bentonite based grout in HSS to details indicated on the drawings.

3.9 BACKFILLING

- .1 Backfill in accordance with Section 31 23 33, Section 32 11 23 and as indicated.
- .2 Take necessary steps to prevent spillage of rock fill materials during backfilling operations.
- .3 Protect piling tie rods and anchorage systems from damage or displacement during backfilling operations.

3.10 INCLINOMETER

- .1 Install inclinometers at the locations indicated on drawings. Maintain casing straight and vertical during rock fill placement. Casings are to extend from the toe of steel sheet piling to the top of steel sheet piling. Casing are to be free sediments and flushed clean for length of casing. Temporarily cap casing upon completion of flushing.

PART 1 - GENERAL

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| <u>1.1 SECTION INCLUDES</u> | .1 | This section specifies requirements for furnishing all materials and equipment and for performing all operations to install the temporary interlock sealant according to requirements identified in this specification, and in accordance and in the necessary quantities to construct the particular feature in the Drawings. |
| <u>1.2 DEFINITIONS</u> | .1 | QC Technician is the technical representative of the grout supplier providing continuous on-site quality control during flushing and sealing operations |
| | .2 | Reference water elevation: is the surface water elevation on the interior of the Engineered Containment Facility (ECF) established at the completion of the interlock sealing. |
| <u>1.3 SUBMITTALS</u> | .1 | Make submittals in accordance with Section 01 33 00. |
| | .2 | Prepare and submit Steel Sheet Pile Interlock Sealing Installation Plan to Departmental Representative for review at least 2 weeks prior to commencement of Work. Interlock Sealing Installation Plan must include:
.1 Detailed outlines of steel sheet pile placement.
.2 Equipment to be used.
.3 Quality Control measures
.4 Interlock preparation prior to sealing. |
| | .3 | Maintain accurate records of interlock sealant installation, including:
.1 Interlock identification number.
.2 Date and time of sealing operation.
.3 Interlock flushing records for each interlock installed.
.4 Sealant installation records for each interlock installed.
.5 A complete list of the equipment used during the installation.
.6 Volume of sealant required to seal each interlock. |
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1.3 SUBMITTALS (Cont'd)

- .3 (Cont'd)
 - .7 List of reagent materials (including amounts of each) required to seal each interlock.
 - .8 Video inspection images.
- .4 Maintain accurate records the following information and incorporate in QC report:
 - .1 Depth Measurement - Record the flushing and probing depth of each interlock.
 - .2 Condition of Sealable Cavity - Record any unusual conditions encountered during the inspection of the sealable cavities.
 - .3 Documented conditions to be included: damage to the top of the interlock (due to driving); debris present at the base of the sealable cavity; and obstructions/restrictions present in the sealable cavity.
 - .4 Depths where flushing fluids show evidence of increased fluid loss in surrounding materials compared to normal observed conditions, which may indicate defects and/or depths where additional grout will be necessary.
- .5 Submit to Departmental Representative for approval at least 30 days prior to start of temporary interlock sealant work:
 - .1 QC Technician performing and or supervising interlock sealing operations shall at least five projects experience, more than 100 linear metres of wall in the past five years.
- .6 Provide Departmental Representative with 3 copies of the above records upon request.

1.4 MEASUREMENT PROCEDURES

- .1 Interlocks Sealant supplied and placed in the steel sheet pile interlocks will be measured by the interlock sealed and shall include all labour, materials and equipment necessary to seal the interlocks. All interlock flushing and debris and obstruction removal within the interlocks is considered incidental and will not be measured separately for payment. QC technician is considered incidental and will not be measured separately for payment.
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PART 2 - PRODUCTS

- 2.1 MATERIAL .1 Sealant material for ECF steel sheet pile interlock to be compatible with Waterloo Barrier system and have the following descriptive and performance properties:
- .1 Bentonite based grout: pre-packaged modified sodium bentonite based grout for use as a interlock sealant.
 - .1 Mix Requirements (per bag):
 - .1 Sealant Packing: 22.7 kg bags.
 - .2 Minimum Water Volume (per bag) 95 L.
 - .3 Maximum Water Volume (per bag) 575 L.
 - .4 Mixer Type: Colloidal, Paddle or Jet.
 - .5 Minimum Mixing Time: 2 (min).
 - .6 Maximum Pot Life: 180 (min)
 - .2 Permeability Requirements:
 - .1 A minimum bulk hydraulic conductivity of 1×10^{-7} cm/s shall be achieved for the combined Waterloo Barrier wall (i.e. sealed interlock and steel sheet pile together) and demonstrated through full scale test cell results.
 - .3 Capable of resisting hydraulic pressure during reduction of water surface elevation test to be carried out at completion of sealing of the ECF.

PART 3 - EXECUTION

- 3.1 WELDED INTERLOCKS .1 All but 20 of the individual sheets of the steel sheet piles for the anchor wall are provided in pairs. The pairs are seal welded along the centre interlock and no action is required under this contract related to flushing or sealing of those seal welded interlocks.
- 3.2 QC TECHNICIAN .1 Retain QC Technician to perform all requirements specified under this Section.
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3.3 INTERLOCK FLUSHING

- .1 Once the sheet piling has been installed, flush and probe the interlock in order to confirm that it is open from the water surface to a depth of 15 metres below chart datum and free of obstructions. This flushing and probing process is to verify that the connection of male and female interlocks is in good integrity.
- .2 All interlocks flushing shall be supervised by the QC Technician.
- .3 Debris and obstructions shall be removed from all interlocks by probing and flushing with pressurized water.
- .4 Alternate methods may be used to remove debris and obstructions within the interlock, including but not limited to: probing and flushing with high pressure or high volume pumps; and hydro lancing or mechanical removal.
- .5 Completely remove all debris and obstruction for the full depth of piling. Where piling has been damaged during driving, remove piling and replace with new piling.

3.4 INTERLOCK VIDEO INSPECTION

- .1 Use fibre-optic video inspection equipment to verify that the interlocks are clear of debris and obstructions. The inspection is performed by advancing a fibre-optic video camera down the interlock.
 - .2 Conduct Video inspection on 1 out of 40 interlocks.
 - .3 In some cases the tolerances of the interlocks may restrict the advancement of the inspection camera or the soil type surrounding the interlock may affect the clarity of the image and the quality of the video inspection (i.e. clays and silts tend to produce a cloudy image); the QC Technician shall determine when to terminate video inspection of a interlock. In the event that any interlocks are unable to be inspected with the fibre-optic camera for the reasons noted above, the next available interlock is inspected and reasons for the substitution are documented.
 - .4 During the video inspection of the interlocks, record images at 1.5 m increments along the depth of the sheet, including an image of the footplate.
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3.4 INTERLOCK VIDEO .5 Provide digital files (jpg format) of recorded
INSPECTION images and include with the final report.
(Cont'd)

3.5 INTERLOCK SEALING

.1 All interlocks sealing shall be supervised by the QC Technician.

.2 Install interlock sealant to specification and to manufacturer's recommendations.

.3 Do not seal steel sheet pile interlocks until QC Technician confirms that the interlocks are open to the full depth of piling, free of debris and obstructions, and in good integrity.

.4 Vibratory construction activity and steel sheet pile installation operations is not permitted within 30 m of interlock sealing operation and no filling operations within 15 m of joint sealing operation until grout has cured.

.5 Prior to the installation of the sealant, secondary flushing of the interlocks shall be completed in order to remove any loose material. A tremie hose shall be inserted into the interlock. When the hose has reached the bottom of the interlock, the sealant shall be injected at an optimum pressure. The hose shall be withdrawn progressively up the interlock as the sealant fills the space below. The tremie nozzle shall be kept at least 300 mm below the rising surface of sealant.

.6 Should conditions warrant, a grout sock may be used in order to retard grout flow out of the interlock during the sealing process. Should conditions warrant, sealing of the interlock may be performed by external sealing methods approved by the Departmental Representative.

.7 Notify Departmental Representative at least 48 hours prior to completion of the last interlock sealing. Departmental Representative will determine the reference water elevation within the ECF upon completion of the last interlock sealing.

.8 Reduce the water surface elevation within the interior of the ECF by 800 mm. Departmental Representative will accept sealing of sheet pile interlocks if the reduced water surface elevation remains unchanged for at least 7 days.

- 3.5 INTERLOCK SEALING (Cont'd) .8 (Cont'd)
The rainfall will be measured at the site by the Departmental Representative. For the purpose of this clause the reference water elevation will be adjusted by an amount equal to the measured rainfall.
- 3.6 REJECTION .1 Departmental Representative will reject any or all interlock sealing if Contractor deviates from this specification or performance requirements. Take suitable corrective action such as flushing and re-sealing of the sheet pile interlocks and replacing steel sheet piles, at no extra cost to Contract.
- 3.7 CERTIFICATION .1 Provide certification from grout supplier that combined steel sheet pile grout system as installed has a bulk hydraulic conductivity less than or equal to 1×10^{-7} cm/sec.

PART 1 - GENERAL

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| <u>1.1 REFERENCES</u> | .1 | Ontario Provincial Standard Specifications (OPSS)/Ontario Ministry of Transportation:
.1 OPSS.PROV 1004 November 2012, Ontario Provincial Standard Specification, Material Specification for Aggregates - Miscellaneous. |
| <u>1.2 MEASUREMENT PROCEDURES</u> | .1 | Material and Equipment Decontamination Area will be measured by the square metres based on the neat horizontal plan lines called for on the Drawings and shall include all labour, equipment and materials necessary to complete the work. Excavation, backfilling, storm drainage, catch basin maintenance hole, arrestor bed aggregate, LLDPE geomembrane, compaction and maintenance of the decontamination area is considered incidental to the work and will not be measured separately for payment. |
| | .2 | Wheel Wash Station will be measured by the square metres based on the neat horizontal plan lines called for on the Drawings and shall include all labour, equipment and materials necessary to complete the work. Excavation, backfilling, storm drainage, catch basin, arrestor bed aggregate, LLDPE geomembrane, compaction and maintenance of the decontamination area is considered incidental to the work and will not be measured separately for payment. |
| | .3 | Treatment of water that comes in contact with contaminated sediments collected in the material and equipment decontamination area and the wheel wash station's catch basins, if directed by the Departmental Representative, will be paid as extra to Contract price in accordance with General Conditions. |
| | .4 | All remaining Work under this Section will be measured as part of the Lump Sum Arrangement. |
| <u>1.3 WASTE MANAGEMENT AND DISPOSAL</u> | .1 | Separate waste materials for reuse and recycling in accordance with Section 01 74 20. |
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PART 2 - PRODUCTS

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| <u>2.1 MATERIALS</u> | .1 | Truck arrester bed aggregate: to OPSS.PROV 1004.05.06 material, OPSS.PROV 1004. |
| | .2 | LLDPE geomembrane: to Section 31 32 19.02. |
| | .3 | Geotextile: to Section 31 32 19.01. |
| | .4 | Catch basin: to Section 33 05 14. |
| | .5 | PVC pipe: to Section 33 44 00. |

PART 3 - EXECUTION

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| <u>3.1 CLEARING AND GRUBBING</u> | .1 | Clearing includes felling, trimming, and cutting of trees into sections and satisfactory disposal of trees and other vegetation, underbrush etc. for removal, including downed timber, snags, brush, and rubbish occurring within designated area. |
| | .2 | Clear areas within staging area where wheel wash station and material and equipment decontamination area are to be constructed. |
| | .3 | Grubbing consists of excavation and disposal of stumps and roots larger than 7.5 cm in diameter to not less than 500 mm below existing ground surface. |
| | .4 | Grub cleared areas including matted roots and stumps. |

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| <u>3.2 EROSION AND SEDIMENT CONTROL</u> | .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 to Section 31 25 00. |
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| <u>3.3 STOCKPILING</u> | .1 | Stockpile fill materials in areas designated by Departmental Representative. Stockpile materials in manner to prevent segregation. |
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3.4 WATER COLLECTION AND TREATMENT

- .1 Stormwater that collects in the wheel wash area and material and equipment decontamination area prior to first contact with contaminated materials does not require treatment. Pump material from the catch basin in the material and equipment decontamination area and discharge on the adjacent ground in the storage area.
- .2 If directed by Departmental Representative, treat all water that collects in the wheel wash station and material and equipment decontamination area after the wheel wash area or material and equipment decontamination area comes in contact with contaminated sediments.

3.5 MATERIAL AND EQUIPMENT DECONTAMINATION AREA

- .1 Excavate and install catch basin/sump unit to details indicated on Drawings and in accordance with Section 33 05 14.
- .2 Install PVC pipes and fittings to details indicated on Drawings and to Section 33 44 00.
- .3 Shape and grade subgrade surface as indicated on Drawings.
- .4 Install geomembrane to details indicated on Drawings and to Section 31 32 19.02.
- .5 Install geotextile to details indicated on Drawings and to Section 31 32 19.01.
- .6 Place truck arrester bed aggregate to thickness, limits and as specified on Drawings.
- .7 Maintain decontamination area as required to the completion of the Contract.

3.6 WHEEL WASH STATION

- .1 Excavate and install catch basin/sump unit to details indicated on Drawings and in accordance with Section 33 05 14.
 - .2 Install PVC pipes and fittings to details indicated on Drawings and to Section 33 44 00.
 - .3 Shape and grade subgrade surface as indicated on Drawings.
 - .4 Install geomembrane to details indicated and in accordance with Section 31 32 19.02.
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| 3.6 WHEEL WASH STATION
(Cont'd) | .5 | Install geotextile to details indicated on Drawings and to Section 31 32 19.01. |
| | .6 | Place truck arrester bed aggregate to details indicated on Drawings. |
| | .7 | Maintain wheel wash station as required to the completion of the Contract. |
| 3.7 USE OF CONTAMINATED MATERIALS STORAGE AREA AND WHEEL WASH STATION | .1 | Store any material or equipment that come in contact with contaminated sediments. |
| | .2 | Decontaminate to Section 01 35 13. |
| | .3 | Decontaminate vehicles that come in contact with contaminated sediments in the wheel wash station to Section 01 35 13. |

PART .1 - GENERAL

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| <u>1.1 REFERENCES</u> | .1 | Ontario Provincial Standard Specifications (OPSS)/Ontario Ministry of Transportation
.1 OPSS.PROV 1004 November 2012, Ontario Provincial Standard Specification, Material Specification for Aggregates - Miscellaneous.
.2 OPSS.PROV 1010 April 2013, Ontario Provincial Standard Specification, Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Material. |
| <u>1.2 MEASUREMENT PROCEDURES</u> | .1 | Granular A Fill will be measured in tonnes of material placed and accepted in the work and shall include all labour, materials and equipment necessary to complete the work. |

PART 2 - PRODUCTS

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| <u>2.1 MATERIALS</u> | .1 | Granular A fill: material in accordance with OPSS.PROV 1010, Granular "A" and following requirements:
.1 Crushed stone or gravel, maximum size 19.0 mm. |
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PART 3 - EXECUTION

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| <u>3.1 UNDERWATER PLACEMENT OF GRANULAR A FILL</u> | .1 | Granular A fill shall be lowered in between the facewall and anchor wall of ECF using a clamshell bucket. Prior to releasing granular fill between the two walls, clamshell bucket shall be no more than 3 m from the bottom. |
| | .2 | Place and uniformly spread granular material between the facewall and anchor wall of ECF to limits indicated on the drawings. If backfilling operations result in piles outside of tolerance specified in Section 31 61 13, take corrective action. |

PART 1 - GENERAL

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|-----------------------------------|----|---|
| <u>1.1 SECTION INCLUDES</u> | .1 | Provide all labour, equipment and materials necessary for construction and installation of catch basins, maintenance holes including frame, grating and covers. |
| <u>1.2 REFERENCES</u> | .1 | Ontario Provincial Standard Drawings (OPSD):
.1 OPSD 400.010, Revision No.1 November 2007, Ontario Provincial Standard Drawing, Cast Iron, Square Frame with Square Overflow Type Dished Grate for Catch Basins, Herring Bone Openings.
.2 OPSD 701.010, Revision No.4 November 2009, Ontario Provincial Standard Drawing, Precast Concrete Maintenance Hole 1200mm Diameter.
.2 OPSD 704.010, Revision No.2 November 2009, Ontario Provincial Standard Drawing, Precast Concrete Adjustment Units for Maintenance Holes, Catch Basins, and Valve Chambers.
.3 OPSD 705.010, Revision No.2 November 2009, Ontario Provincial Standard Drawing, Precast Concrete Catch Basin 600x600 mm. |
| | .2 | Ontario Provincial Standard Specification (OPSS):
.1 OPSS.PROV 1010 April 2013, Ontario Provincial Standard Specification, Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Material. |
| <u>1.3 MEASUREMENT PROCEDURES</u> | .1 | Supply and installation of catch basins and catch basin maintenance holes including adjustment units and grates, excavation, geotextile and backfill will not be measured separately for payment. It is considered incidental to Section 32 11 15. |
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PART 2 - PRODUCTS

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| <u>2.1 MATERIALS</u> | .1 | Precast concrete catch basin: to OPSD 705.010. |
| | .2 | Precast concrete maintenance hole: to OPSD 701.010. |
| | .3 | Precast concrete adjustment units: to OPSD 704.010. |
| | .4 | Frame, grating and cover: to OPSD 400.010. |
| | .5 | PVC pipe: to Section 33 44 00. |
| | .6 | Granular A fill: to Section 32 11 23. |
| | .7 | Geotextile: to Section 31 32 19.01. |

PART 3 - EXECUTION

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| <u>3.1 EXCAVATION</u> | .1 | Advise Departmental Representative at least 7 days in advance of excavation operations for initial cross sections to be taken. |
| | .2 | Excavate hole for catch basins and maintenance holes at location indicated on Drawings. |
| | .3 | Excavated hole for catch basins and maintenance holes shall be dry and free from soft and foreign material. |
| | .4 | Restrict vehicle operations directly adjacent to open excavation. |
| | .5 | Notify Departmental Representative when bottom of excavation is reached. |
| <u>3.2 INSTALLATION</u> | .1 | Place catch basin and maintenance hole unit at location indicated on Drawings. |
| | .2 | Catch basin and maintenance hole unit shall be installed on firm foundation and shall be constructed plumb and true to alignment and grade. |
| | .3 | Set bottom section of precast unit in place. Make each successive joint watertight and in accordance with manufacturer's recommendations. |

3.2 INSTALLATION (Cont'd)

- .4 Interior surface of unit shall be kept clean as work progresses.
- .5 Plug lifting holes with precast concrete plugs set in cement mortar or compound.
- .6 Inlet and outlet pipes shall be securely set into the walls using cement mortar/grout or as recommended by manufacturer so that the unit is watertight.
- .7 All pipes shall be flush with the inside wall of the catch basin and maintenance hole units.
- .8 Place frame with grate or cover on top section to elevation indicated. Use adjustment unit to set frame with grate or cover.
- .9 A minimum of one adjustment unit, but not more than three adjustment units is required at each catch basin and maintenance hole.
- .10 All joints between units and frame with grate or cover shall be laid plumb and make smooth and watertight to manufacturer's recommendations.
- .11 Clean units of debris and foreign materials; remove fins or sharp protuberances.

3.3 BACKFILLING

- .1 Do not proceed with backfilling operations until Departmental Representative has inspected and approved installations.
 - .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 Granular A fill backfill shall be placed to a minimum thickness of 300 mm all around catch basin and maintenance hole. Native soil shall be reused as backfill material beyond the required 300 mm thick Granular A fill. Compact to density not less than 100% corrected maximum dry density to Section 31 05 10.
 - .5 Place backfill material in uniform layers not exceeding 150 mm compacted thickness. Compact each layer before placing succeeding layer.
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- 3.3 BACKFILLING
(Cont'd)
- .5 (Cont'd)
Compact to density not less than 100% corrected maximum dry density to Section 31 05 10.
.1 Place layers simultaneously on all sides of installed Work to equalize loading.
- .6 Install geotextile in accordance with Section 31 32 19.01.

PART 1 - GENERAL

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| 1.1 SECTION INCLUDES | .1 | Installation of monitoring well's steel pipes. Install the monitoring wells pipe to the depths and dimensions shown in the Drawings. |
| 1.2 REFERENCES | .1 | Americian Society for Testing and Materials (ASTM International):
.1 ASTM A53/A53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless. |
| | .2 | Canadian Standards Association (CSA International).
.1 CSA G40.20-04/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel. |
| 1.3 DELIVERY, STORAGE AND HANDLING | .1 | Handle and store materials in strict accordance with the manufacturer's requirements and recommendations. |
| | .2 | Inspect pipe at the time of delivery. Defective or damaged pipe shall be removed from the Work Area and replaced at no additional cost to Contract. |
| 1.4 MEASUREMENT PROCEDURES | .1 | Supply and installation of monitoring well steel pipes will be measured by each monitoring well pipe installed and shall include all labour, materials and equipment necessary to complete the work. Supply and installation of cross brace supports and mounting brackets are considered incidental to the work and will not be measured separately for payment. |
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PART 2 - PRODUCTS

- 2.1 MATERIALS
- .1 Steel Pipe: to ASTM A53/A53M, Grade B.
 - .2 Steel shapes and plates: to CSA G40.20/G40.21, Grade 350W.
 - .3 Welding materials: to CSA W59.

PART 3 - EXECUTION

- 3.1 INSTALLATION
- .1 Submit shop drawings to Section 01 33 00. Shop drawings to show layout of monitoring well and tie rods. Adjust monitoring well locations to eliminate interference with tie rod.
 - .2 Install monitoring well steel pipes and support braces at locations and to details indicated on Drawings prior to placement of clear stone and rock fill between the ECF anchor wall and face wall.
 - .3 Cap the steel pipe as indicated on the Drawings.
 - .4 Protect steel pipe and cap from damage during backfill operations.
 - .5 Monitoring wells pipe not be be more than 1 % of length out of vertical plumbness during backfill and construction operations.

PART 1 - GENERAL

<u>1.1 SECTION INCLUDES</u>	.1	Materials and installation for storm sewer.
<u>1.2 MEASUREMENT PROCEDURES</u>	.1	Supply and installation of stormwater drainage piping including excavating, backfilling, geotextiles, fittings and testing will not be measured separately for payment. It is considered incidental to Section 32 11 15.
<u>1.3 REFERENCES</u>	.1	American Society for Testing and Materials International, (ASTM) .1 ASTM F1336-07, Standard Specification for Poly(Vinyl Chloride) (PVC) Gasketed Sewer Fittings. .2 ASTM F1760-01(2011), Standard Specification for Coextruded Poly(Vinyl Chloride) (PVC) Non-Pressure Plastic Pipe Having Reprocessed-Recycled Content.
	.2	Canadian Standards Association (CSA International) .1 CSA B1800-11, Thermoplastic Non-pressure Piping Compendium - B1800 Series (Consists of B181.1, B181.2, B181.3, B181.5, B182.1, B182.2, B182.4, B182.6, B182.7, B182.8 and B182.11). .1 CSA B182.2-02, PVC Sewer Pipe and Fittings (PSM Type).
<u>1.4 DEFINITIONS</u>	.1	A pipe section is defined as length of pipe between successive catchbasins and/or maintenance holes.
<u>1.5 SUBMITTALS</u>	.1	Submit to Section 01 33 00.
	.2	Submit manufacturer's test data and certification at least 2 weeks prior to beginning Work.
	.3	Certification to be marked on pipe.
	.4	Submit to Departmental Representative 1 copy of manufacturer's installation instructions.

<u>1.6 WASTE MANAGEMENT AND DISPOSAL</u>	.1	Separate waste materials for reuse and recycling in accordance with Section 01 74 20.
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<u>1.7 DELIVERY, STORAGE AND HANDLING</u>	.1	To manufacturer's recommendations.
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PART 2 - PRODUCTS

<u>2.1 STORMWATER DRAINAGE PIPE</u>	.1	Pipe properties: <ul style="list-style-type: none"> .1 Material: Polyvinyl chloride - PVC SDR35 with smooth inner wall, to ASTM F1760. .2 Third party certified to CSA B182.2. .3 Ring stiffness: minimum 320 KPa for SDR35 pipe, to ASTM F1760. .4 Joints: Sealing gaskets to meet requirements of ASTM F1760 and certified to CSA B182.2 and withstand a minimum hydrostatic pressure of 345 KPa without leakage. .5 Fittings: to be injection-molded gasketed PVC fittings to ASTM F1336 and certified to CSA B182.2.
	.2	Geotextile: to Section 31 32 19.01.
	.3	Clear stone: to Section 31 23 33.

PART 3 - EXECUTION

<u>3.1 PREPARATION</u>	.1	Clean pipes and fittings of debris and water before installation, and remove defective materials from site to approval of Departmental Representative.
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<u>3.2 TRENCHING</u>	.1	Do trenching Work in accordance with Section 31 23 33.
	.2	Do not allow contents of sewer or sewer connection to flow into trench.
	.3	Trench alignment and depth as indicated on Drawings and approval by Departmental Representative prior to placing bedding material and pipe.

3.3 GEOTEXTILE .1 Install geotextiles in accordance with Section 31 32 19.01.

3.4 PIPE BEDDING .1 Place bedding material as indicated on Drawings in unfrozen condition.

.2 Place clear stone bedding material to details and limits indicated on Drawings.

.3 Place granular bedding material once above lake level in uniform layers not exceeding 150 mm compacted thickness to depth as indicated.

.4 Shape bed true to grade and to provide continuous, uniform bearing surface for pipe. Do not use blocks when bedding pipes.

.5 Shape transverse depressions as required to suit joints.

.6 Compact each layer full width of bed to at least 100% corrected maximum dry density (Section 31 05 10) before placing succeeding layer.

.7 Fill excavation below bottom of specified bedding adjacent to catch basins as indicated and specified in Section 33 05 14.

3.5 INSTALLATION .1 Lay and join pipe in accordance with manufacturer's recommendations and to approval of Departmental Representative.

.2 Handle pipe using methods recommended by manufacturer.

.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 Begin laying at outlet and proceed in upstream direction with socket ends of pipe facing upgrade.

.5 Install joints to manufacturer's recommendations.

- 3.5 INSTALLATION (Cont'd)
- .6 When any stoppage of Work occurs, restrain pipes as recommended by manufacturer, to prevent "creep" during down time.
 - .7 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.
 - .8 Make watertight connections to maintenance holes and catch basins.
 - .1 Use shrinkage compensating grout when suitable gaskets are not available.
 - .9 Connect to existing catch basin manhole as shown on Drawings.
- 3.6 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.
 - .3 Hand place surround material in uniform layers not exceeding 150 mm. Do not dump material.
 - .4 Place layers uniformly and simultaneously on each side of pipe.
 - .5 Compact each layer excluding clear stone fill to at least 95% corrected maximum dry density to Section 31 05 10.
 - .6 When field test results are acceptable to Departmental Representative, place surround material at pipe joints.
- 3.7 BACKFILL
- .1 Backfill to Section 31 23 33.
 - .2 Place backfill material in unfrozen condition.
 - .3 Place backfill material, above pipe surround, in uniform layers not exceeding 150 mm compacted thickness up to grades as indicated.
 - .4 Compact backfill to at least 100% corrected maximum dry density to Section 31 05 10.
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- 3.8 FIELD TESTING
- .1 Repair or replace pipe, pipe joint or bedding found defective.
 - .2 When directed by Departmental Representative, draw tapered wooden plug with diameter of 50 mm less than nominal pipe diameter through sewer to ensure that pipe is free of obstructions.
 - .3 Remove foreign material from sewers and related appurtenances by flushing with water.
 - .4 Do field testings in accordance with manufacturer's recommendations.

PART 1 - GENERAL

<u>1.1 SECTION INCLUDES</u>	.1	Dredging, sampling, disposal of dredged materials and soundings of Work areas.
<u>1.2 RELATED REQUIREMENTS</u>	.1	Departmental Representative reserves the right to adjust the dredge unit required dredge grades as necessary based on field observations and conditions encountered during dredging.
<u>1.3 DEFINITIONS</u>	.1	Reference water elevation: is the surface water level within the interior of the Engineered Containment Facility (ECF) sheet pile walls established at the completion of the interlock sealing.
	.2	Dredging: excavating, transporting and disposing of underwater materials.
	.3	Class A material: solid rock requiring drilling and blasting to loosen, and boulders or rock fragments of individual volumes of 1.5 cubic metres or more.
	.4	Class B material: loose rock, silt, sand, quick sand, mud, shingle, gravel, clay and sand, gumbo, boulders, till, debris or and material not specified under Class A.
	.5	Contaminated sediments: are area containing sediments with high concentrations of Total Polycyclic Aromatic Hydrocarbons (PAHs), which can include coal tar, also metals, and toxic based on Benthic Assessment of Sediments (BEAST) analysis, refer to Appendix C - Sediment Chemistry for the chemical properties.
	.6	Adhered sediments: contaminated sediments remaining above specified dredge grades after completion of mechanical dredging, that is adhered to the steel sheet piles.
	.7	Second pass dredging: the removal of isolated pockets of contaminated sediments below the specified elevations.
	.8	Obstructions: class of material greater than 3 cubic metres that is not included in this specification.

1.3 DEFINITIONS (Cont'd)

- .9 Debris: pieces of wood, wood products, wood fibre, logs, wire rope, tires, scrap steel, pieces of concrete and other waste materials.
- .10 Dredge grade: plane above which all material is to be dredged.
- .11 CMPM: cubic metres place measurement at dredging site.
- .12 Cleared areas: areas of dredging accepted as complying with plans and specifications.
- .13 Chart datum: permanently established plane from which soundings or tide heights are referenced.
- .14 Mechanical dredging plant: equipment that is comprised of the following - clamshell, dragline, dipper or backhoe dredge with dump scows.
- .15 Hydraulic dredging plant: equipment that uses the movement of water to excavate and transport underwater materials such as: high-solids pump, cutter suction dredger, suction dredger or trailing suction hopper dredger.

1.4 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00.
 - .2 Document and report incidents as required by all federal, provincial and local laws, codes, regulations, and in Section 01 35 28.
 - .3 Qualifications of Dredging Personnel:
 - .1 Names and years of experience in dredging of the proposed dredge operators to be used on the project. All dredge operators shall be approved by the Departmental Representative prior to the start of work. Departmental Representative reserves the right to revoke approval of a previously-approved dredge operator at any point during the work based on performance.
 - .2 Qualifications and experience of positioning equipment technical support personnel used for positioning equipment at the Work Area whenever dredging activities take place.
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| <u>1.4 SUBMITTALS
(Cont'd)</u> | .4 | Prepare and submit a Dredge Work Plan to the Departmental Representative for review. The Dredge Work Plan shall include:
.1 A description of means and methods for placement of sediment and clay into the interior of the ECF.
.2 Proposed approach for providing complete coverage of the areas to be dredged including sufficient overlap to ensure no gaps between dredge cuts.
.3 Assumed work days and hours of operation.
.4 Provide the Departmental Representative details regarding the location and times the Departmental Representative will be able to have access to the dredging equipment prior to mobilization. Facilitate Departmental Representative access to work vessels or equipment upon request. |
| <u>1.5 LOCATION</u> | .1 | Work comprises dredging of following area as indicated and as specified herein.
.1 Between the ECF face and anchor steel sheet pile walls.
.2 The drawing show 35 dredge areas. |
| <u>1.6 NOTIFICATIONS</u> | .1 | Notifications in accordance with Section 01 11 02. |
| <u>1.7 INTERFERENCE
TO NAVIGATION</u> | .1 | To Section 01 11 02. |
| <u>1.8 REQUIREMENTS
OF REGULATORY
AGENCIES</u> | .1 | Mark floating equipment with lights in accordance with the Collision Regulations with Canadian Modifications, 1983, and maintain a VHF marine radio watch on board. |
| <u>1.9 SITE
INFORMATION</u> | .1 | Material to be dredged consists of Class 'B' material. |
| | .2 | Results of most recent soundings are shown on Drawings. |
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1.10 MEASUREMENT PROCEDURES

- .1 Class B Dredging - Sediments to be measured in cubic metres, in-place measurement (CMPM), determined from soundings taken by Departmental Representative before and after dredging. Only material excavated above dredge grade will be measured. The vertical face of the excavation will be measured along the center line of the piling. Dredging shall include all labour, equipment and material necessary to complete the work. Class B Dredging - Sediments includes all material above the specified dredge grades and may include clay.
 - .2 Class B Dredging - Clay to be measured in cubic metres, in-place measurement (CMPM), determined from sounding taken by Departmental Representative before and after dredging. Only material excavated above dredge grade will be measured. Dredging shall include all labour, equipment and material necessary to complete the work.
 - .3 Second Pass Dredging to be measured in cubic metres, in-place measurement (CMPM), determined from sounding taken by Departmental Representative before and after dredging. Only material excavated above dredge design elevation will be measured. Second Pass Dredging shall include all labour, equipment and material necessary to complete the work, removal of adhered sediments in proximity of the wall is considered incidental and will not be measured separately for payment.
 - .4 Odour-related shut down will be measured by the hour based on the time an instruction from the Departmental Representative to stop dredging is given to the end of the regularly scheduled shift.
 - .5 All 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 shall be considered included in the dredging item.
 - .6 There will be no additional payment for delays caused by vessel traffic or downtime.
 - .7 Removal and disposal of obstructions are not considered included in dredging, additional compensation will be negotiated in accordance with the General Conditions.
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1.10 MEASUREMENT PROCEDURES (Cont'd)	.8	Average overdredging thickness within the specified dredged area is not to exceed 200 mm.
1.11 DREDGING EQUIPMENT	.1	Mechanical Dredging Equipment: .1 Use a totally enclosed level-cut clamshell bucket for dredging of Class B Dredging - Sediments. Size of bucket not to exceed 4 cubic metres. .2 Conventional bucket may be used for dredging of Class B Dredging - Clay.
	.2	Dredging Equipment: .1 All dredges shall be fitted with at least 2 marine very high frequency (VHF) radios and an Automatic Identification System (AIS transponder) with associated equipment to read the transponder signal. .2 All dredging equipment shall be seaworthy and maintained to meet the requirements of the work, including the immediate repair of leaks within one hour of observation. .3 Maintain a minimum of one (1) metre of water between the hull and the lake bottom for all dredges, material barges and tow boats .4 Provide immediate line of communication between Contractor's response manager or superintendent and the Departmental Representative and HPA representatives and shall facilitate immediate communications among in-water and land-based operations.
	.3	Dredge Positioning Equipment: .1 The dredge shall be equipped with necessary sensors or transducers, to enable accurate horizontal and vertical positioning of the dredge head or bucket. The dredge head shall have a positioning tolerance of plus or minus 10 cm vertically and plus or minus 20 cm horizontally.
	.4	Tow Boats: All tow boats used for propelling barges and other equipment shall be equipped with DGPS navigational equipment, radar, corrected compass, at least two marine VHF radios, an AIS transponder, and depth sounding equipment which is to be maintained in good operating condition during each tow. The number and size of tow boats to be used shall be specified in the Dredge Plan. Select tows that minimize sediment resuspension and/or erosion from the propeller wash.

1.12 DREDGING
SEQUENCE

- .1 Sequence of dredging:
 - .1 Dredge Class B Dredging - Sediments to dredge grade indicated on Drawings.
 - .2 Dredging of Class B sediments is limited to 7:00 AM to 7:00 PM daily.
 - .1 The Departmental Representative may direct the dredging activity to an alternate location in the ECF once per 12 hour shift.
 - .2 The Departmental Representative may stop the dredging activity to mitigate the impact of odours for the balance of any shift. Payment will be made for odour-related delay in accordance with unit price table.
 - .3 The Departmental Representative will give directions related to Clause 1.12.2.1 and Clause 1.12.2.2 above based on air quality monitoring and odour control. These directions apply to circumstances when the concentrations of naphthalene are below the maximum allowable concentration.
 - .3 Second Pass Dredging at locations to be specified by Departmental Representative after completion of Class B Dredging - Sediments.
 - .4 Dredge Class B Dredging - Clay to limit and dredge grade indicated on Drawings.
- .2 Supply Departmental Representative with plan of dredging sequence and/or stages.
- .3 Departmental Representative may direct Contractor to alter sequence of dredging areas.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 DREDGING DETAILS

- .1 Do not dredge until there is an enclosed basin created by the ECF anchor wall and the internal cell wall.
- .2 Maintain water surface elevation within the ECF interior walls at an elevation no greater than 500 mm above the reference water elevation. Refer to Section 31 62 16.17. The rainfall will be measured at the site by the Departmental Representative. For the purpose of this clause the reference elevation will be adjusted by an amount equal to the measured rainfall.
- .3 Dredge Class B Dredging - Sediments between the ECF sheet pile walls to dredge grade indicated on Drawings.
- .4 Second Pass Dredging may be required at isolated locations after completion of Class B Dredging - Sediments, if required Departmental Representative will provide a dredging plan with coordinates for second pass dredging units and required dredge grade. Second Pass Dredging limits and dredge grades will be provided by the Departmental Representative within 2 weeks of completion of Class B Dredging - Sediments.
 - .1 Dredge up to the anchor wall and face wall to remove any adhered sediments. Control clamshell bucket movements and prevent damages to steel sheet piling.
- .5 Upon completion of removal of Class B Dredge - Sediments and Second Pass Dredging where required, dredge Class B Dredging - Clay to limit and dredge grade indicated on the Drawings. Class B Dredging - Clay shall be placed and distributed in accordance with the Drawings.
- .6 Remove all materials above specified dredge grade, within limits indicated. Material removed from below dredge grade or outside specified area is not part of work. Average overdredging in each dredge unit is not to exceed 0.20 m.
- .7 Take necessary steps to prevent spillage of dredged materials outside the ECF perimeter. Make no claims for delays associated with removal of spilled materials outside the ECF perimeter.

3.1 DREDGING
DETAILS
(Cont'd)

- .8 Immediately notify Departmental Representative upon encountering an obstruction. By-pass the obstruction after clearly marking its location, move to another area and continue work. No related claim will be entertained if the foregoing procedure is not followed.

3.2 SOUNDING
SURVEYS

- .1 Contract Drawings are based on soundings taken by the Departmental Representative in 2002. Contract quantity shown on the Unit Price Table are based on this survey.
- .2 A pre-dredging sounding survey will be taken by the Departmental Representative.
- .3 No area will be dredged prior to Departmental Representative's and Contractor's mutual acceptance of pre-dredge survey for that area.
- .4 The Departmental Representative will conduct one post dredging survey of the dredging site at no cost to the Contractor. Any subsequent surveys as a result of finding high spots or incomplete dredging will be done at the Contractor's cost at a charge of \$2,000/day of survey fieldwork.
- .5 Results of the pre and post dredging surveys will be distributed to the Contractor, by the Departmental Representative, prior to and upon completion of the work, respectively.
- .6 Contractor will be notified of the post dredging survey results within 5 working days of survey completion and given subsequent release if he has successfully fulfilled the requirements of the work.
- .7 The final pay quantity will be calculated on the basis of the pre and post dredging surveys carried out by the Departmental Representative and the dredged grades.

3.3 DISPOSAL OF
DREDGED MATERIAL

- .1 Dispose of dredged material by depositing in the Engineered Containment Facility (ECF) identified.
- .2 Dredged sediments shall be lowered into the ECF using an enclosed clamshell bucket. Prior to releasing dredged materials into the ECF, clamshell bucket shall be at least 3 m below the
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| 3.3 DISPOSAL OF
DREDGED MATERIAL
(Cont'd) | .2 | (Cont'd)
ECF water surface elevation. Mark dredging equipment such that the 3 m depth is visible to the Departmental Representative in a small boat adjacent to the work. |
| | .3 | Do not permit any dredged material to spill or flow into waterways outside of ECF during the disposal of dredged material activities. |
| | .4 | Place and uniformly spread dredged clay materials into the ECF. Use disposal method to avoid mounding greater than 3 m above existing harbour bottom. Redredge areas within ECF where post dredging surveys identify mounding greater than 3 m. |
| 3.4 DISPOSAL OF
DEBRIS | .1 | Do not dispose of debris in open lake. |
| | .2 | Large debris, greater than 3 m ³ in size, must be placed in the ECF within 30 m of the anchor wall along the north side of the ECF. |
| | .3 | Debris within 0 to 3 m ³ in size can be placed anywhere within the ECF. |
| | .4 | Floating debris must be collected and disposed within the ECF. |
| | .5 | Departmental Representative may elect to investigate and redirect debris to shore. Costs will be paid as extra to Contract price in accordance with General Conditions. |
| 3.5 RE-DREDGING | .1 | Re-dredge unsatisfactory work and verify depths with additional sounding to approval of Departmental Representative. |
| 3.6 CO-OPERATION
AND ASSISTANCE TO
DEPARTMENTAL
REPRESENTATIVE | .1 | Cooperate with Departmental Representative on inspection of work and provide assistance requested. |
| | .2 | Furnish use of equipment, labour and materials forming ordinary and usual part of dredging plant as may be reasonably necessary to inspect and supervise work. |
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3.7 MONITORING OF WORK	.1	Monitor effectiveness and productivity on an ongoing basis.
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PART 1 - GENERAL

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| <u>1.1 SECTION INCLUDES</u> | .1 | This section includes sheen control for in-water work. |
| <u>1.2 MEASUREMENT PROCEDURES</u> | .1 | Supply of oil booms will be measured as part of the Lump Sum Arrangement. Unused oil booms will become the property of the Departmental Representative at the end of the Contract. |
| | .2 | Deployment, maintenance and removal of oil booms, if directed by the Departmental Representative, will be paid as extra to Contract price in accordance with General Conditions. |
| <u>1.3 SUBMITTALS</u> | .1 | Submit details of oil booms to Departmental Representative at least 2 weeks prior to the start steel sheet pile installation, details to include:
.1 Type of boom, manufacturer and vendor information, alignment, method of placement, and inspection plans.
.2 In addition to oil spill containment booms, have on-hand spill kits that include oil-absorbent pads and other necessary materials to immediately remove sheen on the water surface within the containment boom, as described in Section 01 35 43.
.3 Describe markings, marker buoys, lighting, and other features that will be used to provide containment boom perimeter visibility to vessels. |

PART 2 - PRODUCTS

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| <u>2.1 MATERIAL</u> | .1 | Oil Booms: 15-cm harbour boom and 100 m in length. |
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PART 3 - EXECUTION

- 3.1 GENERAL
- .1 The Departmental Representative may direct the use of oil booms during in-water work to minimize and control sheen in the vicinity of the Work if necessary. NAPL may be present within the limits of work. Be prepared to control, manage, and properly handle sediment and the contained NAPL, as well as any sheen produced during in-water work.
 - .2 Maintain oil boom on site and store in a fashion that will permit rapid deployment.

PART 1 - GENERAL

- 1.1 REFERENCES
- .1 American Society for Testing and Materials (ASTM):
 - .1 ASTM D751-06(2011), Standard Test Methods for Coated Fabrics.
 - .2 ASTM D2261-13, Standard Test Methods for Tearing Strength of Fabrics by the Tongue (Single Rip) Procedure (Constant-Rate-of-Extension Tensile Testing Machine).
 - .3 ASTM D5034-09, Standard Test Methods for Breaking Strength and Elongation of Textile Fabric (Grab Test).
 - .2 US Army Corps of Engineers:
 - .1 EP 1110-1-16 Appendix C, BMP 27 Type 1.
- 1.2 SUBMITTALS
- .1 Submit details of the turbidity curtain system to the Departmental Representative prior to the start of the work to Section 01 33 00.
 - .2 Submit to Departmental Representative details of geotextile material and seam at least 2 weeks prior to commencing work.
- 1.3 DELIVERY AND STORAGE
- .1 During delivery and storage, protect geotextiles from direct sunlight, ultraviolet rays, excessive heat, mud, dirt, dust, debris and rodents.
- 1.4 MEASUREMENT PROCEDURES
- .1 Supply of turbidity curtain will be measured as part of the Lump Sum Arrangement. Unused turbidity curtain will become the property of the Departmental Representative at the end of the Contract.
 - .2 Deployment, maintenance and removal of turbidity curtain, if directed by the Departmental Representative, will be paid as extra to Contract price in accordance with General Conditions.
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PART 2 - PRODUCTS

2.1 MATERIAL

- .1 Turbidity Curtain:
 - .1 Flotation Properties:
 - .1 Size: 200 mm x 200 mm.
 - .2 Length: 200 m.
 - .3 Curtain Depth: 10 m.
 - .4 Bouyancy: 13 Kg/m.
 - .2 Curtain Body Properties:
 - .1 Nylon Vinyl Reinforced: 610 g/m².
 - .2 Grab Tensile: to ASTM D5034, 1765N x 1660N.
 - .3 Tear: to ASTM D2261, 427 N x 382 N.
 - .4 Adhesion: to ASTM D751, 67 N.
 - .5 Hydrostatic Resistance: to ASTM D751, 2654 kPa.
 - .6 Seam strength: Heat Sealed.
 - .7 Connections: 15.8 mm rope hem edge.
 - .8 Ballast Chain: 8 mm.
 - .2 Seams: sewn in accordance with manufacturer's recommendations.
 - .3 Thread for sewn seams: equal or better resistance to chemical and biological degradation than geotextile.
 - .4 Turbidity curtain shall consist of geosynthetic, load line, flotation, ballast, anchors, mooring buoys, mooring lines, adjustment lines, and tie-downs.
 - .5 Design to conform to US Army Corp of Engineers EP 1110-1-16 Appendix C, BMP 27 Type 1.
 - .6 Turbidity curtains shall be constructed as follows:
 - .1 The flotation shall provide support along the length of the turbidity curtain.
 - .2 A sleeve shall be formed and heat-sealed or sewn along the entire bottom edge of the turbidity curtain geosynthetic, to contain the ballast in the sleeve. Breaks may be made in the sleeve to facilitate pulling, provided they are a minimum 100 mm in size and spaced at minimum 3 m intervals.
 - .3 Where turbidity curtain geosynthetic is joined to provide a continuous run, the sections shall be connected to provide a continuous seal and prevent the escape of turbid water between the sections.
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- 2.1 MATERIAL
(Cont'd)
- .6 (Cont'd)
- .4 The turbidity curtain, as prepared for installation, shall be of sufficient width to account for water depth and wave action.
- .5 The turbidity curtain shall be of sufficient length to permit work inside the area enclosed by the curtain without restricting equipment operations, and personnel from working.
- .6 Seal the ends of the turbidity curtain where it terminates at the existing structure face.

PART 3 - EXECUTION

- 3.1 GENERAL
- .1 The Departmental Representative may direct the use of turbidity curtain for events not described in this Contract.
- .2 Maintain turbidity curtain on site and store in a fashion that will permit rapid deployment.