



**Public Works and
Government Services Canada**

Solicitation No. EZ899 – 151108

Buy And Sell Reference No.:

SPECIFICATIONS: Esquimalt Graving Dock Waterlot
Phase 2 South Jetty Under-Pier Sediment Remediation

Project No.: R.018400.002

Date: 19 December 2014

APPROVED BY:


Collin Kingman
Regional Manager, Environmental Services

07, Jan, 2015
Date


Chris Patterson
Construction Safety Coordinator

07-01-15
Date


Andrew Mylly
Project Manager, Environmental Services

07 Jan 2015
Date

**Real Property Services Branch, Professional and Technical Services, Pacific Region
#641 – 800 Burrard Street, Vancouver, BC V6Z 2V8**

Esquimalt Graving Dock Waterlot Phase 2

South Jetty Under-Pier Sediment Remediation

Specifications

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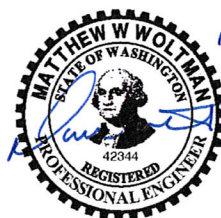
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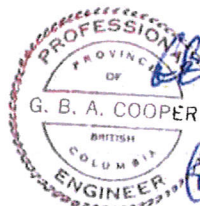
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12/19/14
 (FOR SPECIFICATION CONTENT WITHIN ANCHOR Q&A SCOPE AND RESPONSIBILITY)



G. B. A. Cooper
Dec 18/2014
 (for specification content within KCB scope and responsibility)

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APPENDIX A – JOB HAZARD ANALYSIS

EGD Preliminary Job Hazard Analysis Check List (Sample – For Reference Only), August 2011.

APPENDIX B – EGD REFERENCE DOCUMENTS AND GUIDELINES

EGD Fueling and Oil Transfer Policy, PWGSC, Environmental Services, May 29, 2007.

EGD Best Management Practices for Fire Prevention, PWGSC, Environmental Services, January 26, 2009.

EGD Spill Contingency Plan (Version 03), PWGSC, Environmental Services, February 2010.

EGD Environmental Best Management Practices (Version 04), PWGSC, Environmental Services, October 6, 2010.

EGD Oil Transfer Checklist, PWGSC, Environmental Services, October 2012.

EGD Sample Booking Sheets (Sample – For Reference Only), PWGSC, Environmental Services, October 2012.

EGD Asbestos Management Plan, PWGSC, Environmental Services, April 2012.

EGD Environmental Policy, PWGSC, Environmental Services, August 2013.

EGD Hot Work Application Form, PWGSC, Environmental Services, October 2014.

Esquimalt Harbour – Practices and Procedures, Section 7: Towing of Ships, DND, November 2014.

APPENDIX C – ENVIRONMENTAL REQUIREMENTS

EGD Phase 2 South Jetty Under-Pier Sediment Remediation Project, Environmental Management Plan (EMP), G3 Consulting, December 5, 2014.

EGD Phase 2 South Jetty Under-Pier Sediment Remediation Project, Water Quality Management Plan (WQMP), G3 Consulting, December 5, 2014.

APPENDIX D – REFERENCE DRAWINGS

(Note: These Reference Drawings are for reference purposes only. Contractor shall verify actual conditions at the EGD Work Site.)

Timber Crib Details at Landing Wharf (sheets 29, 32, 33). Department of Public Works Canada, General Plans Esquimalt Graving Dock, ca 1925.

P.W.C. New Esquimalt Dry Dock (sheets 1-9), Final Plan As Constructed, P. Lyall & Sons, 1928.

EGD South Landing Wharf, Provided by PWGSC, Environmental Services, ca. 1940.

EGD Improvements to Graving Dock, Contract No.3, Ker Priestman & Associates, Record Drawings, 1985.

EGD South Jetty Rehabilitation, Record Drawings D-S1 to D-S9, Westmar, 2003.

EGD South Jetty Refurbishment, As-Built Drawings S01-S07, Peterson Galloway, 2005.

EGD Load Rating Layout, Sketch 2, KM Engineering Group Inc, 2005.

EGD South Jetty – West Crane Pad, As-Built Drawings S01-S09, KM Engineering, 2009.

EGD South Jetty – South Crane Pad, As-Built Drawings S01-S07, KM Engineering, 2009.

EGD Electrical Master Drawings – South Substation Single Line Diagrams E5-E6, PWGSC, Environmental Services, September 12, 2012.

Survey of Pilings under South Jetty of Esquimalt Graving Dock, Drawing 030200583-104TS2-UTM, Focus Surveys, January 26, 2010.

EGD Waterlot Environmental Remediation Phase 1A (Sheet Pile Wall) Record Drawings, Anchor QEA, July 24, 2013.

EGD South Jetty Cathodic Protection, PR.100772 Drawing 15 Rev.2 (Update to 1985 Record Drawing 15 of 75), Electrical Wiring & Details, PWGSC, Environmental Services, May 2014.

EGD Waterlot Environmental Remediation Phase 1B (Open-Water Remediation) Record Drawings, Anchor QEA, August 21, 2014.

Dredge Plan Control Points. Anchor QEA, December 19, 2014.

APPENDIX E – DATA REPORTS AND MISCELLANEOUS REPORTS

The New Esquimalt Drydock, J.P.Forde, Engineering Institute of Canada, December 1925.

Supplemental Site Investigation – Esquimalt Graving Dock, Seacor Environmental, March 31, 2003.

EGD Waterlot, Supplementary Test Hole Investigation for Remedial Action Plan/Risk Management Plan, Golder Associates, March 3, 2010.

- EGD South Jetty Wharf Development, Geotechnical Data Report, Klohn Crippen Berger, March 23, 2010.
- EGD Sub-Surface Probing and Dive Surveys Interpretive Report, Golder Associates, November 1, 2012.
- EGD South Landing Wharf - Cathodic Protection Maintenance, Corrosion Service Company Ltd, December 11, 2013.
- EGD Waterlot Remediation Project: Borehole Investigation, Timber Portion of South Jetty, Golder Associates, September 7, 2011.
- EGD South Jetty Structure Condition Inspection Program (2011), WorleyParsons Canada, October 6, 2011.
- EGD Waterlot Remediation Project – South Jetty Confined/Restricted Space Hazard Identification, Golder Associates, September 23, 2011.
- EGD Waterlot Remediation Project, Debris Report, Golder Associates, November 1, 2012.
- EGD South Jetty Structure Condition Inspection Program (Draft), WorleyParsons Canada, October 1, 2012.
- EGD Waterlot – Esquimalt Graving Dock Waterlot Detailed Site Investigation, Golder Associates, June 7, 2013.
- EGD Waterlot Remediation Project – South Jetty Confined Space Hazard Identification – Atmospheric Testing and Illumination Assessment, Golder Associates, January 6, 2014.
- EGD South Jetty, Visual Assessment for Asbestos (Rev. 1), North West Environmental Group Ltd, December 5, 2014.
- EGD Draft Archaeological Impact Assessment, Golder Associates, December 15, 2014.
- Guidelines for Archaeological Chance Find Management, Golder Associates, December 12, 2014.

APPENDIX F – INDEMNIFICATION FORMS

- Indemnification Form
- Schedule 1 Form

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END OF SECTION

1. PART 1 – GENERAL

1.1 Description of Work

- .1 Public Works and Government Services Canada (PWGSC) requires the remediation of contaminated marine sediments within the South Jetty under-pier area as Phase 2 of the Esquimalt Graving Dock (EGD) Waterlot Remediation Project in Constance Cove of Esquimalt Harbour on Vancouver Island, British Columbia. PWGSC also requires the demolition of the timber pile supported sections of the South Jetty at the EGD Facility, to provide access to the under-pier area for remediation.
- .2 PWGSC will designate a representative (termed the Departmental Representative) to advise, coordinate, and monitor the work on behalf of PWGSC.
- .3 The sediment remediation required by this Contract is not a standard marine dredging and disposal project.
 - .1 Material within the EGD Work Site that is to be dredged and excavated is located in difficult access areas and is contaminated with various chemicals of concern.
 - .2 The Contractor shall use extra care to conduct its work in a manner that is suitable for environmental cleanup and not in a production dredging manner.
 - .3 Marine sediments will be removed as part of this work for disposal at a Disposal Facility and Hazardous Waste Management Facility.
 - .4 The Detailed Site Investigation (DSI) characterization of the material to be dredged and excavated is suitable for sediment classification purposes for this project. The Contractor shall be responsible for any additional sediment characterization that may be required during the execution of the contract for health and safety purposes, transportation, disposal, or to meet regulatory or permit requirements. Some of the sediment is classified as Hazardous Waste, according to the British Columbia Hazardous Waste Regulation (BC HWR). The remainder is classified as IL+ waste material, according to the British Columbia Contaminated Sites Regulation (BC CSR).
 - .5 Re-suspension of contaminated sediments during construction activities that may result in re-contaminating portions of the EGD Work Site, or areas outside the EGD Work Site, that have been cleaned up as part of this work or previous remediation work is of great concern to PWGSC. The Contractor shall conduct its work in a manner to minimize, to the extent practicable, re-suspension and redistribution of contaminated sediment, and to comply with environmental protection requirements in the Specifications and with permit requirements.
- .4 The EGD Facility is an actively used facility for ship repair and maintenance. Numerous vessels of varying sizes will call at the EGD Facility throughout this construction contract. EGD Operations maintains a vessel booking list that will be

made available to the Contractor following Notice of Award. The vessel booking list is an active working document, and is subject to change on a daily basis. The Contractor shall closely coordinate with the Departmental Representative to understand the EGD Facility usage and frequency of vessel calls, and to coordinate its work at the EGD Work Site around use of the EGD Facility.

- .5 The Contractor shall provide all supervision, labour, materials, supplies, tools, equipment, hoisting, transportation, receiving, handling, storage, quality control, environmental protection, and all other services necessary for the proper execution of the work.
- .6 Work to be performed under this Contract includes, but is not limited to, the following summary of principal items covered further in the Contract documents. This list of principal items is presented for Contractor convenience only, and does not represent the full list of work required, nor the required sequence of work:
 - .1 Contractor, EGD Work Site, and public Health and Safety responsibility.
 - .2 Environmental protection responsibilities provided in Sections 01 35 43 (Environmental Procedures and Sustainability), 01 35 13.43 (Special Procedures for Contaminated Sites), and other Sections of the Specifications. Environmental protection responsibilities also include compliance with all Environmental Management Plan (EMP) requirements, EGD environmental best management practices (EBMPs), EGD Environmental Policy, and other environmental protection requirements to comply with permit requirements.
 - .3 Complying with all submissions and documentation requirements.
 - .4 Coordination with the Departmental Representative (and designated alternates) in performance of all work.
 - .5 Conducting Pre-Construction, Progress, and Post-Construction bathymetric surveys as described in the Specifications.
 - .6 Set up, operations, and maintenance at the Contractor Off-Site Offload Facility.
 - .7 Temporary relocation of the tug boat wharf located at the east approach of the South Jetty, for the Contractor's own use during the work, as shown on the Drawings. Any temporary relocation of the tug boat wharf for the Contractor's own purpose, shall be solely within the EGD Work Site.
 - .8 Temporary disconnection, removal, storage, and subsequent reinstatement of the impressed current cathodic protection (ICCP) system on the seabed under the existing steel-piled South Jetty deck structure.
 - .9 Selective site demolition, salvage, disposal, storage and reinstatement of miscellaneous items related to the work (e.g., safety ladders and high mast light).
 - .10 Demolition, salvage, and disposal of existing electrical and mechanical services under the timber jetties, including fire water main, sanitary sewer

- line, compressed air line, stormwater sewer line, various cables up to 600 V, lighting, and fire alarm systems.
- .11 Design, procurement, installation, operation of, maintenance, and subsequent removal, cleaning, and disposal of Temporary Re-Suspension Barrier (TRB) systems as required by the Specifications, permit requirements, and water quality performance criteria, and as described in the EMP/Water Quality Monitoring Plan (WQMP). The TRB systems are required to contain, and prevent redistribution of, sediment that is re-suspended during dredging activities and to prevent recontamination of remediated areas due to redistribution of the suspended sediments.
 - .12 Re-driving of existing sheet pile perimeter wall around the perimeter of the South Jetty.
 - .13 Extraction and removal of existing timber jetty piles, fender piles, and corner dolphins. Demolition and removal of existing timber jetty structures (west timber jetty and south timber jetty) including concrete deck slabs and asphalt pavement, and timber-piled concrete deck structures (west/south crane pads). Demolition and removal of high mast light foundation (including demolition and reconstruction of a portion of the jetty deck slab to support the reinstated high mast light).
 - .14 Extraction and removal of existing timber pilings and collapsed sheet piling that are remnants of previous wharf structures (that were removed circa 1985) within the under-pier areas of the EGD Work Site.
 - .15 Removal of asphalt pavement and excavation of overburden materials.
 - .16 Construction of temporary shoring for dredging and for excavations.
 - .17 Removal of all miscellaneous debris from the seabed within the Temporary Re-suspension Barrier Containment Area (TRBCA).
 - .18 Removal of contaminated sediment including Hazardous Waste from within the EGD Work Site using mechanical dredging and excavation techniques (as per the Specifications and Drawings), dewatering of dredged sediment (as necessary), and in-water transportation of dredged sediment, Hazardous Waste, and debris to the Contractor Off-Site Offload Facility.
 - .19 Offloading, stockpiling, and dewatering of contaminated sediment including Hazardous Waste, and debris at the Contractor Off-Site Offloading Facility; treatment (if proposed) of IL+ classified waste at an approved Treatment Facility; and upland transportation and disposal of contaminated sediment, debris, and Hazardous Waste at an approved Disposal Facility and Hazardous Waste Management Facility. Treatment of Hazardous Waste prior to final disposal is preferred.
 - .20 Placement of Engineered Cap material in flat areas and on slopes (including impermeable geosynthetic material), underwater and on the foreshore, to isolate and provide protection from underlying contaminated sediments that

- are not removed by dredging activities, and to protect sediment surfaces that are susceptible to erosive forces (i.e., propeller wash, vessel wakes, and waves).
- .21 Placement of Residuals Management Cover Material, as required and as specified.
 - .22 Installation of timber fender piles and navigation marker dolphins, using re-used timber piles.
 - .23 Construction of timber bull rail (using re-used timber components) and steel hand-railing, and reinstallation of marine safety ladders.
 - .24 Relocation of the (temporarily relocated) tug boat wharf to its final location adjacent to the steel-piled concrete deck structure, as shown on the Drawings.
 - .25 Maintenance of the Contractor's Off-Site Offload Facility throughout the duration of the project.
 - .26 Extraction, cleaning, and disposal of the re-driven sheet pile perimeter wall around the perimeter of the South Jetty.
 - .27 Reinstatement of slope protection rock at the east approach foreshore (after removal of timber jetty structure).
 - .28 Backfilling and asphalt paving.
 - .29 Construction of buried fire water main and loop connection into existing fire water main near to boundary of demolished timber jetty structures.
 - .30 Termination and end capping of existing sanitary sewer lines near to boundary of demolished timber jetty structures.
 - .31 Termination and end capping of existing compressed air lines near to boundary of demolished timber jetty structures.
 - .32 Disconnection, reconnection and testing of fire alarm system.
 - .33 Termination of electrical cables and ducts near to boundary of demolished timber jetty structures, and installation of new electrical cables and ducts for relocated tug boat wharf.
 - .34 Restoration, decommissioning of temporary facilities, cleanup, and demobilization from EGD Work Site and the Contractor Off-Site Offload Facility.
- .7 The Contractor becomes the owner of, and is responsible for, any soil, sediment, excavated material, debris, waste, timber jetty components designated for demolition, or other material (including materials identified for recycling and/or re-use) once it is removed, dredged, or excavated to be loaded on a vehicle, barge, or other vessel for transport to a Contractor Off-Site Offload Facility, Disposal Facility, Treatment Facility, Hazardous Waste Management Facility, or other recycling/re-use facility.

- .8 The Coasting Trade Act shall apply to all vessels utilized by the Contractor for the work.
- .9 All works must comply with environmental guidelines of the EMP, WQMP, Laws and Regulations, and any permit requirements.
- .10 The Contractor shall comply with “Sustainable” requirements provided in Section 01 35 43 (Environmental Procedures and Sustainability). The list of principal sustainable requirement items presented herein is for Contractor convenience only, as these items must be included as a section of the Contractor’s Environmental Protection Plan (EPP), and is not intended to provide detailed requirements:
 - .1 Management of energy and air emissions.
 - .2 Water management approach.
 - .3 Waste management plan including material consumption, waste generation, waste reduction, and disposal procedures. This shall consider both Contractor- and project-generated waste.
 - .4 Consideration of ecological impacts (including on-site traffic pattern and speed control management).
 - .5 Post-construction documentation.
- .11 The work will require a planned, careful, and flexible approach by an experienced Contractor to ensure that structures are demolished, relocated, and/or reconstructed carefully; contaminated sediment is dredged and disposed in a proper manner; existing structures to remain are not disturbed; in-water placement of materials is performed according to the methods described in the Specifications; and suspended sediment, contaminants, and Deleterious Substances are controlled to maintain environmental quality throughout completion of the work.
- .12 The work to be performed by the Contractor shall include all of the requirements specified throughout each of the Sections that comprise the Specifications unless otherwise expressly stated to be performed by PWGSC, the Departmental Representative, or other named entities. To fully comprehend the work, the Specifications and Appendices shall be read in conjunction with the Drawings, the Unit Price Table included in the Tender documents, the EMP, site information (including Reference Drawings, documents, surveys, and other data), and other Contract documents.
- .13 The Contractor shall provide certifications of marine vessels by a certified marine architect, including certified barge displacement charts for haul barges to be used for tracking of dredge sediment and debris tonnage. Information shall be provided to the Departmental Representative in the form of a Marine Surveyor Report as described in the Specifications. The Contractor shall be responsible for supplying an updated marine certification for any vessel requiring repair during the project.

1.2 Related Sections

- .1 All Sections of the Specifications shall be read together. The Sections listed below are specifically referenced from this Section.
- .2 Section 01 32 16.06 (Construction Progress Schedule – Critical Path Method)
- .3 Section 01 33 00 (Submittal Procedures)
- .4 Section 01 35 13.43 (Special Procedures for Contaminated Sites)
- .5 Section 01 35 33 (Health and Safety Requirements)
- .6 Section 01 35 43 (Environmental Procedures and Sustainability)
- .7 Section 01 51 00 (Temporary Facilities)
- .8 Section 01 78 30 (Closeout Submittals)
- .9 Section 02 21 13 (Surveying and Positioning Control)
- .10 Section 02 41 13 (Selective Site Demolition)
- .11 Section 02 41 16.01 (Structure Demolition)
- .12 Section 31 61 13 (Pile Foundations General Requirements)
- .13 Section 35 37 10 (Engineered Capping)
- .14 Section 35 37 10.01 (Residuals Management Cover Placement)

1.3 Definitions (of capitalized terms in the Specifications)

- .1 Aquatic Water Quality Control Plan (AWQCP): The AWQCP is part of the Contractor's EPP that describes Contractor's approach for prevention of resuspended sediment from leaving the EGD Work Site area during Required Dredging and other aquatic construction activities, and Contractor compliance with all permit, Specifications, and EMP requirements related to meeting water quality requirements during construction. The AWQCP includes the TRB system control plan.
- .2 Cap Type (or Engineered Cap Type): Specified areas require placement of Engineered Cap materials. The engineered capping design is separated into several Cap Types as described and shown on the Drawings.
- .3 Certificate of Disposal: The Certificate of Disposal is a document issued by the Disposal Facility and Hazardous Waste Management Facility, which includes, on company letterhead, the name and location where the material is being placed for final permanent disposal, a description of the date and quantity for each shipment of material received, total quantity of material received, and signature by the identified authorized company representative.
- .4 Certificate of Treatment: The Certificate of Treatment is a document issued by the Treatment Facility, which includes, on company letterhead, the name and location where the material is being treated, a description of the date and quantity for each

shipment of material received, total quantity of material received, date and quantity of material for each treatment event, laboratory certificates demonstrating treatment objectives were met, total quantity of material treated, and signature by the identified authorized company representative.

- .5 Chance Find Procedures: The Chance Find Procedures outline the Contractor's required actions if relics and antiquities are encountered during the work under the Contract and are included as a reference document to the Specifications. Chance Find Procedures include protection of such articles and notification to the Departmental Representative immediately if they are encountered.
- .6 Chart Datum: Permanently established plane from which soundings or tide heights are typically referenced for marine construction works, as shown on the Drawings.
- .7 Completion Milestones: Completion of major components of work, Substantial Completion, and Total Completion.
- .8 Construction Quality Control Plan: The Construction Quality Control Plan describes the Contractor's means and methods by which construction activities will be monitored for technical compliance with the Contract.
- .9 Construction Work Plan: The Construction Work Plan describes the Contractor's means and methods for the performance of the work of the Contract.
- .10 Contingency Re-Dredging: Contingency Re-Dredging is additional dredging as specified by the Departmental Representative after Required Dredging activities have been completed, and based on PWGSC-conducted confirmational sampling and testing results. Any need for Contingency Re-Dredging, as well as the horizontal and vertical limits for Contingency Re-Dredging, will be determined by the Departmental Representative. Contingency Re-Dredging inside the TRBCA is a payable item with quantities included in the Unit Price Table. Required Contingency Re-dredging of contaminated sediment outside of the TRBCA, required as a result of the Contractor's activities, will not be paid for.
 - .1 Residuals Contingency Re-Dredging: The target cut thickness for Residuals Contingency Re-Dredging is 0.3 metres below the post-Required Dredging surface.
 - .1 Residuals Contingency Re-Dredging Payable Tolerance: The Residuals Contingency Re-Dredging Payable Tolerance is 0.15 metres above or below the target cut thickness for Residuals Contingency Re-Dredging. Material removed from within this tolerance will qualify for payment under the Contract.
 - .2 Missed Inventory Contingency Re-Dredging Minimum Cut Thickness: The minimum cut thickness for Missed Inventory Contingency Re-Dredging activities is a minimum 0.5 metres below the post-Required Dredging surface.
 - .1 Missed Inventory Contingency Re-Dredging Payable Overdredge Allowance: The Missed Inventory Contingency Re-Dredging Payable Overdredge Allowance is 0.3 metres below the Missed Inventory

Contingency Re-Dredging Minimum Cut Thickness for Missed Inventory Contingency Re-Dredging. Material removed from within this allowance will qualify for payment under the Contract.

- .11 Contingency Re-Dredge Volume: Contingency Re-Dredge Volume is the volume of all contaminated materials that may require removal as part of Contingency Re-Dredging inside the TRBCA, as identified by the Departmental Representative, and that will be paid for within the specified tolerances and Payable Overdredge Allowance.
- .12 Contractor Off-Site Offload Facility: The Contractor Off-Site Offload Facility is defined as the Contractor-provided off-site upland site where contaminated sediment and debris and Hazardous Waste that has been generated from the EGD Work Site is offloaded, stockpiled, dewatered and treated, re-handled, and transferred onto trucks or rail cars (if rail access is available) for disposal at a Disposal Facility and Hazardous Waste Management Facility as applicable. The Contractor Off-Site Offload Facility includes the Off-Site Staging and Stockpile Area. Operation of the facility must comply with Laws and Regulations.
- .13 Contractor Off-Site Offload Facility Plan: The Contractor Off-Site Offload Facility Plan is the proposed layout for use of the proposed Contractor Off-Site Offload Facility, not located at the EGD Work Site. This plan will show configuration of equipment for offloading operations, locations of sediment and debris, Off-Site Staging and Stockpile Area, equipment decontamination and wheel wash facilities, and access routes for materials leaving the Contractor Off-Site Offload Facility for transport to the Disposal Facility and Hazardous Waste Management Facility. The Contractor Off-Site Offload Facility Plan will also include copies of all permits and approvals associated with operation of the facility. The Contractor Off-Site Offload Facility Plan is included as part of the Construction Work Plan for Departmental Representative review.
- .14 Contractor Subarea: The Contractor may choose to divide the Required Dredging and Engineered Capping areas within the TRBCA into subareas for the purpose of construction sequencing, progress payments, and compliance with water quality criteria as described in the EMP/WQMP. The Contractor may define different subareas for dredging and capping activities. The Contractor may elect to use additional TRBs to physically isolate Contractor Subareas to prevent recontamination during construction. The Contractor must identify proposed Contractor Subareas and intended use of additional TRBs in the Construction Work Plan and in the AWQCP.
- .15 Coordinates:
 - .1 U.T.M.: Universal Transverse Mercator projection.
 - .2 U.T.M. Coordinates: Plane rectangular coordinates used in grid system in which grid network is applied to U.T.M. projection. Horizontal control information as indicated.

- .16 Daily Construction Report: The Daily Construction Report is a submittal by the Contractor to the Departmental Representative on a daily basis and will document all activities associated with the work that are completed each day. Specific submittal requirements for the Daily Construction Report are described in the individual Sections of the Specifications.
- .17 Deleterious Substance: A Deleterious Substance is as defined by the Fisheries Act. Generally, it is a substance that if added to water, makes the water deleterious to fish or fish habitat or any water containing a substance in such quantity or concentration or has been changed by heat or other means, that if added to water makes that water deleterious to fish or fish habitat.
- .18 Demolition Debris: Demolition Debris is defined as incidental material arising as a result of selective site demolition or structure demolition activities, as described in Section 02 41 13 (Selective Site Demolition) and Section 02 41 16.01 (Structure Demolition). All costs associated with removal and disposal of Demolition Debris will be included within the unit rates for Selective Site Demolition and Structure Demolition, respectively. No separate payment will be made for removal of demolition debris as Obstructions.
- .19 Directed Move: A Directed Move is when an emergency vessel access, or unforeseen or planned vessel access need occurs and the Departmental Representative advises the Contractor to stop work and move the Contractor's equipment to another location to provide vessel access. Directed Moves are solely at the discretion of the Departmental Representative and do not include regular Contractor operational moves, planned moves, or when the Contractor is given notice at least eight (8) hours in advance of the need to provide vessel access.
- .20 Disposal Facility: An existing facility located in Canada where waste is placed in or on land and that is designed, constructed, and operated to prevent any pollution from being caused by the facility outside the area of the facility. The facility must hold a valid and subsisting permit, license, certificate, approval, or other form of authorization issued by a province or territory for the disposal of soil or other material that is not suitable for industrial, commercial, urban park, residential, agricultural, wildlands, or any other land use specified in the British Columbia Contaminated Sites Regulation. The facility must comply with Laws and Regulations.
- .21 Drawings: Where the term is capitalized, Drawings are defined as the Contract Drawings for the work. Elsewhere, the term refers to other drawings (e.g., shop drawings).
- .22 Dredge Debris: Any solid waste materials other than sediment excavated as part of the dredging operations, such as logs, wire, cable, steel bands, anchors, lumber, trash, concrete, etc. Dredge Debris excludes Demolition Debris. All costs associated with removal and disposal of Dredge Debris will be included within the unit rates for Required Dredging or Contingency Re-Dredging, as appropriate to the circumstance.

- .23 Dredge Pay Volume: Dredge Pay Volume is the calculated quantity of in-situ dredged material removed by the Contractor that will be paid for as described in the Specifications. Dredge Pay Volume does not include upland excavation materials.
- .24 Dredge Prism: The Dredge Prism is the area defined by the horizontal limits of dredging shown on the Drawings that the Contractor is required to dredge. The Dredge Prism includes the area within the defined toe of cuts.
- .25 Dredge Unit: A Dredge Unit is a specified area located within the EGD Work Site, as shown on the Drawings, that is assigned an elevation and Payable Overdredge Allowance for Required Dredging, minimum or target cut thickness for dredge cut, or target grade to be used for Elevation Dredging or Slope Dredging activities.
- .26 EGD Facility: The EGD Facility encompasses the landside areas contained within the fenced security perimeter of the EGD, plus the adjacent waterlot areas under EGD control (termed the EGD Waterlot), all within the PWGSC property lines.
- .27 EGD Work Site: The EGD Work Site is the Contractor's work area and is defined as the boundaries by which work will be completed under this Contract. All Contractor on-site equipment and facilities will be located within the EGD Work Site. The nominal EGD Work Site boundary is shown on the Drawings. It is recognized that the EGD Work Site boundary will expand temporarily to accommodate construction activities related to the Pre-Construction Survey, service terminations, and miscellaneous other construction activities as required for the work.
- .28 Elevation Dredging: Dredging to the target Dredge Unit elevation.
- .29 Engineered Capping: Engineered Capping (also referred to as Capping or Engineered Cap) is the controlled, accurate placement of clean isolating material or materials to cover or isolate contaminated material from the aquatic environment. Engineered Cap composition and thickness can consist of a single layer of material, or multiple layers of different material types. Within the EGD Work Site, several Cap Types have been specified for placement. An Engineered Cap can serve any or all of three primary functions:
 - .1 Physical isolation of the contaminated material from the benthic environment.
 - .2 Physical containment of the underlying contaminated material, preventing re-suspension and transport to other sites.
 - .3 Reduction of the flux of dissolved contaminants into the Engineered Cap and overlying water column.
- .30 Environmental Management Plan (EMP): The EMP, provided in the Appendices to the Specifications, identifies components of the work that could present a hazard to the environment and, therefore, require environmental management and monitoring. The overall objective of the EMP is to provide a framework through which potential environmental risks will be managed during implementation of the construction activities. The EMP provides guidance and generally accepted best management practices (BMPs) and mitigation measures, to assist the Contractor in preparation of

the EPP. Because water quality management is a significant environmental protection component of the project, a WQMP has been prepared and is included as part of the EMP. The Contractor is required to adhere to the EMP and the Departmental Representative-accepted Contractor's EPP. In the event of a discrepancy between the EMP and Laws and Regulations, the more stringent requirements resulting in the higher protection of the environment and lower discharge of contaminants will prevail.

- .31 Environmental Pollution and Damage: Environmental Pollution and Damage includes the presence of chemical, physical, or biological elements or agents in or on land, water, or air that substantially alter, degrade, impair, disrupt, or affect human health or welfare or the environment including species of importance; habitat; ecological balances; aesthetics, cultural resources, and heritage values.
- .32 Environmental Protection: The prevention and control of Environmental Pollution and Damage, including management of aesthetics, odours, noise, light, thermal energy, and solid, chemical, gaseous, biological, physical, or liquid wastes or other pollutants.
- .33 Environmental Protection Plan (EPP): The EPP identifies the Contractor's means and methods for complying with the environmental protection requirements of the Specifications, the performance standards and other requirements of the EMP, and any other environmental requirements of the Laws and Regulations for all construction activities to be completed. The EPP also identifies the procedures by which the Contractor is required to establish and maintain quality control for environmental protection of all items of the work. Although provincial laws and municipal bylaws generally do not apply on federal lands, the Contractor shall comply with provincial laws, municipal bylaws and the Laws and Regulations at the EGD Work Site, and all other locations used for this Contract, unless otherwise directed by the Departmental Representative. This plan shall address all construction activities.
- .34 Excessive Dredging: Excessive Dredging is defined as material removed outside the Dredge Prism or below the Payable Overdredge Allowance, as described in these Specifications, and as shown on the Contract Drawings. Excessive Dredging will not be paid for.
- .35 Excessive Overplacement: Cap materials placed above the established Payable Over-Placement Allowances shall be considered Excessive Overplacement and will not be paid for.
- .36 Hazardous Waste Area: The Hazardous Waste Area is a subarea within the TRBCA as shown on the Drawings, which indicates the presence of Hazardous Waste Quality Sediment material that is to be removed under this Contract.
- .37 Hazardous Waste Management Facility: An existing facility located in Canada where Hazardous Waste quality soil, sediment, or other waste is placed in or on land and that is designed, constructed, and operated to prevent any pollution from being caused by the facility outside the area of the facility. The facility must hold a

- valid and subsisting permit, license, certificate, approval, or other form of authorization issued by a province or territory for the disposal of Hazardous Waste Quality soil, sediment, or other waste that is not suitable for industrial, commercial, urban park, residential, agricultural, wildlands, or any other land use specified in the British Columbia Contaminated Sites Regulation. The facility must comply with Laws and Regulations.
- .38 Hazardous Waste Quality Sediment: All sediment demonstrated to meet the definition of Hazardous Waste in the British Columbia Hazardous Waste Regulations.
- .39 Health and Safety Plan: The site-specific and project-specific Health and Safety Plan, prepared by the Contractor, is to cover all of the Contractor's health and safety considerations throughout construction, and define an emergency response plan (i.e., procedures to be followed and contacts in the event of an emergency).
- .40 Horizontal Datum: Universal Transverse Mercator (U.T.M.) North American Datum (NAD) 83, in metres (m).
- .41 IL+: IL+ refers to soil classification for material containing concentrations greater than the BC CSR Industrial Land Use standards, but does not meet the criteria for Hazardous Waste in the Hazardous Waste Regulations.
- .42 Laws and Regulations: All laws, regulations, by-laws, orders, codes, rules, standards, guidelines, or other lawful requirements of any federal, provincial, municipal, local, or other government authority.
- .43 Materials Source Separation Program (MSSP): Consists of a series of ongoing activities to separate re-usable and recyclable waste material into material categories from other types of waste at the point of generation.
- .44 Minimum Cut Thickness Dredging: Minimum Cut Thickness Dredging involves dredging a defined area to a minimum thickness as shown on the Drawings. Dredging areas include Dredge Unit 19, as shown on the Drawings.
- .45 Minimum Required Thickness: The Minimum Required Thickness is defined as the minimum thickness that the Contractor is required to place Engineered Capping materials (sand, filter, armour, and Residuals Management Cover Material) within the required areas as shown on the Drawings.
- .46 Missed Inventory: Missed Inventory is defined as contaminated materials that are not removed as part of Required Dredging, as identified by the results of the Departmental Representative's confirmation sampling and testing.
- .47 Obstruction(s): Rock pieces, wood, concrete, metal items, chains, wire ropes, drill rods, and other non-soil materials that are encountered fully embedded within the soils below seabed and that are demonstrated to the Departmental Representative's satisfaction to materially affect the pile driving, pile re-driving, or pile extraction work. Bedrock or dense granular or till-like soils encountered during installation of piles are not to be considered as Obstructions.

- .48 Off-Site Staging and Stockpile Area: The Off-Site Staging and Stockpile Area is defined as the upland area, located within the Contractor Off-Site Offload Facility, where handling of dredged sediment and debris will occur following completion of offloading activities and prior to upland transportation and disposal of the material at a Disposal Facility and Hazardous Waste Management Facility. The Off-Site Staging and Stockpile Area is also the area that the Contractor uses for off-site staging of equipment or materials.
- .49 On-Site Staging Area: The On-Site Staging Area is located on the South Jetty, as shown on the Drawings (also referred to as the On-Site Laydown / Office Area), and may be used for on-site offices and staging of equipment, but will not be used for stockpiling of soil materials and debris.
- .50 Payable Overdredge Allowance: The Payable Overdredge Allowance is 0.3 metres below the Required Dredge Elevation or grades, as shown on the Drawings. Material removed within the Payable Overdredge Allowance will qualify for payment under this Contract for the work.
- .51 Payable Over-Placement Allowance: The Payable Over-Placement Allowance for cap material is the maximum thickness above the Required Minimum Placement Thickness that will be paid for. Payable Over-Placement Allowance varies by Cap material types and areas as shown on the Drawings, and the maximum volume of Payable Over-Placement Allowance is included in the Unit Price Table for Engineered Capping materials.
- .52 Post-Construction Survey: The Post-Construction Survey documents bathymetry conditions following completion of each component of the work. The Post-Construction Surveys will be used for measurement of work completed within the EGD Work Site. The categories of Post-Construction Surveys include: Required Dredging Post-Construction Survey; Contingency Re-Dredging Post-Construction Survey; Cap Material Placement Post-Construction Survey; and Residuals Management Cover Material Placement Post-Construction Survey.
- .53 Pre-Construction Meeting: The Pre-Construction Meeting is defined as the coordination meeting between the Departmental Representative and the Contractor, prior to the start of work. The Departmental Representative will schedule the Pre-Construction Meeting following award of Contract.
- .54 Pre-Construction Survey: The Pre-Construction Survey will be completed by the Contractor to document bathymetry (sub-tidal) and topographic (intertidal and shoreline) conditions before performing dredging work. The Pre-Construction Survey will be used as the basis for measurement of work completed within the EGD Work Site.
- .55 Progress Meeting: Progress Meeting is defined as a meeting between the Departmental Representative and the Contractor that will occur on a weekly basis throughout the duration of the work, except where alternate timing arrangements are made by mutual agreement. The Contractor is responsible for scheduling Progress Meetings with the Departmental Representative.

- .56 Progress Surveys: Progress Surveys will be completed by the Contractor on a daily basis to document progress of construction activities completed as part of the Contract. Progress Surveys will be used for progress payment to the Contractor. The categories of Progress Surveys include: Required Dredging Progress Survey; Contingency Re-Dredging Progress Survey; Cap Material Placement Progress Survey; and Residuals Management Cover Material Placement Progress Survey. The Contractor may use Contractor Subareas to delineate progress survey areas.
- .57 Project Permits: Project Permits are the permits, licenses, certificates, authorizations, or any other form of approval required by, or provided by any federal, provincial, municipal, local, or other governmental authority to carry out the work under the Contract and to address the Contractor's means and methods in carrying out the work. This includes any requirements of commercial facilities such as a Treatment Facility, Hazardous Waste Management Facility, and Disposal Facility. Copies of key Project Permits that have been obtained by PWGSC are provided in the Appendices to the Specifications. All other Project Permits are the sole responsibility of the Contractor to obtain prior to the start of the work to which the Project Permit applies.
- .58 Re-Classification: Re-classification is defined as the process by which the Contractor conducts testing in accordance with BC CSR of dredged sediment and debris generated at the EGD Work Site following treatment to lower the disposal threshold to below Industrial Land Use (IL+) standards.
- .59 Record Drawings: Record Drawings are defined as completion records that document conditions by which construction activities are completed at the EGD Work Site. Record Drawings will serve as the final record of conditions at completion of the work.
- .60 Required Dredge Elevation: The Required Dredge Elevation represents the minimum elevation that must be achieved within Elevation Dredging Dredge Units. Required Dredge Elevations are shown on the Drawings for each Elevation Dredging Dredge Unit and must be achieved by the Contractor in order to qualify for acceptance of the work by the Departmental Representative.
- .61 Required Dredging: Required Dredging is defined as the required dredging and removal of all materials within the horizontal extents and to the vertical Required Dredge Elevations shown on the Drawings, including any side slope material that sloughs into the dredge prism (i.e., Slough Material) and upland overburden excavation materials. Required dredging includes Test Dredging and dredging of the Hazardous Waste Quality Sediment in the Hazardous Waste Area. The Unit Price Table includes the Payable Overdredge Allowance volume as part of the tender for Required Dredging. Additional Contingency Re-Dredging (as defined in this Section) may be necessary based on PWGSC confirmation sampling and testing results.
- .62 Residuals Management Cover Material: Residuals Management Cover Material is defined as clean sand material meeting the requirements of Section 35 37 10.01 (Residuals Management Cover Placement) that may be placed at EGD Work Site,

in locations identified by the Departmental Representative, based on review of confirmation testing results to meet remedial objectives for seabed/surface sediment quality. Placement of Residuals Management Cover Material will not be paid for.

- .1 The maximum over-placement allowance for Residuals Management Cover Material is 0.3 metres above the Minimum Required Thickness as described in the Specifications and as shown on the Drawings.
- .63 Restricted Elevation: The Restricted Elevation is the maximum elevation to which Engineered Capping materials can be placed, where shown on the Drawings.
- .64 Slope Dredging: Slope Dredging is defined as dredging work performed within the slope areas of the EGD Work Site, as shown on the Drawings. Dredge Units where Slope Dredging occurs identify a toe of cut Required Dredge Elevation and a required grade to cut the slope as shown on the Drawings.
- .65 Slough Material: Sediment on a side slope that loses toe support and sloughs into the dredge prism from the slope as a result of making a vertical cut to grade along the toe of dredging.
- .66 South Jetty: The global term “South Jetty,” as used in the Specifications, is a general (and historical) term referring to the footprint of the existing timber deck structures and concrete deck structures within the EGD Work Site and includes both the West Jetty area (e.g., the West Timber Jetty) and South Jetty area (e.g., the South Timber Jetty) as shown on the Drawings (and as indicated on Reference Drawings and in Data Reports appended to the Specifications).
- .67 Stand-by Time:
 - .1 Stand-by Time is defined as the time during which the Contractor is unable to perform work identified on the Contractor’s progress schedule due to unanticipated conditions associated with operational needs or activities of the EGD Facility, and that has been approved as such by the Departmental Representative.
 - .2 The Contractor will be compensated for approved Stand-by Time, under the Tender Item identified as STAND-BY TIME in the Unit Price Table. Stand-by Time will not be approved or paid for under the following conditions:
 - .1 If adverse weather conditions, equipment breakdown or damage, or other unforeseen causes of delay (except for operational needs or activities of the EGD Facility) are encountered during the work.
 - .2 If the Contractor’s approved progress schedule does not show work to be performed during the period affected by the change in vessel arrival or departure times or by operational needs or activities of the EGD Facility.
 - .3 If the Contractor does not have the claimed crews and equipment on site ready to work, unless the Contractor has received prior approval from the Departmental Representative to send the crews home early or bring them in late due to the schedule impact.

- .4 If the Contractor is given a minimum of eight (8) hours advanced notice of a change in vessel arrival or departure time that may affect the Contractor's work schedule.
 - .5 If the Contractor does not immediately notify the Departmental Representative in writing of an unanticipated operational event that is preventing scheduled work from being completed, and the number of days of delay.
 - .6 If the Contractor could continue working at another area of the EGD Work Site that is not affected by the unanticipated condition. In this case, payment for a Directed Move may apply.
 - .7 If the Contractor cannot adjust its work activities with eight (8) hours advance notice to accommodate the vessel arrival or departure, the Contractor shall substantiate this in writing to the satisfaction of the Departmental Representative. The Contractor's justification for Stand-by Time must be approved by the Departmental Representative to be considered as payable Stand-by Time.
 - .8 If the request for compensation for Stand-by Time has not received the pre-approval of the Departmental Representative.
 - .9 If marine mammals enter the TRBCA, any associated delays will not be considered as Stand-by Time.
- .3 Notify the Departmental Representative immediately in advance of all conditions for which the Contractor may request payment for Stand-by Time. Immediately following the impact event, the Contractor will provide the Departmental Representative with the number of days of delay. If the time is approved by the Departmental Representative, then the Departmental Representative will notify the Contractor of approval for payment under Stand-by Time. The Departmental Representative has sole discretion as to whether a Stand-by Time event is approved or not, to the extent allowed by the Specifications.
- .68 Survey and Positioning Control Plan: Work plan that describes the means and methods for completion of surveys and establishment of positional control at the EGD Work Site, as described elsewhere in this Section. The Survey and Positioning Control Plan will be included as part of the Contractor's Construction Quality Control Plan.
- .69 Tailgate Meeting: Tailgate Meeting is defined as a meeting between the Contractor and the Contractor's crew (including subcontractors) that will occur on a daily basis throughout the duration of the work, and will focus on daily Health and Safety and environmental considerations and concerns associated with planned construction activities. The Contractor is responsible for scheduling daily Tailgate Meetings.
- .70 Temporary Re-suspension Barrier (TRB): A Temporary Re-suspension Barrier is a requirement of the work for environmental protection from re-suspension and distribution of contaminated sediment into remediated areas during completion of

- dredging and capping activities. The TRB system will be designed by the Contractor's third party engineer and reviewed and accepted by the Departmental Representative prior to the start of dredging activities at the EGD Work Site.
- .71 Temporary Re-suspension Barrier Containment Area (TRBCA): The portion of the EGD Work Site that is bounded by the fully installed and operational TRB system, as illustrated on the Drawings. The Contractor may partition Contractor Subareas within the TRBCA using additional TRBs to facilitate compliance with water quality requirements of the EMP/WQMP during dredging and capping activities.
- .72 Tender Item: Tender Item is defined as a measure of work presented on the Unit Price Table by which the Contractor will provide cost to complete the work as part of the tender process.
- .73 Test Dredging: Test Dredging is an initial dredging action for the Contractor to demonstrate to the Departmental Representative that the Contractor's means and methods can achieve positioning control, water quality control, and bathymetric surveying requirements of the Specifications. Results of Test Dredging must meet these requirements prior to conducting Required Dredging elsewhere at the EGD Work Site.
- .74 Treatment Facility: An existing off-site facility located in Canada that is designed, constructed, and operated for the handling or processing of waste in such a manner as to change the physical, chemical, or biological character or composition of the waste. The facility must hold a valid and subsisting permit, license, certificate, approval, or other form of authorization issued by a province or territory for the treatment of soil or other material that is not suitable for industrial, commercial, urban park, residential, agricultural, wildlands, or any other land use specified in the British Columbia Contaminated Sites Regulation. The facility must comply with the Laws and Regulations.
- .75 Under-Pier Dredging: Under-Pier Dredging is defined as dredging work completed inside the TRB where overwater structure is present at time of dredging. These areas are shown as Dredge Units on the Drawings and include a Required Dredge Elevation or grade to which dredging activities shall be performed. Refer also to definition of Elevation Dredging and Slope Dredging.
- .76 Vertical Datum: The vertical datum for this work shall be Chart Datum, as shown on the Drawings.
- .77 Waste Audit (WA): Relates to projected waste generation, and involves controlled separation of waste.
- .78 Waste Quality: Waste Quality shall be defined as contaminated sediment and debris or other material that is not suitable for industrial, commercial, urban park, residential, agricultural, wildlands, or other land use specified in the BC CSR.
- .79 Waste Reduction Work Plan (WRWP): A written report as part of the EPP that addresses opportunities for reduction, re-use, or recycling of materials and specific information describing any materials that are intended to be recycled and/or re-used as part of this contract for Departmental Representative review and acceptance.

- .80 Wastewater Treatment and Disposal Facility: A facility designed, constructed, and operated for the primary purpose of treating and disposing of wastewater. The facility may be located at the EGD Work Site or off site, and must comply with Laws and Regulations for operation of the facility, treatment, and disposal of the treated wastewater. The facility must also meet water quality requirements of the EMP/WQMP for discharge of allowed wastewater streams, as described in the Specifications, at the EGD Work Site.
- .81 Weekly Construction Report: The Weekly Construction Report is to be submitted by the Contractor to the Departmental Representative each week and shall provide a summary of the week's construction activities that were completed under the Contract. Specific submittal requirements for the Weekly Construction Report are described in the individual Sections of the Specifications.
- .82 Working Day Durations (working days): Working Day Durations refer to Monday through Friday, not including statutory holidays. The project working days are defined for submittal timeline purposes and do not preclude the Contractor from performing work on other days provided the schedule meets the requirements of the Specifications.

1.4 Additional Definitions

- .1 Some Sections of the Specifications contain additional definitions (of capitalized terms) that are directly related to the scope of that Section. An example is the list of additional definitions contained in Section 01 32 16.06 (Construction Progress Schedule – Critical Path Method).

1.5 Public Notification

- .1 Prepare a public notification plan as part of the Construction Work Plan that provides all details of the Contractor operations pertinent to the public (or First Nations) interest and the methods to be used to provide this information to the public. Initial public notifications shall be executed by the Contractor prior to the start of work on site, and shall continue on a regular basis as necessary throughout the Project. Separate notifications shall be issued for different locations and activities, to properly target the information, and to provide adequate advance notice prior to the start of each activity in each location.
- .2 Public notification is required, at minimum two (2) weeks ahead of planned start of the identified work activity, for all work under the Contract pertinent to the public (or First Nations) interest, including: EGD Work Site work hours; EGD Work Site noise and dust control measures; Contractor Off-Site Offload Facility; Off-Site Staging and Stockpile Area; off-site material source locations or facilities; in-water transportation timing, methods, and routing; upland transportation timing, methods, and routing; treatment; disposal; and notifications required by Laws and Regulations or permit requirements.

- .3 Submit proposed notifications and communication materials to PWGSC for review prior to issuance or use. Communications materials shall include a list of typical questions and answers that may be used in responding to the public and media.
- .4 Have suitable trained staff available to respond to public communications or inquiries or media inquiries related to the Contractor's operations.
- .5 Notify PWGSC of any public or media inquiries or communications received, and provide documentation of every such communication, including the Contractor's response.
- .6 Any communications or inquiries received related to the overall project, or to PWGSC's operations, shall be promptly forwarded to PWGSC for response.
- .7 Maintain a log of all public or media communications sent and received by the Contractor. The updated log shall be submitted to PWGSC on a monthly basis.
- .8 Acceptable notification methods may include: attendance and presentations at municipal council meetings; newspaper advertisements; door-to-door distribution of notices; and Project-specific public or town hall meetings or open houses organized by the Contractor, including poster presentations.
- .9 Public notices shall be in bilingual format.

1.6 Construction Sequencing

- .1 The Contractor shall perform the work in the sequence described in the Specifications, and as shown on the Drawings. The Contractor shall minimize disturbance to ongoing vessel maintenance and repair operations at the EGD Facility.
- .2 The Contractor shall prepare a construction sequencing section in the Construction Work Plan submittal that describes the Contractor's implementation plan for all construction activities and how this approach will meet the sequencing and EGD Facility operational requirements of the Specifications and Drawings.
- .3 The Contractor shall perform the work as described in this Contract under the following general sequencing requirements. The general sequencing listed below does not identify all necessary work elements and is only intended to provide an overview of the required sequence of construction for several key work elements. The Contractor may propose an alternate sequencing approach in the Construction Work Plan, but deviation from the specified sequencing would require Departmental Representative review and may not be acceptable to the Departmental Representative. Construction sequencing requirements include the following:
 - .1 Mobilize to site and set up temporary facilities.
 - .2 Complete On-Site Staging Area set-up activities at the EGD Work Site and Off-Site Staging and Stockpile Area set-up activities at the Contractor Off-Site Offload Facility prior to start of other work activities.

- .3 The Departmental Representative reserves the right to inspect all Contractor quality control and environmental protection measures to ensure they are in place and working properly prior to initiating in-water construction activities. In-water construction activities may not begin until all Contractor quality control components are in place and working properly, as accepted by the Departmental Representative.
- .4 The entire EGD Work Site, excluding the steel-piled concrete deck not included as part of the On-Site Laydown / Office Area, will be made available to the Contractor for equipment access, moorage, and maintenance of construction operations, as shown on the Drawings. An additional working area is provided in the EGD Waterlot outside of the existing South Jetty footprint for the Contractor's marine access when work is being performed.
- .5 Tenderers shall familiarize themselves with the terminology and scope related to the definition of "South Jetty" and, if any ambiguity or uncertainty is noted, request clarification during the tender period regarding the use of the term "South Jetty."
- .6 Any temporary relocation of the tug boat wharf for the Contractor's own purpose shall be solely within the EGD Work Site.
- .7 The timber / concrete jetty structures provide lateral support for the existing sheet pile perimeter wall. Once disconnected from the jetty structure, the sheet pile perimeter wall shall be re-driven within and not in excess of five (5) days to final elevation as shown on the Drawings, to avoid leaving any portion of the sheet pile perimeter wall at its original elevation without lateral support.
- .8 Complete all sheet pile wall re-driving and install all necessary TRBs to establish the TRBCA prior to the start of timber pile extraction and dredging activities.
- .9 Install the complete TRB system to form the TRBCA as soon as practicable following re-drive of the sheet pile perimeter wall in order to protect exposed EGD Work Site areas (i.e., areas that become exposed to external marine conditions when the sheet pile wall is re-driven) from potential re-suspension and transport of contaminated sediments due to wind waves, vessel wakes, propeller scour, erosive forces, or the Contractor's activities, and to meet the water quality requirements of the Contract Documents. Timing for completion of installation of the TRB system and formation of the TRBCA relative to schedule for re-drive of the sheet pile perimeter wall shall be clearly described in the Contractor Construction Work Plan for review and acceptance by the Departmental Representative in advance of the start of construction activities at the EGD Work Site. Phased installation of the TRB system, closely following behind re-driving of the sheet pile perimeter wall, will be considered by Departmental Representative as appropriate mitigation, subject to adequate performance, of potential re-suspension and transport of

- contaminated sediments. Division of the TRBCA into Contractor Subareas shall not alter the above requirements.
- .10 Demolition of timber jetty structures (including disconnection, removal, and capping of services) and timber pile extraction can occur simultaneously with dredging activities, provided no interference is caused by so doing (e.g., to quality control or quality assurance monitoring of the works) and contamination due to demolition of timber jetty structures and timber pile extraction does not occur on areas where Required Dredging has been completed.
 - .11 Schedule the temporary removal and subsequent reinstatement of the relevant portions of the ICCP system, to minimize the length of time that any portion of the ICCP system is out of service during the work.
 - .12 The Contractor shall provide to the Departmental Representative, as part of the Construction Work Plan, a proposed Test Dredging location to be conducted prior to conducting Required Dredging elsewhere at the EGD Work Site. The Test Dredging location shall not be within the Hazardous Waste Area. Test Dredging is intended to demonstrate that the Contractor's means and methods are adequate to meet the requirements of these Specifications and permit requirements (e.g., positioning control and water quality criteria). Test Dredging shall not be initiated until acceptance of the proposed area by the Departmental Representative. If results of Test Dredging indicate that the Contractor's means and methods are inadequate to meet requirements, the Contractor shall modify its means and methods at no additional cost to PWGSC, prior to conducting Required Dredging elsewhere at the EGD Work Site. Test Dredging shall be measured and paid for as part of Required Dredging. All costs associated with Test Dredging shall be included in the tendered price for Required Dredging.
 - .13 Conduct Required Dredging activities, as shown on the Drawings. The following sequencing requirements apply for Required Dredging:
 - .1 Test Dredging shall be performed and accepted by the Departmental Representative prior to all other Required Dredging.
 - .2 Following acceptance of Test Dredging, the Contractor shall continue with remaining Required Dredging. However, dredging of the Hazardous Waste Area shall be sequenced and completed such that Hazardous Waste Quality Sediment does not recontaminate other previously dredged areas. Therefore, the Contractor may choose to complete dredging of the Hazardous Waste Area prior to dredging of non-hazardous waste areas, and/or implement appropriate BMPs to ensure recontamination of previously dredged areas does not occur.
 3. When working in the Slope Dredging areas, the Contractor shall conduct all dredging activities starting from the top of slope and working toward the toe of slope.

- .4 When working in the west timber jetty area, install temporary soil support at the southwest corner of the timber crib, as indicated on the Drawings, before dredging adjacent slope materials.
- .14 Following completion of Required Dredging activities, and after the Departmental Representative accepts that all Required Dredging has been completed or all Required Dredging has been completed in a Contractor Subarea, the Departmental Representative will conduct post-dredge confirmation sampling and testing. The Departmental Representative will review results of post-dredge sample testing to determine whether Contingency Re-Dredging, to remove Missed Inventory, is required.
 - .1 The Departmental Representative shall be allowed up to ten (10) working days after collection of confirmation samples for completion of analytical testing and evaluation of confirmation test results. Stand-by Time will not be allowed during the period for collection of confirmation samples, completion of analytical test, and evaluation of confirmation test results. The Contractor shall account for these activities in the Contractor's construction work schedule.
 - .2 Upon review of confirmation test results, the Departmental Representative may advise the Contractor to conduct Contingency Re-Dredging activities to remove missed inventory material as necessary.
 - .3 Upon receiving advisement by the Departmental Representative, the Contractor shall complete Contingency Re-Dredging activities. The Contractor shall allow for two (2) working days for the Departmental Representative to perform Contingency Re-Dredging confirmation sampling.
- .15 Following completion of all Required Dredging activities (and Contingency Re-Dredging as necessary), or all Required Dredging activities (and Contingency Re-Dredging as necessary) within a Contractor Subarea, and acceptance of the work by the Departmental Representative, the Contractor shall place Engineered Capping materials (sand, filter, and armour rock), as shown on the Drawings, except as otherwise noted in this Section.
 - .1 The Contractor shall relocate the tug boat wharf following completion of all dredging and Capping activities in the south timber jetty area, as shown on the Drawings.
 - .2 The Contractor shall install the required timber fender piles before installing armour rock in those locations. Refer also to Section 31 61 13 (Pile Foundations General Requirements).
 - .3 The Contractor shall prevent contamination of Contractor Subareas (if Contractor Subareas are used) during Engineered Capping activities by installing additional TRBs within the TRBCA, as accepted by the Departmental Representative, prior to performing dredging activities in other Contractor Subareas.

- .16 Following completion of all Engineered Capping activities in a Contractor Subarea, and acceptance of the Engineered Capping by the Departmental Representative, the Contractor shall remove the TRB system and extract the re-driven sheet pile wall that forms the TRBCA enclosing the completed Contractor Subarea(s). Extraction of the re-driven sheet pile wall shall be performed in accordance with Section 31 62 17 (Steel Sheet Piling) and Section 35 37 10.01 (Residuals Management Cover Placement). The Contractor shall comply with all water quality criteria of the EMP/WQMP for the duration of the work and shall use additional TRBs as necessary if portions of the TRB system and sheet pile perimeter wall defining the TRBCA are removed prior to completion of all Engineered Capping activities for the project.
- .17 Following completion of all Capping activities, and acceptance of all Engineered Capping by the Departmental Representative, the Contractor shall perform Residuals Management Cover Material placement if required by the Departmental Representative and in accordance with Section 35 37 10.01 (Residuals Management Cover Placement).
- .18 During the work, the Contractor shall transport dredged sediment and debris, and demolition debris from the EGD Work Site to the Contractor Off-Site Offload Facility, only by use of waterborne transport. Do not use trucks to transport dredged sediment or debris, or demolition debris from the EGD Work Site to the Contractor Off-Site Offload Facility.
- .19 The Contractor shall clean up all EGD Work Site and Contractor Off-Site Offloading Facility area(s), including decontamination of Contractor equipment, and remove all temporary facilities.
- .20 The Contractor shall demobilize following completion of the work, and following acceptance of the work by the Departmental Representative.

1.7 Other Contracts

- .1 Other contractors operate at the EGD Facility.
- .2 General contractors may include:
 - .1 Victoria Shipyards Co. Ltd. (Seaspan Marine Corporation);
 - .2 Esquimalt Drydock Company;
 - .3 Other ship repair or maintenance contractors;
 - .4 Other general contractors working on PWGSC projects; and,
 - .5 Consultants retained by PWGSC to assist the Departmental Representative.
- .3 The Departmental Representative will be responsible for coordination with other contractors operating at the EGD Facility (outside the EGD Work Site) during this Contract. The Contractor is responsible for coordinating all work within the EGD Work Site.

- .4 Coordinate with other contractors in carrying out their respective works and comply with instructions from the Departmental Representative.
- .5 Assist other contractors by providing access, including boat service, to the Contractor's equipment, facilities, and work area.
- .6 Refer to Section 01 51 00 (Temporary Facilities) for spatial allowance within the Contractor's On-site Laydown / Office Area for the office of the Departmental Representative's consultant team.

1.8 Esquimalt Graving Dock Operations

- .1 The EGD Facility will remain operational during the work described in this Contract.
 - .1 An example representation of vessel calls at the EGD Facility can be found at: <https://cse-egd.tpsgc-pwgsc.gc.ca/reserve-book-eng.cfm>.
 - .2 An example of vessel calls at the EGD Facility is also provided in the Appendices to the Specifications.
 - .3 Information found on the website and in the Specification Appendices will vary from actual booking list conditions at the time of the work in this Contract, and is intended only to provide a general representation of vessel calls at the EGD Facility.
 - .4 Information found on the website and in the Specification Appendices may reflect prior operational conditions at the EGD that may not apply during construction (e.g., South Jetty is not available for moorage by others after jetty demolition works commence).
 - .5 The Contractor shall not use these reference sources as the basis for Tender. A booking list of planned vessels that will call at the EGD Facility will be provided to the Contractor following award of the Contract. Changes to the booking list will occur and shall not be considered as a basis for any claim under the Contract.
- .2 Commercial and EGD Facility operational activities shall take priority over the Contractor's construction operations. The Contractor shall conduct its operations in a manner that will minimize interference with commercial vessel activities. In the event that the Contractor's marine construction equipment obstructs the navigable waterway or EGD Facility berthing areas (outside the EGD Work Site) so as to hinder movement of commercial vessels or hinder EGD Facility operations, the equipment shall immediately be moved, at the Contractor's own expense to facilitate the operational activity.
- .3 The Contractor shall coordinate construction planning and sequencing of work with the Departmental Representative. The Construction Work Plan shall provide a schedule and sequence for all construction activities associated with this work, based on the access requirements to maintain facility operations. Access requirements are described in the Specifications.

- .4 The EGD Facility provides emergency vessel repair services and the Contractor shall be prepared to relocate construction equipment within four (4) hours of notification provided by the facility through the Departmental Representative.
- .5 The Contractor shall make allowance in its construction schedule for delays or interruptions due to vessel movement in the EGD Waterlot, or for vessels berthing at the EGD Facility.
- .6 Any damage to the Contractor's equipment within the EGD Work Site, or in navigation lanes, due to the Contractor's failure to move or remove such equipment when required shall be at the Contractor's sole risk and expense.
- .7 The Contractor shall provide updates in its Weekly Construction Reports regarding planned locations for dredging, barge dewatering, other marine construction activities, and marine transportation activities within the subsequent reporting period.
- .8 The Contractor shall complete all construction activities in a manner to minimize disruption to EGD operations.
- .9 The Contractor shall provide, as part of the Construction Work Plan, planned locations of floating equipment for all construction activities for times when in-water and marine construction activities will be occurring.
- .10 The Contractor shall accommodate planned or scheduled vessels that will be entering or exiting the EGD Facility, with a minimum of four (4) hours' notice.
- .11 The Contractor shall be compensated for Directed Moves when advised to move construction equipment by the Departmental Representative to accommodate facility emergency or operational needs. Directed Moves only apply when the Departmental Representative gives less than eight (8) hours of advanced notice.
- .12 The Departmental Representative shall notify the Contractor when a Directed Move is required to accommodate EGD Facility emergency or routine vessel call operations. Payment for Directed Move(s) will be made as indicated on the Unit Price Table.
- .13 Mechanical and electrical services outside the EGD Work Site (up to the termination point of each service under this Contract as shown on the Drawings) are to remain in operation throughout construction, except during the process of service termination as detailed in:
 - .1 Section 22 15 00 (Compressed Air Systems).
 - .2 Section 26 05 00 (Common Work Results for Electrical).
 - .3 Section 33 11 16 (Water Utility Distribution Piping).
 - .4 Section 22 33 18 (Drainage Waste Piping – Plastic).

1.9 Division of Specifications

- .1 The Specifications are subdivided into Divisions (e.g., Division 01, 02, 03, etc.) and Sections (e.g., this Section 01 11 55) in accordance with the current 6-digit National Master Specifications System.
- .2 A Division or Section may consist of the work of more than one (1) subcontractor or trade. Responsibility for determining which subcontractor or trade provides the labour, material, equipment, and services required to complete the work rests solely with the Contractor.
- .3 In the event of discrepancies or conflicts when interpreting the Drawings and Specifications, the Specifications govern.

1.10 Commencement Date, Time of Completion, and Construction Windows

- .1 The following schedule conditions are fundamental to the Contract:
 - .1 On-site construction activities for this project shall not commence prior to June 1, 2015. The EGD Work Site will be made available to the Contractor for construction activities on that commencement date. This on-site commencement date does not affect off-site pre-construction activities (such as the preparation of pre-construction submittals), nor does it affect off-site construction-related activities (such as the setup of the Contractor Off-Site Offload Facility or Disposal Facility).
 - .2 Complete the work of this project ready for use to achieve Substantial Completion by March 2, 2016, to allow four (4) weeks for Departmental Representative inspections and completion of corrective actions as necessary, unless otherwise approved by the Departmental Representative. All corrective actions shall be completed to achieve Total Completion by March 30, 2016; i.e., within four (4) weeks after the above-stated Substantial Completion date.
 - .3 With the exceptions of fender log removal, fender pile extraction, sheet pile wall re-drive, navigation marker pile installation, and installation of TRB systems, there shall be no in-water works (i.e., works conducted below the water surface) conducted outside the TRBCA during the periods from:
 - .1 February 16th to June 30th; and
 - .2 October 2nd to November 30th.In-water works are permitted year-round inside the TRBCA, and during opening of the TRB, provided works can be conducted in a manner that does not result in the deposition of deleterious substances into waters outside the TRBCA, and does not result in water quality exceedances outside the TRBCA.
 - .4 In accordance with the EMP, in-water construction may occur outside of the TRBCA within the marine fisheries timing windows, as follows:

- .1 July 1st to October 1st (in the same year);
 - .2 December 1st to February 15th (of the following year).
- .2 The abovementioned schedule conditions have been made with the EGD Facility. The Contractor is expected to complete all activities as described in the Contract documents within these dates.

1.11 Hours of Work

- .1 Restrictive as follows:
 - .1 Normal work hours at the EGD are between 07:00 am to 11:00 pm Monday through Friday (i.e., working days for submittal purposes) and Saturday, not including statutory holidays.
 - .2 The Contractor may work, at its own discretion and cost, outside the above-mentioned normal work hours. Notify the Departmental Representative a minimum of forty-eight (48) hours in advance of all after-hours work, including Sundays and statutory holidays.

1.12 Construction Work Schedule and Progress Documentation

- .1 Prepare, update, and submit a construction Detail Schedule, Master Plan, “month-by-month” cash flow estimate, and associated documents per the requirements of Section 01 32 16.06 (Construction Progress Schedule – Critical Path Method). The construction work schedule format shall be a network analysis of the critical path method.
- .2 The updated construction Detail Schedules and “month-by-month” cash flow estimates shall identify the work clearly, showing the detailed items of work.
- .3 Additional definitions and requirements related to scheduling activities are provided within Section 01 32 16.06 (Construction Progress Schedule – Critical Path Method).

1.13 Measurement and Payment

- .1 Before submitting the first progress claim, submit a breakdown of the Contract unit rates and lump sum prices in detail as requested by the Departmental Representative, aggregating to the Contract price.
- .2 Measurement and payment for work completed to the Departmental Representative’s satisfaction will be made as stipulated in the relevant technical Section of the Specifications for that work item and the Unit Price Table.
- .3 Measurement for Departmental Representative-advised Directed Moves shall be through formal documented communications (i.e., letters or emails) with the Contractor.

- .4 Measurement for approved Stand-by Time shall be through formal documented communications (i.e., letters or emails) with the Contractor.
- .5 Payment for Departmental Representative-advised Directed Moves shall be made by each required Directed Move event under the Tender Item for DIRECTED MOVE, as described in the Unit Price Table.
- .6 Payment for approved Stand-by Time shall be made on a per-day basis under the Tender Item for STAND-BY TIME, as described in the Unit Price Table.

1.14 Codes, Bylaws, Standards

- .1 Perform work in accordance with the Laws and Regulations.
- .2 Comply with the Laws and Regulations at the location concerned. Although provincial laws and municipal bylaws generally do not apply on federal lands, the Contractor shall comply with provincial laws, municipal bylaws and the Laws and Regulations at the EGD Work Site, and all other locations used for this Contract, unless otherwise directed by the Departmental Representative. Meet or exceed requirements of the Contract Documents, specified standards, codes, and referenced documents.
- .3 In any case of conflict or discrepancy, the most stringent requirements shall apply.

1.15 Documents Required

- .1 Maintain one (1) copy of each of the following documents and any other applicable documents at the EGD Work Site:
 - .1 Contract Drawings.
 - .2 Contract Specifications and Appendices.
 - .3 Addenda to Contract documents (as applicable).
 - .4 Copy of accepted work schedule and most recent version of construction work schedule.
 - .5 Health and Safety Plan and other safety related documents.
 - .6 Notice of Project (NOP).
 - .7 Copies of Contractor bid bonds.
 - .8 Required pre-construction submittals that have been reviewed and accepted by PWGSC (e.g., Contractor's Construction Work Plan, EPP, and Quality Control Plan).
 - .9 EMP.
 - .10 Permits and approvals (including Building Permit).

- .11 Required construction submittals (e.g., shop drawings, materials data, product data, samples, MSDS data sheets, Contractor's daily and weekly construction reports).
- .12 Change orders.
- .13 Other modifications to the Contract.
- .14 Quality control test reports.
- .15 Manufacturers' installation and application instructions.
- .16 One set of Drawings and Specifications marked-up for "as-built" purposes.
- .17 Current construction standards of workmanship listed in each Section of the Specifications (these can be in electronic format).

1.16 Regulatory Requirements

- .1 The Contractor is responsible for all Project Permits, with the exception of those provided as part of the Tender package.
- .2 It is anticipated that a Building Permit will be required for this project. The Contractor shall obtain and pay for the Building Permit prior to the start of construction. In order to expedite the Building Permit process, PWGSC's consultant will file the construction plans with Township of Esquimalt prior to Contract award.
- .3 Obtain and pay for any additional permits (including Building Permit), certificates, licenses, and other approvals that have not been provided by the Departmental Representative and that are required by the Laws and Regulations, and commercial facilities to be used to complete the work.
- .4 Obtain and pay for any additional permits, certificates, licenses and other approvals that have not been provided by the Departmental Representative and that are required by the Contractor to suit the Contractor's means and methods to complete the work.
- .5 The Contractor shall comply with the Laws and Regulations for all work under this contract regardless of whether the work is carried out off-site, or at the EGD Work Site. In the case of a conflict or difference in requirements or standards, the most stringent shall apply. Any requirement in the Specifications for the Contractor to meet standards set out in a provincial or municipal law or regulation does not constitute an acknowledgement by PWGSC that provincial or municipal law applies to federal lands, including the EGD Work Site.
- .6 The transportation of materials by barge requires the Contractor to coordinate with the Queens Harbour Master pursuant to the Canada Marine Act. The Contractor shall coordinate with other authorities as required for transportation of materials by barge.

- .7 Mark floating equipment with lights, buoys, or other acceptable markings in accordance with regulations for the prevention of collisions, requirements, and directives of EGD Facility, Transport Canada, and the Queens Harbour Master.
- .8 If any portion of off-site work is conducted on federal lands not administered by PWGSC, the Contractor is required, as part of its operations, to contract the federal custodian to confirm the regulatory or other requirements, that may apply to the Contractor's operations.
- .9 Provide inspection authorities with plans and information required for issue of acceptance certificates.
- .10 Furnish inspection certificates in evidence that the work installed conforms to the requirements of the authority having jurisdiction.

1.17 Contractor Use of EGD Work Site

- .1 The Contractor's EGD Work Site, including the On-Site Laydown / Office Area, is indicated on the Drawings.
- .2 The Contractor will be required to provide the EGD (through the Departmental Representative) a duly completed Indemnification Form and a Schedule 1 Form in order to gain waterborne access to the EGD Facility and EGD Work Site (i.e., access by the Contractor's marine derricks, barges, tugboats, survey boats, and other watercraft). These forms are attached in an Appendix to the Specifications.
- .3 The Contractor is designated as the Prime Contractor on the EGD Work Site and assumes all responsibilities of the Prime Contractor as per relevant acts and regulations. The Contractor shall be responsible for all work conducted by the Contractor and the Contractor's subcontractors on the EGD Work Site.
- .4 Use of EGD Work Site:
 - .1 The EGD Work Site will be made available completely and exclusively to the Contractor for execution of the work (except where indicated otherwise on the Drawings), to suit the timing for the work as shown on the Contractor's construction work schedule that has been accepted by the Departmental Representative.
 - .2 Assume responsibility for assigned premises for performance of the work.
 - .3 Coordinate all work activities associated with this Contract at the EGD Work Site with the Departmental Representative.
 - .4 Provide security of landside portion of EGD Work Site and all of the Contractor's and subcontractors' equipment and material. Secure landside portion of EGD Work Site at the end of each work day.
 - .5 Supply spare set of security keys for fenced off areas to EGD Operations Manager for emergency access purposes.

- .6 Refer to Section 01 35 33 (Health and Safety Requirements) for perimeter fencing, safety barricades, lighting, traffic control, and temporary enclosures.
- .5 Perform work in accordance with Contract documents. Ensure work is carried out in accordance with indicated phasing.
- .6 Do not unreasonably encumber the EGD Work Site with material and equipment.
- .7 Any area in the EGD property to which access is restricted by signage is a secured or restricted area and shall not be entered, unless otherwise approved by the Departmental Representative.
- .8 Do not obstruct access to EGD property outside of the EGD Work Site. Maintain overhead clearances, keep roadways and walkways clear, maintain vessel navigation as described in the Specifications, and maintain routes for emergency response vehicles.
- .9 The Contractor shall refer to an Appendix to the Specifications for load rating layout sketch supplemented by more recent record drawings for west and south crane pad rehabilitation works, which describe vehicle and live loading restrictions on existing South Jetty structures. The Contractor shall comply with all loading limitations in force at the EGD.

1.18 Examination

- .1 Examine the EGD Work Site and be familiar and conversant with existing conditions likely to affect the work.
- .2 Provide photographs of surrounding properties, objects, and structures liable to be damaged or be the subject of subsequent claims.

1.19 Existing Services

- .1 Where work involves breaking into, disconnecting, end capping, or connecting into existing services, carry out work at time as advised by the Departmental Representative and as stipulated in the Specifications.
- .2 Except where connection into (or other similar disturbance of) utilities is required for the work, do no damage to existing utilities at the EGD Facility. If any damage to EGD utilities occurs, and is attributable to the Contractor's actions, the Contractor shall immediately notify the Departmental Representative and provide incident reports, and shall immediately repair any such damage to satisfaction of the Departmental Representative.

1.20 Location of Equipment and Fixtures

- .1 Location of equipment, fixtures, and outlets indicated or specified are to be considered as approximate.

- .2 Locate equipment, fixtures, and distribution systems to provide minimum interference and maximum usable space, and in accordance with manufacturer's recommendations for safety, access, and maintenance.
- .3 Inform the Departmental Representative of impending installation and obtain the Departmental Representative's acceptance for actual locations if different from locations shown on the Drawings.
- .4 Submit field drawings or shop drawings to indicate the relative position of various services and equipment when required by the Departmental Representative.

1.21 Setting Out of Work

- .1 Assume full responsibility for, and execute complete layout of, work to locations, lines, and elevations indicated.
- .2 Provide all equipment, devices, materials, labour, and supplies needed to layout and construct the work.
- .3 Facilitate the Departmental Representative's inspection of the work.

1.22 Acceptance of Substrates

- .1 The Contractor shall examine existing surfaces, surfaces prepared by other contractors, and job conditions that may affect the work, and shall report defects to the Departmental Representative. Commencement of work shall imply acceptance of prepared work or substrate surfaces.

1.23 Quality of Work

- .1 Ensure that quality workmanship is performed through use of skilled tradesmen, under supervision of qualified journeyman.
- .2 Workmanship, accuracy, erection methods, and procedures shall meet minimum standards set out in the applicable codes and standards for that part of the work.
- .3 In cases of dispute, decisions as to standard, accuracy, or quality of work rest solely with the Departmental Representative, whose decision is final.

1.24 Works Coordination

- .1 Coordinate work of sub-trades.
 - .1 Designate one person to be responsible for review of Contract documents and shop drawings and managing coordination of work.
- .2 Convene meetings between subcontractors whose work interfaces and ensure awareness of areas and extent of interface required.

- .1 Provide each subcontractor with a complete set of the Drawings and Specifications for the Contract, to assist them in planning and carrying out their respective work.
- .2 Develop coordination drawings when required to facilitate the work, illustrating potential interference between the work of various trades, and distribute to affected parties.
 - .1 Pay particular close attention to overhead work and work within or near to structural elements.
 - .2 Identify on coordination drawings the structural elements, service lines, and location of external tie-in to existing EGD services.
 - .3 Facilitate meeting and review coordination drawings. Ensure subcontractors agree and sign off on drawings.
 - .4 Plan and coordinate work in such a way to construct the work as shown on the Drawings, with minimum number of service line offsets and bends.
 - .5 Submit a copy of coordination drawings to the Departmental Representative for information purposes.
 - .6 Submit shop drawings and product data only after coordination meeting for such items has taken place and coordination drawings have been prepared and issued to the Departmental Representative.
- .3 Work coordination:
 - .1 Ensure cooperation between trades to facilitate general progress of work and avoid situations of spatial interference.
 - .2 Ensure that each trade provides all other trades reasonable opportunity for completion of work and in such a way as to prevent unnecessary delays, cutting, patching and removal or replacement of completed work.
 - .3 Ensure disputes between subcontractors are resolved.
- .4 The Departmental Representative is not responsible for, or accountable for, extra costs incurred as a result of the Contractor's failure to coordinate work among trades and subcontractors.

1.25 Submittals

- .1 In accordance with Section 01 33 00 (Submittal Procedures), submit the requested shop drawings, materials data, product data, MSDS sheets, and samples indicated in each Section of the Specifications.
- .2 Allow sufficient time for the following:
 - .1 Review of shop drawings.
 - .2 Review of material or product data and MSDS sheets and samples.

- .3 Review of re-submissions as necessary for acceptance by the Departmental Representative.
- .4 Ordering of accepted materials and/or products.
- .3 Refer to Section 01 33 00 (Submittal Procedures) for review periods and other requirements for submittals.

1.26 Relics and Antiquities

- .1 Relics and antiquities may be encountered during the work under the Contract. The Contractor shall protect such articles and notify the Departmental Representative immediately if they are encountered, as detailed in the Chance Find Procedures, which are included as a reference document to the Specifications.
- .2 The Contractor shall be familiar with the Chance Find Procedures and shall follow the Chance Find Procedures in the event of an archaeological find.
- .3 Relics and antiquities and items of historical or scientific interest shall remain the property of PWGSC. Protect such articles and request course of action from the Departmental Representative.
- .4 Give immediate notice to the Departmental Representative if evidence of archeological finds are encountered during dredging or excavation, and await the Departmental Representative's written instructions before proceeding with work in this area. If archeological finds are encountered, unanticipated stoppages of work and/or selective excavation procedures may be required.

1.27 Products Supplied by Departmental Representative

- .1 No products will be supplied by the Departmental Representative. Items to be re-used in the work are as indicated on the Drawings and in relevant Sections of the Specifications.

1.28 EGD Site Access and Security

- .1 The Contractor's personnel (and its subcontractors' personnel) employed on this project will be subject to security check at entry into, and exit from, the EGD Facility. Obtain requisite clearances, as instructed, for each individual required to enter the EGD Facility.
- .2 Personnel will be provided with a pass that must be worn at all times.
- .3 The Contractor shall secure the Contractor's equipment and staging areas and its contents throughout the construction period.

1.29 Testing and Inspection

- .1 Particular requirements for testing and inspection to be carried out by the Contractor's Quality Control testing service or laboratory accepted by the Departmental Representative are specified in the Contract documents.
- .2 The Contractor shall appoint and pay for the services of a Quality Control testing firm or testing laboratory to perform Quality Control testing as required in each Section of the Specifications, and also where required for the following:
 - .1 Inspection and testing required by the Laws and Regulations.
 - .2 Tests specified to be carried out by the Contractor under the supervision of the Departmental Representative.
 - .3 Inspection and testing performed exclusively for the Contractor's convenience.
- .3 Where tests or inspections by the Contractor's Quality Control testing firm or testing laboratory reveals that work is not in accordance with the Contract requirements, the Contractor shall pay costs for additional tests or inspections as the Departmental Representative may require to verify acceptability of corrected work.
- .4 Notify the Departmental Representative in advance of planned tests or inspections.
- .5 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.
- .6 Pay costs for uncovering and make good work that is covered before required inspection or testing is completed and accepted by the Departmental Representative.
- .7 Provide the Departmental Representative with Quality Control reports from the Contractor's Quality Control testing firm or laboratory as soon as they are available.
- .8 The Departmental Representative may require, and pay for, additional inspection and testing services beyond those specified or otherwise required.

1.30 Surveying and Recording Changes in the Work

- .1 Within ten (10) working days after Notice of Award, submit to the Departmental Representative the name of the licensed surveyor (member of the Association of British Columbia Land Surveyors, ABCLS) or Professional Engineer registered to practice in the Province of British Columbia, and who is employed by the Contractor, who will be responsible for the preparation and submittal of the hardcopy Record Drawings (for "as-built" purposes) for the constructed works, as appropriate to the portion of the work under consideration.
- .2 Record Drawings, describing the final accurate "as-built" condition of the constructed works, prepared by the Contractor's licensed surveyor or Professional Engineer as appropriate to the portion of the work under consideration, shall be submitted to the Departmental Representative as required by Section 01 78 30 (Closeout Submittals).

1.31 Record Documents (for “as-built” purposes)

- .1 The Departmental Representative will provide two (2) sets of hardcopy Contract Drawings and two (2) sets of hardcopy Specifications, for the Contractor to annotate for Record Document purposes.
- .2 The Departmental Representative will provide one (1) set of the original AutoCAD files of the Contract Drawings, for the Contractor’s general use during construction at its own risk. No representation is made as to the correctness or completeness of these AutoCAD Drawings. These AutoCAD drawings are provided for informational purposes only, and do not replace or supersede the Contract Drawings.
- .3 As work progresses, maintain accurate records to show all deviations from the Contract documents. Annotate the Specifications, Contract Drawings and shop drawings as changes occur. Record changes in red ink.
- .4 Review all annotations (draft Record Document information) with the Departmental Representative during every project progress meeting to ensure up-to-date documentation at the completion of project.
- .5 Refer to Section 01 78 30 (Closeout Submittals) for submittal of Record Documents.

1.32 Cleaning

- .1 Conduct cleaning and disposal operations daily. Comply with Laws and Regulations including municipal ordinances and anti-pollution laws.
- .2 Ensure cleanup of the work areas each day after completion of work.
- .3 Use cleaning materials and methods in accordance with instructions of the manufacturer of the surface to be cleaned.

1.33 Maintenance Materials, Special Tools, and Spare Parts

- .1 Specific requirements for maintenance materials, tools, and spare parts are specified in individual Sections of the Specifications.

1.34 Building Smoking Environment

- .1 Smoking within any building is not permitted.
- .2 Comply with EGD Smoking Policy and designated smoking areas.

1.35 System of Measurement

- .1 The metric system of measurement (SI) will be employed on this Contract.
- .2 Refer to Section 02 21 13 (Surveying and Positioning Control).

- 2. PART 2 – PRODUCTS – NOT USED**
- 3. PART 3 – EXECUTION – NOT USED**

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 Meetings shall be required throughout the duration of the work as described in the Specifications.
- .2 The Contractor shall attend all required meetings and provide required preparation and follow-up materials.

1.2 Measurement and Payment

- .1 No separate payment will be made for effort associated with project meetings.

1.3 Related Sections

- .1 Section 01 11 55 (General Instructions)
- .2 Section 01 33 00 (Submittal Procedures)

1.4 Definitions

- .1 Refer to Section 01 11 55 (General Instructions) for all definitions related to the Contract.

1.5 Submittals

- .1 The Contractor shall provide pre-construction, progress, and post-construction submittals in accordance with the requirements of Section 01 33 00 (Submittal Procedures).

1.6 References – Not Used

1.7 Administrative

- .1 The Contractor shall complete the following activities regarding administration of meetings throughout the progress of the work:
 - .1 Schedule and administer Progress Meetings and Tailgate Meetings as required, or at the request of the Departmental Representative.
 - .2 Prepare agendas for Progress Meetings.
 - .3 Distribute written notice of each Progress Meeting two (2) working days in advance of meeting date to the Departmental Representative.
 - .4 Provide physical space (within the EGD Work Site) and make arrangements for Tailgate Meetings.

- .5 Departmental Representative will provide physical space (within the PWGSC project office at the EGD Facility) for Progress Meetings.
- .6 Preside at Progress Meetings and Tailgate Meetings.
- .2 The Contractor will record the Progress Meeting minutes, including significant proceedings and decisions, and identify actions by parties.
 - .1 The Contractor will reproduce and distribute copies of Progress Meeting minutes within three (3) working days after meetings and transmit to the meeting participants. The Departmental Representative will review meeting minutes and request changes as applicable. The Contractor shall provide a final copy of meeting minutes within three (3) days after receipt of comments from the Departmental Representative.
- .3 Representatives of the Contractor, subcontractors, and suppliers attending Progress Meetings shall be qualified and authorized to act on behalf of the party each represents.

1.8 Pre-Construction Meeting

- .1 Within ten (10) working days after award of Contract, the Departmental Representative will request a meeting of parties involved in the Contract to discuss and resolve administrative procedures and responsibilities.
- .2 PWGSC and its project team, the Departmental Representative, the Contractor, and major subcontractors will be in attendance.
- .3 The Departmental Representative will incorporate mutually agreed variations to Contract documents into agreement, prior to signing.
- .4 The Contractor shall be prepared to discuss and/or provide, at a minimum, the following information at the Pre-Construction Meeting:
 - .1 Appointment of official representative of participants in the work.
 - .2 Contractor Health and Safety.
 - .3 Construction Work Schedule.
 - .4 Construction Work Plan (in outline only).
 - .5 Environmental Management.
 - .6 Schedule of submissions, including but not limited to, Construction Work Plan, Health and Safety Plan, Quality Control Plan, and Environmental Protection Plan.
 - .7 WorkSafe BC Notice of Project.
 - .8 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, and fences.
 - .9 Daily Tailgate Meeting.
 - .10 Progress Meetings.

- .11 EGD Work Site security.
- .12 Project administration, including:
 - .1 Proposed changes, change orders, procedures, acceptances required, time extensions, and administrative requirements.
 - .2 Monthly progress claims, administrative procedures, photographs, and hold backs.
 - .3 Appointment of inspection and testing firms.
 - .4 Insurances and transcripts of policies.

1.9 Progress Meetings

- .1 During the course of the work, the Contractor shall schedule Progress Meetings at least once per week.
- .2 The Contractor, major subcontractors involved in the work, PWGSC and its project team, and the Departmental Representative are to be in attendance.
- .3 The Contractor shall notify parties a minimum of two (2) working days prior to Progress Meetings.
- .4 The Contractor will reproduce and distribute copies of Progress Meeting minutes within three (3) working days after meetings and transmit to the meeting participants. The Departmental Representative will review Progress Meeting minutes and request changes as applicable. The Contractor shall provide a final copy of Progress Meeting minutes within three (3) days after receipt of comments from the Departmental Representative.
- .5 Progress Meeting agendas shall include, at a minimum, the following:
 - .1 Review and acceptance of minutes from the previous meeting.
 - .2 Health and safety considerations.
 - .3 Review of work progress since previous meeting.
 - .4 Field observations, problems, or conflicts.
 - .5 Technical discussion (as required).
 - .6 Environmental management.
 - .7 Problems that impede the construction schedule.
 - .8 Corrective measures (action items) and procedures to regain the projected schedule.
 - .9 Revisions to the Construction Work Plan and construction schedule.
 - .10 Progress schedule, during succeeding work period.
 - .11 Review submittal schedules: expedite as required.
 - .12 Maintenance of quality standards.

- .13 Review proposed changes for effect on construction schedule and on completion date.
- .14 Review Contemplated Change Notices and current or potential Change Orders.
- .15 Other business.
- .6 The Departmental Representative may schedule additional project meetings as necessary.

1.10 Tailgate Meetings

- .1 During the course of the work, the Contractor shall hold daily Tailgate Meetings to occur at the start of each work shift. Multiple Tailgate Meetings shall be held if the Contractor intends to work multiple shifts within a 24-hour period.
- .2 Tailgate Meeting agenda shall include, at a minimum, the following:
 - .1 Sign-in of all attendees.
 - .2 Planned work activities and environmental considerations for that shift.
 - .3 Hazards associated with these work activities, including environmental hazards (e.g., potential for hypothermia, heat exhaustion, or heat stroke).
 - .4 Appropriate job-specific safe work procedures.
 - .5 Required personal protective equipment (PPE).
 - .6 Appropriate emergency procedures.

2. PART 2 – PRODUCTS – NOT USED

3. PART 3 – EXECUTION – NOT USED

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section describes general requirements and procedures for preparation of the Contractor's construction Master Plan, construction Detail Schedule (CPM logic diagram), cash flow estimates, and associated documents. Additional requirements are provided for ongoing progress monitoring and reporting throughout the project.

1.2 Related Sections

- .1 Section 01 11 55 (General Instructions)
- .2 Section 01 33 00 (Submittal Procedures)

1.3 Measurement and Payment Procedures

- .1 No measurement or payment will be made under this Section. All costs for execution, preparation, reproduction, submittal and re-submittal (as stipulated by the Specifications) of schedule submittals are deemed incidental to the work.

1.4 References – Not Used

1.5 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 Actual Finish Date (AF): Point in time that Work actually ended on activity
- .3 Actual Start Date (AS): Point in time that Work actually started on activity.
- .4 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.
- .5 Baseline: Original approved plan (for Project, work package, or activity), plus or minus approved scope changes.
- .6 Completion Milestones: Completion of major components of work, Substantial Completion and Total Completion.
- .7 Constraint: Applicable restriction that will affect performance of Project. Factors that affect activities can be scheduled.
- .8 Control: Process of comparing actual performance with planned performance, analyzing variances, evaluating possible alternatives, and taking appropriate

- corrective action as needed.
- .9 Critical Activity: Any activity on a critical path; most commonly determined by using critical path method.
- .10 Critical Path: Series of activities that determines duration of Project. In deterministic model, critical path is usually defined as those activities with float less than or equal to specified value, often zero. It is longest path through Project.
- .11 Critical Path Method (CPM): Network analysis technique used to predict Project duration by analyzing which sequence of activities (which path) has least amount of scheduling flexibility (least amount of Float).
- .12 Data Date (DD): Date at which, or up to which, Project's reporting system has provided actual status and accomplishments.
- .13 Detail Schedule: The detailed CPM logic diagram describing the work, as explained elsewhere in this Section of the Specifications.
- .14 Duration: Number of work periods (not including holidays or other non-working periods) required to complete activity or other Project element; usually expressed as workdays or work weeks.
- .15 Early Finish Date (EF): In critical path method, earliest possible point in time on which uncompleted portions of activity (or Project) can finish, based on network logic and schedule constraints. Early finish dates can change as Project progresses and changes are made to Project plan.
- .16 Early Start Date (ES): In critical path method, earliest possible point in time on which uncompleted portions of activity (or Project) can start, based on network logic and schedule constraints. Early start dates can change as Project progresses and changes are made to Project Plan.
- .17 Finish Date: Point in time associated with activity's completion. This is usually qualified by one of following: actual, planned, estimated, scheduled, early, late, baseline, target, or current.
- .18 Float: Amount of time that activity may be delayed from its early start without delaying Project finish date. Float is mathematical calculation, and can change as Project progresses and changes are made to Project plan.
- .19 Lag: Modification of logical relationship that directs delay in successor task.
- .20 Late Finish Date (LF): In critical path method, latest possible point in time that activity may be completed without delaying specified milestone (usually Project finish date).
- .21 Late Start Date (LS): In critical path method, latest possible point in time that activity may begin without delaying specified milestone (usually Project finish date).
- .22 Lead: Modification of logical relationship that allows acceleration of successor task.

- .23 Logic Diagram: See definition of Project Network Diagram.
- .24 Master Plan: Summary-level schedule that identifies major activities and key Milestones.
- .25 Milestone: Significant event in Project, usually completion of major deliverable.
- .26 Monitoring: Capture, analysis, and reporting of Project performance, usually as compared to plan.
- .27 Near-Critical Activity: Activity that has low total float.
- .28 Non-Critical Activities: Activities which when delayed, do not affect specified Contract duration.
- .29 Project Control System: Fully computerized system, preferably utilizing Microsoft Project software package, showing specific tasks, dates, critical path of anticipated stages of work, and final completion of the work within the time period required by the Contract documents.
- .30 Project Network Diagram: Schematic display of logical relationships of Project activities. Always drawn from left to right to reflect Project chronology.
- .31 Project Plan: Formal, approved document used to guide both Project execution and Project control. Primary uses of Project plan are to document planning assumptions and decisions, facilitate communication among stakeholders, and document approved scope, cost, and schedule baselines. Project plan may be summary or detailed.
- .32 Project Planning: Development and maintenance of Project Plan.
- .33 Project Planning, Monitoring and Control System: overall system operated by the Departmental Representative to enable monitoring of Project Work in relation to established milestones.
- .34 Project Schedule: Planned dates for performing activities and 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.
- .35 Quantified Days Duration: Working days based on 5 day work week, discounting statutory holidays.
- .36 Risk: Uncertain event or condition that, if it occurs, has positive or negative effect on Project's objectives.
- .37 Scheduled Finish Date (SF): Point in time that work was scheduled to finish on activity. Scheduled finish date is normally within range of dates delimited by early finish date and late finish date.
- .38 Scheduled Start Date (SS): Point in time that work was scheduled to start on activity. Scheduled start date is normally within range of dates delimited by early start date and late start date.

- .39 Start Date: Point in time associated with activity's start, usually qualified by one of following: actual, planned, estimated, scheduled, early, late, target, baseline, or current.
- .40 Work Breakdown Structure (WBS): Deliverable-oriented grouping of project elements that organizes and defines total work scope of Project. Each descending level represents increasingly detailed definition of Project work.

1.6 System Description

- .1 Construction progress schedule: Describes processes required to ensure timely completion of Project. These processes ensure that various elements of Project are properly coordinated. It consists of planning, time estimating, scheduling, progress monitoring, and control.
- .2 Planning: This is most basic function of management, that of determining presentation of action and is essential.
 - .1 It involves focusing on objective consideration of future, and integrating forward thinking with analysis; therefore, in planning, implicit assumptions are made about future so that action can be taken today.
 - .2 Planning and scheduling facilitates accomplishment of objectives and should be considered continuous interactive process involving planning, review, scheduling, analysis, monitoring, and reporting.
- .3 Ensure that planning process is iterative and results in generally top-down processing with more detail being developed as planning progresses, and decisions concerning options and alternatives are made. This implies progressively more reliability of scheduling data. The construction Detail Schedule is used for analysis and progress monitoring.
- .4 Ensure project schedule efficiencies through monitoring.
 - .1 When activities begin on time and are performed according to estimated durations without interruptions, original Critical Path will remain accurate. Changes and delays will, however, create an essential need for continual monitoring of Project activities.
 - .2 Monitor progress of Project in detail to ensure integrity of Critical Path, by comparing actual completions of individual activities with their scheduled completions, and review progress of activities that has started but are not yet completed.
- .5 Monitoring should be done sufficiently often so that causes of delays are immediately identified and removed if possible.
- .6 Project monitoring and reporting: As Project progresses, keep the team aware of changes to the schedule, and possible consequences. In addition to Bar Charts and CPM networks, use narrative reports to provide advice on the seriousness of difficulties and measures to overcome them.

- .1 Narrative reporting begins with a statement on the general status of the Project followed by summarization of delays, potential problems, corrective measures, and Project status criticality.

1.7 CPM Requirements

- .1 Ensure Master Plan and construction Detail Schedule are practical and remain within specified Contract duration.
- .2 Master Plan and construction Detail Schedule deemed impractical by the Departmental Representative are to be revised and re-submitted for review and acceptance by the Departmental Representative.
- .3 Acceptance of Master Plan and construction Detail Schedule showing scheduled Contract duration shorter than specified Contract duration does not constitute change to Contract. Duration of Contract may only be changed through bilateral Agreement.
- .4 Consider Master Plan and construction Detail Schedule deemed practical by the Departmental Representative, showing Work completed in less than specified Contract duration, to have float.
- .5 First Milestone on Master Plan and construction Detail Schedule will identify start Milestone with an “ES” constraint date equal to Award of Contract date.
- .6 Calculate dates for Completion Milestones from Plan and Schedule using specified time periods for Contract.
- .7 Substantial Completion and Total Completion with “LF” constraint equal to calculated date.
- .8 Delays to non-critical activities, those with float may not be basis for time extension.
- .9 Do not use float suppression techniques such as software constraints, preferential sequencing, special lead/lag logic restraints, extended activity times or imposed dates other than required by Contract.
- .10 Allow for and show Master Plan and construction Detail Schedule adverse weather conditions normally anticipated. Specified Contract duration has been predicated assuming normal amount of adverse weather conditions.
- .11 Provide necessary crews and labour to meet schedule requirements for performing Work within specified Contract duration. Simultaneous use of multiple crews on multiple fronts on multiple critical paths may be required.
- .12 Arrange participation on and off site of subcontractors and suppliers, as required by the Departmental Representative, for purpose of network planning, scheduling, updating and progress monitoring. Approvals by the Departmental Representative of original networks and revisions do not relieve the Contractor from duties and responsibilities required by Contract.

- .13 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Substantial Completion, Total Completion, and Final Certificate as defined times of completion are of essence to this contract.

1.8 Submittals

- .1 Provide submittals in accordance with Section 01 33 00 (Submittal Procedures).
- .2 Submit to the Departmental Representative the Contractor's Project Control System for planning, scheduling, monitoring and reporting of project progress.
- .3 Submit Project Control System to the Departmental Representative for approval. Failure to comply with each required submission may result in progress payment being withheld.
- .4 Submit letter confirming that schedule has been prepared in co-ordination with major subcontractors.
- .5 Submit Project planning, monitoring and control system data as part of initial schedule submission and status reporting as required by the Departmental Representative in following form:
- .1 CD files in original scheduling software (preferably Microsoft Project) containing schedule and cash flow information, labelled with data date, specific update, and person responsible for update.
- .2 Master Plan Bar Chart.
- .3 Construction Detail Schedule Bar Chart, clearly showing Critical Path (in red colour).
- .4 Listing of project activities including milestones and logical connectors, networks (sub-networks) from Project start to end. Sort activities by activity identification number and accompany with descriptions. List early and late start and finish dates together with durations, codes and float.
- .5 Criticality report listing activities and milestones with negative, zero and up to five (5) days total float used as first sort for ready identification of critical or near critical paths through entire project. List early and late starts and finishes dates, together with durations, codes, and float for critical activities.
- .6 Progress report in early start sequence, listing for each trade, activities due to start, underway, or finished within two (2) months from update date. List activity identification number, description, and duration. Provide columns for entry of actual start and finish dates, duration remaining and remarks concerning action required.
- .7 Initial "month-by-month" cash flow estimate for all construction works, as outlined elsewhere in this Section of the Specifications.
- .6 Submit construction Detail Schedule updates (and companion schedules) and monthly cash flow estimates as outlined elsewhere in this Section of the

Specifications.

1.9 Quality Assurance

- .1 Use experienced personnel, fully qualified in planning and scheduling to provide services from start of construction to Final Certificate, including Commissioning.

1.10 Project Meeting

- .1 Meet with the Departmental Representative during Pre-Construction Meeting, to establish work requirements and approach to project construction operations

1.11 Work Breakdown Structure

- .1 Prepare construction Work Breakdown Structure (WBS) within twenty-one (21) calendar days of Award of Contract date. The breakdown of work shall, at a minimum, show all of the items identified in the Unit Price Table and significant design, manufacturing, construction, and installation activities.

1.12 Cash Flow Estimates

- .1 Prepare and submit an initial “month-by-month” cash flow estimate for all construction works within twenty-one (21) calendar days of Award of Contract date. The breakdown of work shall, at a minimum, show all of the items identified in the Unit Price Table and significant design, manufacturing, construction, and installation activities. Detailed format for cash flow estimates shall be determined by the Departmental Representative, in consultation with the Contractor.
- .2 Prepare and submit with each monthly progress draw an updated “month-by-month” cash flow estimate for all construction works. The month-by-month cash flow estimates shall:
 - .1 Be based on the contract Unit Price Table, and the current approved Contractor’s construction schedule.
 - .2 Be consistent with progress payment claims submitted to date.
 - .3 Include most up to date confirmed, actual quantities, as well as most up to date and accurate estimate of remaining quantities.
 - .4 Include Change Orders for additional cost items that have been incorporated into the Contract.
 - .5 Provide an updated total estimated final Contract value, excluding and including applicable taxes.

1.13 Master Plan

- .1 Structure and base CPM construction networks system on WBS coding in order to

- ensure consistency throughout Project.
- .2 Prepare comprehensive construction Master Plan (CPM logic diagram) and dependent Cash Flow Projection within twenty-one (21) calendar days of Award of Contract date to confirm validity or alternates of identified milestones. Master Plan will be used as baseline.
 - .1 Revise baseline as conditions dictate and as required by the Departmental Representative.
 - .2 The Departmental Representative will review and return revised baseline within seven (7) calendar days.
 - .3 Reconcile revisions to Master Plan and Cash Flow Projections with previous baseline to provide continuous audit trail.
 - .4 Initial and subsequent Master Plans will include:
 - .1 CD containing schedule and cash flow information, clearly labelled with data date, specific update, and person responsible for update.
 - .2 Bar chart identifying coding, activity durations, early/late and start/finish dates, total float, completion as percentile, current status, and budget amounts.
 - .3 Network diagram showing coding, activity sequencing (logic), total float, early or late dates, current status, and durations.
 - .4 Actual and projected monthly cash flow: expressed monthly and shown in both graphical and numerical form.

1.14 Construction Detail Schedule

- .1 Provide construction Detail Schedule (CPM logic diagram) within twenty-one (21) calendar days of Award of Contract date showing activity sequencing, dates, interdependencies, equipment resourcing and assumed working hours, shifts, and days. Include listed activities as follows:
 - .1 Submission of shop drawings, materials data, product data, MSDS data sheets, and samples.
 - .2 Approvals.
 - .3 Procurement (including off-site prefabrication activities, and items with long lead time).
 - .4 Construction.
 - .5 Installation.
 - .6 Site works.
 - .7 Commencement and completion of work of each Section of the Specifications or trade.

- .8 Allowable in-water construction time periods and indicate on construction work schedule when in-water work cannot be performed.
- .9 Other specified scheduling constraints.
- .10 Final completion date within the time period required by the Contract documents.
- .11 Commissioning and acceptance.
- .2 Detail CPM schedule to cover in detail complete project life cycle beginning from Award of Contract to completion of the work.
 - .1 Detail activities completely and comprehensively throughout duration of project.
- .3 Relate construction Detail Schedule activities to basic activities and milestones developed and approved in Master Plan.
- .4 Clearly show sequence and interdependence of construction activities and indicate:
 - .1 Start and completion of all items of the work, their major components, and interim milestone completion dates.
 - .2 Activities for procurement, delivery, installation, and completion of each major piece of equipment, materials, and other supplies, including:
 - .1 Time for submittals, resubmittals, and review.
 - .2 Time for fabrication and delivery of manufactured products for the work.
 - .3 Interdependence of procurement and construction activities.
 - .3 Include sufficient detail to assure adequate planning and execution of the work. Activities should generally range in duration from three (3) to fifteen (15) workdays each.
- .5 Provide level of detail for project activities such that sequence and interdependency of Contract tasks are demonstrated and allow for co-ordination and control of project activities. Show continuous flow from left to right.
- .6 Ensure activities with no float are calculated and clearly indicated on logical CPM construction network system as being, whenever possible, continuous series of activities throughout length of Project to form “Critical Path”. Increased number of critical activities is seen as indication of increased risk.
- .7 Insert Change Orders in appropriate and logical location of Detail Schedule. After analysis, clearly state and report to the Departmental Representative for review effects created by insertion of new Change Order.
- .8 The construction Detail Schedule shall include sufficient time for Departmental Representative review and acceptance of all work, Contractor corrective work if determined necessary by the Departmental Representative, and cleaning or

equipment decontamination, prior to the designated Substantial Completion date.

1.15 Review of the Construction Detail Schedule

- .1 Allow seven (7) calendar days for review by the Departmental Representative of proposed construction Detail Schedule.
- .2 Upon receipt of reviewed Detail Schedule make necessary revisions and resubmit within seven (7) calendar days to the Departmental Representative for review and acceptance.
- .3 Promptly provide additional information to validate practicability of construction Detail Schedule as required by the Departmental Representative.
- .4 Submittal of construction Detail Schedule indicates that it meets Contract requirements and will be executed generally in sequence.
- .5 The construction Detail Schedule, as reviewed and accepted by the Departmental Representative, will be an integral part of the Contract and will establish interim completion dates for the various activities under the Contract.

1.16 Compliance with (and Adjustment of) Construction Detail Schedule

- .1 Comply with the reviewed construction Detail Schedule.
- .2 Proceed with significant changes and deviations from scheduled sequence of activities that cause delay, only after written receipt of approval by the Departmental Representative.
- .3 Identify activities that are behind schedule and causing delay. Should any activity not be completed by the stated scheduled date, the Departmental Representative will have the right to require the Contractor to expedite completion of the activity by whatever means appropriate and necessary, without additional compensation to the Contractor. Corrective measures may include:
 - .1 Increase of personnel on site for effected activities or work package.
 - .2 Increase in materials and equipment.
 - .3 Overtime work or additional work shifts.
- .4 Submit to the Departmental Representative, justification, project schedule data and supporting evidence for approval of extension to Contract completion date or interim milestone date when required. The construction Detail Schedule shall be used to justify time extension days requested by the Contractor. Include as part of supporting evidence:
 - .1 Written submission of proof of delay based on revised activity logic, duration, and costs, showing time impact analysis illustrating influence of each change or delay relative to approved contract schedule.
 - .2 Prepared schedule indicating how change will be incorporated into the overall logic diagram. Demonstrate perceived impact based on date of

- occurrence of change and include status of construction at that time.
- .3 Other supporting evidence requested by the Departmental Representative.
 - .4 Do not assume approval of a Milestone extension prior to receipt of written approval from the Departmental Representative.
 - .5 In event of a Milestone extension, display in the construction Detail Schedule that scheduled float time available for work involved has been used in full without jeopardizing earned float.
 - .1 The Departmental Representative will determine and advise the Contractor on the number of allowable days for extension of the Milestone based on project schedule updates for the period in question, and other factual information.
 - .2 Construction delays affecting project schedule will not constitute justification for extension of a Milestone or Contract completion date.

1.17 Progress Monitoring and Reporting

- .1 Requirements for progress monitoring and reporting are basis for progress payment request.
- .2 On an ongoing basis, the construction Detail Schedule must show “Progress to Date.”
- .3 Arrange participation on and off site of subcontractors and suppliers, as, and when necessary, for purpose of network planning, scheduling, updating and progress monitoring.
- .4 Inspect Work with the Departmental Representative at least once (1) monthly to establish progress on each current activity shown on applicable networks.
- .5 Update and reissue project Work Breakdown Structure and relevant coding structures as project develops and changes.
- .6 Review, update and submit the construction Detail Schedule to the Departmental Representative **at minimum one (1) day before each weekly construction progress meeting**. The updated construction Detail Schedule shall reflect activities completed to date, activities in progress, logic and duration changes. The weekly update of the construction Detail Schedule shall be submitted in paper and electronic formats (source file and PDF formats).
- .7 Upon the Departmental Representative’s request, issue a companion schedule (in source file and PDF formats) showing all sequencing logic, dependencies, equipment resourcing and assumed working hours, shifts, and days.
- .8 Provide a short-term “4-week look ahead schedule” based on the updated construction Detail Schedule at two-weekly intervals. The short-term “4-week look ahead schedule” shall be submitted in paper and electronic formats (source file and PDF formats).

- .9 All changes to the construction Detail Schedule of more than three (3) working days shall be documented on the updated schedule and shall be submitted both in writing and electronic format (e-mailed) to the Departmental Representative.
- .10 Do not automatically update actual start and finish dates by using default mechanisms found in project management software.
- .11 Interim reviews of work progress based on the construction Detail Schedule will be conducted as decided by the Departmental Representative, and the schedule shall be updated by the Contractor in conjunction with, and to the acceptance of the Departmental Representative.
- .12 Submit monthly written report based on construction Detail Schedule, showing Work to date performed, comparing Work progress to planned, and presenting current forecasts. Report must summarize progress, defining problem areas and anticipated delays with respect to Work schedule, and critical paths. Explain alternatives for possible schedule recovery to mitigate any potential delay. Include in report:
 - .1 Description of progress made.
 - .2 Pending items and status of: permits, shop drawings, Change Orders and possible time extensions.
 - .3 Status of Contract completion date and milestones.
 - .4 Current and anticipated problem areas, potential delays and corrective measures.
 - .5 Review of progress and status of Critical Path activities.

2. PART 2 – PRODUCTS – NOT USED

3. PART 3 – EXECUTION – NOT USED

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section describes general requirements and procedures for the Contractor's submissions of all required submittals following award of the Contract (including the Construction Work Plan, other plans, construction schedule, cash flow estimate, shop drawings, product samples, and product testing data) to the Departmental Representative for review.
- .2 The Contractor is to provide submittals to the Departmental Representative in advance of, and throughout the duration of the work.
- .3 Detailed requirements for each submittal are stipulated in the related Sections of the Specifications.

1.2 Measurement and Payment Procedures

- .1 No separate payment will be made for required submittals or for re-submittals, as described in this Section, except as described in Clauses 1.2.3 and 1.2.4 of this Section.
- .2 Pre-construction and post-construction submittals will not be measured for payment.
- .3 Pre-construction submittals and re-submittals will be paid for at the Lump Sum price tendered for PRE-CONSTRUCTION SUBMITTALS. Payment shall include for all costs in connection with pre-construction submittals and re-submittals. The Lump Sum tendered for pre-construction submittals will be paid on completion of all applicable items listed in this Section to the satisfaction of the Departmental Representative.
- .4 Post-construction submittals and re-submittals will be paid for at the Lump Sum price tendered for POST-CONSTRUCTION SUBMITTALS. Payment shall include for all costs in connection with post-construction submittals and re-submittals. The Lump Sum tendered for post-construction submittals shall be paid on completion of all applicable items listed in this Section to the satisfaction of the Departmental Representative.
- .5 Construction submittals and re-submittals shall be considered as incidental to the work.

1.3 Related Sections

- .1 All Sections of the Contract documents shall apply to requirements for submittals associated with the work. The Contractor shall review and be familiar with the structure and contents of all required submittals.

1.4 Definitions

- .1 Refer to Section 01 11 55 (General Instructions) for all definitions related to the work.

1.5 Submittals

- .1 This summary list (**Tables 1, 2, and 3**) is presented for the Contractor's convenience only, and no warranty is given to its accuracy or completeness. In the event of any discrepancies with individual Sections of the Specifications, the requirements of the individual Section of the Specifications apply.

SUMMARY LIST OF SUBMITTALS

Table 1 – Pre-Construction Submittals

Section	Clause	Submittal	Submittal Schedule
01 11 55 01 35 43 02 41 16.02 35 20 23 35 20 23 35 20 23 35 20 23.01 35 20 23.01 35 37 10 35 37 10.01	1.8.3 1.1.6 1.5.1 1.5 3.3.1 3.5.3 1.5 1.10.1 1.5 1.5	Construction Work Plan	Within twenty-one (21) calendar days following Contract award
01 11 55	1.17.2	Indemnification Form and Schedule 1 Form	Prior to gaining access to the EGD Facility
01 11 55	1.30.1	Name of Surveyor or Engineer	Within ten (10) working days following Contract award
01 35 33	1.12	Notice of Project	Before work commences
01 11 55 01 32 16.06 01 32 16.06	1.12 1.8 1.14	Construction Detail Schedule	Within twenty-one (21) calendar days following Contract award
01 11 55 01 32 16.06 01 32 16.06	1.12 1.8 1.13	Master Plan	Within twenty-one (21) calendar days following Contract award
01 11 55 01 32 16.06 01 32 16.06	1.12 1.8 1.12	Initial Cash Flow Estimate	Within twenty-one (21) calendar days following Contract award

Section	Clause	Submittal	Submittal Schedule
01 35 33	1.30.5	Confined Space Entry / Work Plans	At least seven (7) days prior to each planned entry into any confined space
01 35 13.43 01 35 43	1.5.1 1.5	Environmental Protection Plan (EPP)	Within twenty-eight (28) calendar days following Contract award
01 35 13.43 01 35 13.43	1.5.3 2.1.4	Design Drawings of Temporary Re-suspension Barrier System	Within twenty-eight (28) calendar days following Contract award, and no less than fourteen (14) days prior to TRB installation
01 35 13.43 01 35 13.43	1.5.6 2.1.1	Shop Drawings of Temporary Re-suspension Barrier System	Within twenty-eight (28) calendar days following Contract award, and no less than fourteen (14) days prior to TRB installation
01 35 13.43 01 35 13.43	1.5.4 1.5.5	Proposed Working Practices for Operation of Tug Boats	Within twenty-eight (28) calendar days following Contract award, and no less than fourteen (14) days prior to TRB installation
01 35 13.43	1.26.2	Temporary Re-suspension Barrier Control Plan	As part of the Environmental Protection Plan (EPP)
01 35 43 01 35 13.43 01 35 13.43	1.5.6.6 1.5.1.1 1.8	Wastewater Management and Disposal Plan	As part of the Environmental Protection Plan (EPP)
01 35 43 01 35 13.43 01 35 13.43	1.5.6.5 1.5.1.2 1.11	Pollution Control Plan	As part of the Environmental Protection Plan (EPP)
01 35 43 01 35 13.43 01 35 13.43	1.5.6.7 1.5.1.3 1.24.2	Stormwater Pollution Prevention Plan	As part of the Environmental Protection Plan (EPP)
01 35 13.43 01 35 13.43	1.25.1 1.5.1.4	Temporary Erosion and Sedimentation Control Plan	As part of the Environmental Protection Plan (EPP)
01 35 13.43 01 35 13.43	1.26.1 1.5.1.5	Aquatic Water Quality Control Plan	As part of the Environmental Protection Plan (EPP)
01 35 43	1.20	Sustainable Remediation Efforts	As part of the Environmental Protection Plan (EPP)
01 74 19 02 41 16.01 31 23 10	1.5.1 1.6.4 1.6.2	Waste Reduction Work Plan	As part of the Environmental Protection Plan (EPP) and at least twenty-eight (28) days prior to start of related work
01 74 19	1.5.3	Materials Source Separation Program Plan	As part of the Environmental Protection Plan (EPP)
01 35 13.43 01 51 00	1.5.2 1.5	Site Layout Drawings	As part of the Environmental Protection Plan (EPP)

Section	Clause	Submittal	Submittal Schedule
31 23 10	1.6.1	Soil Management Plan	At least twenty-eight (28) days prior to commencing bulk excavation work
01 35 33 01 35 33	1.5 1.13	Health and Safety Plan	Within fifteen (15) working days following Contract award
01 35 33 01 35 33	1.5 1.14	Emergency Procedures	As part of the Health and Safety Plan
02 41 13	1.6.1	Selective site demolition method and procedure	As part of Construction Work Plan, at least twenty-eight (28) days prior to commencing selective site demolition work
02 41 16.01	1.6.1	Structure demolition method and procedure	As part of Construction Work Plan, at least twenty-eight (28) days prior to commencing structure demolition work
02 41 16.01	1.6.6	Proof of accurate calibration and certification of weigh scale facilities	At least seven (7) days prior to commencing structure demolition
01 45 00 02 21 13 03 30 00	1.5.1 1.5.1 3.14.2	Construction Quality Control Plan	Within twenty-one (21) calendar days following Contract award
01 35 33	1.5.3	Health and Safety Requirements	As part of the Health and Safety Plan
02 21 13	1.5.1	Survey and Positioning Control Plan	As part of the Quality Control Plan
02 21 13	3.4.1	Pre-Construction Survey	Minimum of ten (10) working days prior to the start of dredging activities
31 61 13 31 62 17 31 63 19	1.6 1.6 1.6	Pile Submittals	Per the Specifications
03 20 00	1.6	Concrete Reinforcement Submittals	Per the Specifications
03 30 00 03 39 00	1.7 1.6	Concrete Submittals	Per the Specifications
04 05 12	1.6.1	Grout Submittals	At least twenty-eight (28) days prior to commencing work
09 97 19	1.6.1	Coating Submittals	No less than twenty-eight (28) days prior to application
26 05 00	1.9	Electrical Submittals	At least twenty-eight (28) days prior to commencing work
26 05 20	1.5.2	Low voltage wire and box connectors product data	At least twenty-eight (28) days prior to commencing work
26 05 21	1.5.2	Low voltage wires and cables product data	At least twenty-eight (28) days prior to commencing work
26 05 27	1.5.2	Grounding equipment product data	At least twenty-eight (28) days prior to commencing work

Section	Clause	Submittal	Submittal Schedule
26 05 31	1.5.2	Splitters, junction boxes, pull boxes and cabinets product data	At least twenty-eight (28) days prior to commencing work
26 05 36	1.5.2	Cable trays product data	At least twenty-eight (28) days prior to commencing work
26 05 43.01	1.5.2	Cables in underground ducts product data	At least twenty-eight (28) days prior to commencing work
28 31 00	1.5.2	Fire alarm systems and components product data	At least twenty-eight (28) days prior to commencing work
31 24 15	2.1.2	General fill source and qualification/quality control test results	At least twenty-eight (28) days prior to commencing the placement of general fill
32 11 19	2.1.3	Granular sub-base source, qualification/quality control test results and placement procedures	At least twenty-eight (28) days prior to commencing granular sub-base placement
32 11 23	2.1.3	Granular base source, qualification/quality control test results and placement procedures	At least twenty-eight (28) days prior to commencing granular sub-base placement
33 11 16	2.7.3	Pipe bedding/surround fill material source, qualification/quality control test results and placement procedures	At least twenty-eight (28) days prior to commencing pipe bedding/surround placement
31 24 15	3.2.1	Methodology for compaction of general fill	Not less than twenty-eight (28) days prior to commencing the placing of the general fill
32 12 14	1.6.2	Asphalt prime samples	At least fourteen (14) days prior to commencing work
32 12 15	1.6.2	Asphalt tack coat samples	At least fourteen (14) days prior to commencing work
32 12 16	1.6	Asphalt Paving Submittals	Per the Specifications
33 11 16	1.7.1	Water utility distribution pipe material certification	At least twenty-eight (28) days prior to commencing work
31 32 19.01	1.6.1	Geotextiles maintenance and adjustment method statement	At least twenty-eight (28) days prior to start of geotextile maintenance and adjustment
31 32 19.01	1.6.2	Geotextile "as-found" condition dive survey	Before re-driving any sheet piles
35 20 23.01	1.10	Disposal Facility and Hazardous Waste Management Facility (and Treatment and Recycling/Re-Use Facility if applicable) Permit(s)	Within ten (10) working days following Contract award
03 30 00	1.7.2	Concrete placement check list	At least four (4) hours prior to the start of concrete placement
03 30 00	3.6.4		
01 91 13	1.9.1.1	Cx Procedures	At least four (4) weeks prior to start of Cx

Section	Clause	Submittal	Submittal Schedule
22 15 00	1.7.1	Compressed air pipe material certification	At least twenty-eight (28) days prior to commencing work
22 33 18	1.7.1	Drainage waste pipe material certification	At least twenty-eight (28) days prior to commencing work

Table 2 – Progress Submittals

Section	Clause	Submittal	Submittal Schedule
01 31 19	1.7.2.1	Minutes of Progress Meeting(s)	Within three (3) working days following Progress Meeting(s)
01 31 19	1.9.4		
01 11 55	1.12	“Month-by-month” Cash Flow Estimates	Per the Specifications
01 32 16.06	1.12.2		
01 11 55	1.12	Construction Detail Schedule updates	Per the Specifications
01 32 16.06	1.16		
35 20 23	1.5.3	Daily Construction Report	By noon of the following day
35 20 23.01	1.5.5		
35 37 10	1.5.6		
35 37 10.01	1.5.5		
35 20 23	1.5.3	Marine Surveyor Report	As part of the Daily Construction Report
35 20 23	3.4.3		
01 35 13.43	1.5.7	Weekly Construction Report	By noon on the first work day in the week (usually Monday) following completion of work for the previous week
35 20 23	1.5.4		
35 20 23.01	1.5.5		
35 37 10	1.5.7		
35 37 10.01	1.5.6		
01 35 13.43	1.5.6	Shop Drawings of Temporary Re-suspension Barrier System	No later than fourteen (14) calendar days prior to the start of any in-water demolition or dredging work
01 35 13.43	2.1.1		
01 74 19	1.5.4	Waste Audit	Upon request by Departmental Representative
02 41 16.01	1.6.7	Copies of all manifests, weight tickets, and other documentation to track final disposition of Demolition Debris	Per the Specifications
02 21 13	1.5.2	Progress Survey(s)	Per the Specifications
02 21 13	3.4.2		
02 21 13	1.5.2	Post-Construction Survey(s)	Per the Specifications
02 21 13	3.4.3		
02 21 13	1.5.5	Quantity Calculations and supporting information	Per the Specifications

Section	Clause	Submittal	Submittal Schedule
01 11 55 03 30 00	1.29.7 3.14.2.8	Quality Control Reports	Per the Specifications
31 62 17	1.7	Tension test results	Per the Specifications
31 32 19.01	1.6.3	Geotextile final condition dive survey	Within 48 hours of completion of sheet pile re-driving
31 61 13 31 62 17 31 62 19	3.14 3.9 3.5	Pile Driving Records	Per the Specifications
03 20 00 03 39 00 05 50 00	1.6 1.6.1 1.6	Shop Drawings for Structural Items	Per the Specifications
22 15 00 22 33 18 33 11 16	1.6.1 1.6.1 1.6.1	Shop Drawings and Product data for Mechanical Items	Per the Specifications
26 05 00 26 05 36 26 27 26 28 31 00	1.9.3 1.5.3 1.5.1 1.5.3	Shop Drawings and Product data for Electrical Items	Per the Specifications
33 11 16	1.6.1	Shop Drawings and Product data for Civil Items	Per the Specifications
35 37 10	1.5.3	Cap Material Samples	Minimum of two (2) weeks in advance of use at the EGD Work Site
03 20 00	2.3.2	Reinforcing steel mill test report	Upon request by Departmental Representative
05 50 00	1.7.1	Metal materials mill reports	Upon request by Departmental Representative
32 12 14	1.6.4	Asphalt prime test data	Upon request by Departmental Representative
32 12 15	1.6.4	Asphalt tack coat test data	Upon request by Departmental Representative
28 31 00	1.5.4	Fire detection and alarm quality assurance submittals	Per the Specifications
04 05 12	1.6.2	Grouting Records	Per the Specifications
26 05 27	3.2.1.5	Grounding network test results	Prior to burying ground conductors
26 05 43.01	3.3.5	Circuit test results	Per the Specifications
32 11 19	2.1.5	Granular sub-base quality control test reports	Per the Specifications
32 11 23	2.1.5	Granular base quality control test reports	Per the Specifications
33 11 16	2.7.5	Pipe bedding/surround fill material quality control test reports	Per the Specifications

Section	Clause	Submittal	Submittal Schedule
26 05 00	3.7.3	Electrical field quality control test results	Per the Specifications
26 05 43.01	3.3.5	Electrical field quality control test results	Per the Specifications
01 45 00	1.5.2	Laboratory Test Reports	Per the Specifications
35 37 10	1.5.2.4		

Table 3 – Post-Construction Submittals

Section	Clause	Submittal	Submittal Schedule
01 11 55	1.30	Record Drawing(s)	Two (2) weeks prior to substantial performance of the work
01 78 30	1.8.3		
02 41 16.01	3.2.5		
26 05 00	1.9.4		
33 11 16	1.10		
26 05 00	1.9.5.5	Electrical permit and certificate of acceptance	Upon completion of the work
01 78 30	1.8.3	Operation and maintenance manuals	Two (2) weeks prior to substantial performance of the work
22 15 00	3.7.1		
22 33 18	3.6.1		
26 05 00	1.14		
28 31 00	1.5.5		
33 11 16	3.14		
01 11 55	1.3.4	Certificates of Treatment (if applicable)	Per the Specifications
35 20 23.01	1.5.6		
01 11 55	1.3.3	Certificates of Disposal	Per the Specifications
35 20 23	1.5.5		
35 20 23.01	1.5.7		
01 78 30	1.18.1	Certificate of Completion	Per the Specifications
01 35 43	1.20.8	Sustainable Remediation Documentation	Following completion of the work

1.6 References – Not Used

1.7 Administrative

- .1 Submit to the Departmental Representative all submittals required for review as described in the Specifications. Submit promptly and in orderly sequence so as not to cause delay in work. Failure to submit in ample time is not considered sufficient reason for extension of Contract duration and no claim for extension by reason of such default will be allowed.

- .2 Allow sufficient time for the following:
 - .1 Review of product/sample data.
 - .2 Review of re-submissions as necessary.
 - .3 Ordering of accepted materials and/or products.
- .3 Unless noted otherwise in the Specifications, allow a minimum of five (5) working days for Departmental Representative review of each submittal and an additional five (5) working days for each re-submittal. Provide re-submittals within five (5) working days upon receipt of Departmental Representative comments. For pre-construction submittals, working days refer to Monday through Friday.
- .4 Do not proceed with work affected by submittal until the Departmental Representative's review and/or acceptance is complete.
- .5 Present submittal information in SI Metric units as applicable.
- .6 Where items or information are not produced in SI Metric units, converted values are acceptable.
- .7 Coordinate each submission with the requirements of the work and the Contract documents.
- .8 Review submittals prior to submission to the Departmental Representative. This review is to ensure that all necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated with requirements of work and Contract documents. Submittals with content that does not meet the requirements of the Specifications, or is not stamped, signed, dated, and identified as to specific project and the Contractor's or subcontractor's name will be returned without being examined and considered rejected. Departmental Representative review time starts only when a complete submittal is received.
- .9 Verify that field measurements and affected adjacent work are coordinated.
- .10 Notify the Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract documents and stating reasons for deviations.
- .11 The Contractor's responsibility for errors and omissions in its submissions is not relieved or diminished by the Departmental Representative's review and/or acceptance of the Contractor's submissions.
- .12 The Contractor's responsibility for deviations in its submissions from requirements of Contract documents or permit requirements is not relieved by the Departmental Representative's review and/or acceptance of submittals.
- .13 The Contractor shall revise and correct all submittals and re-submittals that are determined by the Departmental Representative to be inadequate or non-compliant with the Contract documents or permit requirements. When re-submitting, identify all revisions made.

- .14 Submittals and re-submittals shall be completed to the satisfaction of Department Representative.
- .15 Keep one reviewed, and accepted if appropriate, copy of each submission on site.

1.8 Shop Drawings

- .1 The term “shop drawings” means drawings, survey drawings, diagrams, illustrations, schedules, brochures, and other data that are to be provided by the Contractor to illustrate details of a portion of work.
- .2 Unless stipulated otherwise in the Specifications, shop drawings shall be submitted in unscaled portable document format (i.e., full size “PDF”), with no added security features.
- .3 All shop drawings that are required to be submitted by the Contractor to the Departmental Representative in raw CAD format (e.g., progress / final surveys) shall be in conformance to PWGSC National Computer Aided Design and Drafting (CADD) Standard, and shall be accompanied by unscaled portable document format (i.e., full size “PDF”), with no added security features. The current version of the PWGSC National CADD Standard may be obtained through the Departmental Representative.
- .4 Where the development of shop drawings by the Contractor has required the application of engineering principles, submit those shop drawings bearing stamp and signature of qualified professional engineer registered or licensed in the Province of British Columbia.
- .5 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.
- .6 Details of appropriate portions of work as applicable.
 - .1 Fabrication.
 - .2 Layout, showing dimensions (including identified field dimensions) and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
 - .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.

- .10 Relationship to adjacent work.
- .7 Submissions shall include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of the Contractor (plus subcontractor, supplier or manufacturer, as appropriate to the submittal).
 - .4 The Contractor's stamp, signed by the Contractor's authorized representative certifying acceptance of submissions, verification of field measurements, and compliance with Contract documents
 - .5 Details of appropriate portions of work.
- .8 Review of shop drawings by the Departmental Representative is for the sole purpose of ascertaining conformance with the general concept shown on the Drawings and required by the Specifications.
- .9 This review shall not mean that PWGSC, the Departmental Representative, or others approve detail design inherent in shop drawings, responsibility for which shall remain with the Contractor submitting same.
- .10 This review shall not relieve the Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract documents.
- .11 Adjustments made on shop drawings by the Departmental Representative are not intended to change the scope of work or the Tender amount for the Contract. If adjustments affect value or duration of work, state such in writing to the Departmental Representative prior to proceeding with work.
- .12 Make changes in shop drawings as the Departmental Representative may require, consistent with Contract documents. When re-submitting, identify all revisions made.
- .13 If, upon review by the 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, a noted copy will be returned and re-submission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of work may proceed.
- .14 Without restricting the generality of the foregoing, the Contractor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or to techniques of construction and installation, and for coordination of work of sub-trades.

1.9 Product Data

- .1 The term “product data” means manufacturers’ catalogue sheets, MSDS sheets, brochures, literature, performance charts, and diagrams used to illustrate standard manufactured products or any other specified information.
- .2 Delete information not applicable to project.
- .3 Supplement standard information to provide details applicable to project.
- .4 Cross-reference product data information to applicable portions of Contract documents.

1.10 Samples

- .1 The term “samples” means examples of materials, equipment, quality, finishes, and workmanship.
- .2 Where colour, pattern, or texture is a criterion, submit a full range of samples.
- .3 Reviewed and accepted samples will become the standard of workmanship and material against which installed work will be verified.

1.11 Progress Schedule

- .1 Submit work schedule and cost breakdown as required in Section 01 11 55 (General Instructions) and Section 01 32 16.06 (Construction Progress Schedule – Critical Path Method).

1.12 Test Results and Inspection Reports

- .1 Submit test results and inspection reports as listed throughout this Contract.

2. PART 2 – PRODUCTS – NOT USED

3. PART 3 – EXECUTION – NOT USED

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section describes special procedures that are applicable for work performed at contaminated sites, such as the EGD Work Site. The Contractor shall be responsible for adhering to these special procedures while performing all work under this Contract.
- .2 This Section also describes methods and procedures for design, procurement, installation, operation, maintenance, monitoring, repairs, cleaning, removal, and disposal of the Temporary Re-suspension Barrier (TRB) system required for in-water work within the Temporary Re-suspension Barrier Containment Area (TRBCA).
- .3 Other Sections of the Specifications, the Environmental Management Plan (EMP), and Project Permits may also contain specific requirements for environmental protection. These documents are to be reviewed and complied with by the Contractor. Those specific requirements are in addition to the requirements in this Section. In the event of a perceived difference or discrepancy between the EMP, Contract Specifications, and the Laws and Regulations, the more stringent provisions resulting in the higher degree of environmental protection and safety, and the lower discharge of contaminants, will prevail. The control of environmental pollution requires consideration of noise levels, air, water, and land.
- .4 The Contractor shall review, understand, and comply with, the EGD Environmental Best Management Practices (EBMPs) and the EGD Environmental Policy during completion of the work. The EGD EBMPs and Environmental Policy are included as reference documents to these Specifications.
- .5 Environmental degradation arising from construction activities shall be prevented, abated, controlled, and minimized by the Contractor. Although provincial laws and municipal bylaws generally do not apply on federal lands, the Contractor shall comply with provincial laws, municipal bylaws and the Laws and Regulations at the EGD Work Site, and all other locations used for this Contract, unless otherwise directed by the Departmental Representative.
- .6 The Contractor shall comply with the requirements of all permits issued for completion of this project.
- .7 The Contractor is responsible for environmental protection during all construction activities at all locations where it performs work. Work locations include, but are not limited to, the EGD Work Site, Contractor Off-Site Offload Facility, and during barge transport over water and land-based transportation of dredged material to the permitted Disposal Facility. This Section primarily addresses work conducted at the EGD Work Site, but the Contractor is responsible for complying with Laws and Regulations.

- .8 The Contractor is responsible for its actions if they result in recontamination of areas outside of the EGD Work Site. Contingency action to clean up previously remediated areas that are contaminated as a result of Contractor operations will be the responsibility of the Contractor at the Contractor's own cost.
- .9 In addition to the requirements of this Section, refer also to Section 31 62 17 (Steel Sheet Piling) for design and construction requirements for the TRB system.

1.2 Related Sections

- .1 Section 01 11 55 (General Instructions)
- .2 Section 01 33 00 (Submittal Procedures)
- .3 Section 01 35 43 (Environmental Procedures and Sustainability)
- .4 Section 01 74 11 (Cleaning)
- .5 Section 02 55 10 (Dust Control)
- .6 Section 31 62 17 (Steel Sheet Piling)
- .7 Section 35 20 23 (Dredging, Barge Dewatering and In-Water Transportation)
- .8 Section 35 20 23.01 (Offloading, Upland Transportation and Disposal)
- .9 Section 35 37 10 (Engineered Capping)
- .10 Section 35 37 10.01 (Residuals Management Cover Placement)

1.3 Measurement and Payment Procedures

- .1 Except for TRBs, no separate payment will be made for Special Procedures for Contaminated Sites.
- .2 Design, procurement, and installation of the TRB system will not be measured individually. Payment for design, procurement, and installation of the TRB system will be made at the Lump Sum price tendered for TEMPORARY RE-SUSPENSION BARRIERS: DESIGN AND PROCUREMENT. All costs associated with design, procurement and installation of the TRB system, and any temporary piling works that the Contractor chooses to undertake in connection with the TRB system, shall be included in this payment item.
- .3 Operation, maintenance, monitoring, repairs, cleaning, removal, and disposal of the TRB system will not be measured individually. Payment for maintenance, repairs, cleaning, and removal of the TRB system will be made at the Lump Sum price tendered for TEMPORARY RE-SUSPENSION BARRIERS: INSTALLATION, MAINTENANCE AND REMOVAL. All costs associated with operation, maintenance, monitoring, repairs, cleaning, removal, and disposal (at completion of under-pier sediment remediation works) of the TRB system, and any temporary piling works that the Contractor chooses to undertake in connection with the TRB system, shall be included in this payment item.

1.4 Definitions

- .1 See Section 01 11 55 (General Instructions) for all definitions related to the Contract documents.

1.5 Submittals

- .1 Submit, within twenty-eight (28) calendar days following Contract award, an Environmental Protection Plan (EPP) for Departmental Representative review and acceptance; see Section 01 35 43 (Environmental Procedures and Sustainability) and further requirements in elsewhere in this Section of the Specifications for required submittal information.
 - .1 Wastewater Management and Disposal Plan (WWMDP). Submit a WWMDP as a section of the EPP.
 - .2 Pollution Control Plan (PCP). Submit a PCP as a section of the EPP.
 - .3 Stormwater Pollution Prevention Plan (SWPPP). Submit a SWPPP as a section of the EPP.
 - .4 Temporary Erosion and Sedimentation Control Plan (TESCP). Submit a TESCP as a section of the EPP.
 - .5 Aquatic Water Quality Control Plan (AWQCP). Submit the AWQCP as a section of the EPP.
- .2 Site Layouts: Prior to mobilization to the EGD Work Site, and as part of the EPP; submit site layout drawings for both the EGD Work Site and Contractor Off-Site Offload Facility, showing existing conditions and facilities, construction temporary facilities, and temporary controls provided by the Contractor including the following:
 - .1 Equipment and personnel decontamination areas.
 - .2 Means of ingress, egress, and temporary traffic control facilities.
 - .3 Equipment staging areas.
 - .4 Soil, sediment, and debris stockpile areas at the Contractor's Off-Site Offload Facility.
 - .5 Exclusion zones, contaminant reduction zones, and other zones specified in the Contractor's site-specific Health and Safety Plan.
 - .6 Grading, including contours, required to construct temporary facilities.
 - .7 Wastewater collection areas or facilities as necessary.
 - .8 Wastewater Treatment and Disposal Facilities as necessary.
 - .9 Wastewater storage areas as necessary.
 - .10 Emergency spill response measures and locations.

- .3 As a component of the AWQCP, submit design drawings developed by a third party engineer and stamped by a Professional Engineer of the TRB system, and method statement describing the design, procurement, installation, operation, maintenance, monitoring, repairs, cleaning, removal, and disposal of the TRB system as a pre-construction submittal within twenty-eight (28) calendar days following Award of Contract (but not less than fourteen [14] calendar days prior to installation of TRB system), for Departmental Representative review and acceptance.
- .4 As a component of the AWQCP, submit the Contractor's proposed working practices (e.g., engine power, vessel speed, and propeller wash) for operation of tug boats to assist the movement of floating equipment (e.g., marine derricks and barges) **inside** the TRBCA, designed to minimize re-suspension of contaminated sediments within the TRBCA, as a pre-construction submittal within twenty-eight (28) calendar days following Award of Contract (but not less than fourteen [14] calendar days prior to installation of TRB system), for Departmental Representative review and acceptance.
- .5 As a component of the AWQCP, submit the Contractor's proposed working practices (e.g., engine power, vessel speed, and propeller wash) for operation of tug boats to assist the movement of floating equipment (e.g., marine derricks and barges) **outside** the TRBCA but within the EGD Work Site, designed to minimize propeller wash forces on the TRB, on the TRB support system and on the re-driven sheet pile wall as a pre-construction submittal within twenty-eight (28) calendar days following Award of Contract (but not less than fourteen [14] calendar days prior to installation of TRB system), for Departmental Representative review and acceptance.
- .6 Submit shop drawings, developed by the Contractor's third party engineer and stamped by a Professional Engineer, of the TRB system as a construction submittal no later than twenty-eight (28) calendar days prior to start of any in-water demolition or dredging work and no later than fourteen (14) calendar days prior to installation of the TRB system, for Departmental Representative review and acceptance.
- .7 All water quality data collected by the Contractor since the previous water quality data submittal, including the date, time, and location of data collection, as part of Contractor quality control monitoring activities, shall be provided as part of the Contractor's Weekly Construction Report or at the request of the Departmental Representative.

1.6 Sequencing and Scheduling

- .1 Do not commence work involving contact with potentially contaminated or hazardous materials until all environmental controls (including, but not limited to, TRB systems, and decontamination facilities) are operational and accepted by the Departmental Representative.

1.7 Equipment Decontamination Facility

- .1 Prior to commencing work involving equipment contact with potentially contaminated materials, design and construct an equipment decontamination area suitable to accommodate the largest piece of potentially contaminated equipment.
- .2 Provide, operate, and maintain necessary equipment, pumps, and piping required to collect and contain equipment decontamination wastewater, if unable to discharge directly to the receiving waters per the requirements of the EMP and EGD EBMPs.
- .3 Refer to Section 01 35 43 (Environmental Procedures and Sustainability) for additional information regarding the equipment decontamination facility.

1.8 Wastewater Management and Disposal

- .1 Describe the Contractor's approach, equipment, and methods to manage and properly discharge and/or dispose of wastewater generated during construction activities in a WWMDP as part of the EPP.
- .2 Wastewater management and disposal requirements provided in this Section apply to management of wastewater generated at the EGD Work Site. The Contractor shall be responsible for compliance with permit requirements for wastewater management and disposal activities performed at the Contractor's Off-Site Offload Facility. Although provincial laws and municipal bylaws generally do not apply on federal lands, the Contractor shall comply with provincial laws, municipal bylaws and the Laws and Regulations at the EGD Work Site, and all other locations used for this Contract, unless otherwise directed by the Departmental Representative.
- .3 Provide, operate, and maintain wastewater storage tanks to store wastewaters.
- .4 Wastewater includes handbasin and shower wastewaters from personnel hygiene and decontamination facilities, water collected from passive dewatering operations, and water collected from the equipment decontamination facility.
- .5 Store wastewaters from the equipment decontamination facility in separate tank from wastewater from personnel hygiene.
- .6 If toilet facilities are provided in personnel hygiene, store wastewater from these toilets with wastewater from hand-basins and showers for ultimate disposal at an off-site Wastewater Treatment and Disposal Facility.
- .7 Discharges: Comply with applicable discharge limitations and requirements in the EMP and Project Permits; do not discharge dredged material dewatering wastewaters to EGD on-site sewer systems.
 - .1 Do not discharge wastewater from personnel hygiene or toilet facilities on site. Dispose of these wastewaters at a permitted off-site Wastewater Treatment and Disposal Facility.

- .2 Passive dewatering of barges and discharge at the EGD Work Site, where allowed, shall comply with the EMP and Water Quality Monitoring Plan (WQMP).
- .3 Equipment decontamination wastewater should be contained, treated, and tested prior to discharging it at the EGD Work Site, provided it meets water quality performance objectives per the EMP and WQMP.
- .4 Wastewater generated as part of these activities that cannot meet these requirements for on-site discharge shall be disposed of at an off-site Wastewater Treatment and Disposal Facility.
- .8 Provide pumps and piping to convey collected wastewaters to designated wastewater storage tanks; provide wastewater storage tanks with minimum total live capacity such that effluent quality can be analyzed and accepted prior to discharge.
- .9 Install wastewater storage tanks in locations determined by the Contractor and accepted by the Departmental Representative.
- .10 Support tank(s) on temporary aboveground foundation(s).
- .11 Connect pumps, piping, valves, miscellaneous items, and necessary utilities as required for operation of facilities; and protect tanks, valves, pumps, piping, and miscellaneous items from freezing.
- .12 Do not operate wastewater storage tanks until inspected and accepted by the Departmental Representative.
- .13 Transport and dispose of wastewaters that cannot be discharged at the EGD Work Site (e.g., personnel hygiene, toilet facilities, and wastewaters that do not comply with water quality criteria) at an off-site Wastewater Treatment and Disposal Facility, as identified by the Contractor for review by the Departmental Representative.
- .14 Wastewater sample and analysis: the Contractor shall perform sampling and analysis of stored wastewater for disposal purposes in accordance with the EMP/WQMP prior to discharge at the EGD Work Site or removal from the EGD Work Site and transport to an off-site Wastewater Treatment and Disposal Facility. The Contractor shall determine appropriate methods of disposal based on results of the analyses. Upon receipt of analytical results, the Contractor shall transfer tank contents, without spills or release, to off-site permitted Disposal Facility. Following completion of tank emptying, the Contractor shall decontaminate tank interior with steam or high-pressure water wash supplemented by detergent, and dispose of tank decontamination water with tank contents.
 - .1 Sanitary wastewater and potentially other wastewater streams that do not meet water quality criteria shall be disposed of at an off-site Wastewater Treatment and Disposal Facility.
 - .2 Wastewater designated for disposal at a Wastewater Treatment and Disposal Facility must be transported from the EGD Work Site on water; truck transport of wastewater from the EGD Work Site is not allowed.

- .3 The Contractor shall identify all Wastewater Treatment and Disposal Facilities in the EPP for other wastewater streams, per results of wastewater testing, and in accordance with the requirements defined in the Specifications.

1.9 Vehicular Access

- .1 Maintenance and use at EGD Work Site and Contractor Off-Site Offload Facility:
 - .1 Prevent contamination of access roads. Immediately scrape up debris or material on access roads that is suspected to be contaminated as determined by the Departmental Representative; transport and place into a designated area accepted by the Departmental Representative. Clean access roads at least once per shift.

1.10 Dust and Particulate Control

- .1 Complete dust control activities according to means and methods presented in Section 02 55 10 (Dust Control).

1.11 Pollution Control

- .1 Describe the Contractor's approach, equipment, and methods to control pollution during construction activities in a PCP as part of the EPP.
- .2 Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious toxic substances and pollutants produced by construction operations.
- .3 Be prepared to intercept, clean up, and dispose of spills or releases that may occur, whether on land or water. Maintain materials and equipment required for cleanup of spills or releases readily accessible on site.
- .4 Promptly report spills and releases potentially causing damage to the environment, as specified by the EMP. The Contractor shall review, understand, and comply with the EGD EBMPs for spill response during completion of the work.
- .5 The Contractor shall make available the Material Safety Data Sheets (MSDS) at the EGD Work Site for the list of known pollutants that are being used at the EGD Work Site as part of the work. Contact manufacturer of pollutant if known and ascertain hazards involved, precautions required, and measures used in cleanup or mitigating action.
- .6 Take immediate action using the necessary resources to contain and mitigate effects on environment and persons from spill or release. In addition, comply with the EGD Spill Contingency Plan for work at the EGD Work Site.
- .7 Provide spill response materials including containers, adsorbent, shovels, and personal protective equipment (PPE). Make spill response materials available at all times in which hazardous materials or wastes are being handled or transported.

1.12 Transportation of Contaminated Materials from the EGD Work Site

- .1 Refer to Section 01 35 43 (Environmental Procedures and Sustainability), Section 35 20 23 (Dredging, Barge Dewatering and In-Water Transportation), and Section 35 20 23.01 (Offloading, Upland Transportation and Disposal) for information regarding transportation of contaminated materials from the EGD Work Site.

1.13 Upland Equipment Decontamination at Contractor Off-Site Offload Facility

- .1 Upland equipment decontamination primarily applies to activities that will be completed at the Contractor's Off-Site Offload Facility.
- .2 The Contractor is responsible for managing and monitoring its upland equipment decontamination activities in accordance with Laws and Regulations. In addition, the following requirements shall also be adhered to:
 - .1 Commence work involving equipment contact with potentially contaminated material only after equipment decontamination facility is operational.
 - .2 Decontaminate equipment after working in potentially contaminated work areas and prior to subsequent work or travel on remediated or other areas.
 - .3 Perform equipment decontamination on Contractor-constructed equipment decontamination pad or in watertight barges to prevent cross-contaminating un-impacted areas.
 - .4 At a minimum, perform the following steps during equipment decontamination:
 - .1 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.
 - .2 Pay particular attention to tire treads, equipment tracks, springs, joints, sprockets, and undercarriages.
 - .3 Scrub surfaces with long-handle scrub brushes and cleaning agent.
 - .4 Rinse off and collect cleaning agent.
 - .5 Air dry equipment in clean zone before removing from site or travelling on remediated or other areas.
 - .5 Each piece of equipment may be inspected by the Departmental Representative after decontamination and prior to removal from site and/or travel on remediated or other areas. The Departmental Representative will have the right to require that additional decontamination be completed if deemed necessary at the Contractor's own cost.

- .6 Take appropriate measures necessary to minimize drift of mist and spray during decontamination including provision of wind screens.
- .7 Collect decontamination wastewaters and sediments that accumulate on equipment decontamination pad. Transfer wastewaters to Contractor-supplied drums, wastewater storage tanks, or on-site treatment facility.
- .8 Dispose of sediments at the permitted Disposal Facilities and/or Hazardous Waste Management Facility (if applicable) used for the work.
- .9 Furnish and equip personnel engaged in equipment decontamination with PPE including suitable disposable clothing, respiratory protection, and face shields.

1.14 Floating Equipment Decontamination at the EGD Work Site

- .1 Decontaminate floating equipment that is used to dredge and/or haul contaminated sediment, prior to subsequent work in remediated or other areas or travel outside of the EGD Work Site. Watertight haul barges transporting contaminated sediment to the Contractor's Off-Site Offload Facility do not need to be decontaminated during construction work, but do need to be decontaminated once all contaminated dredging activities are completed.
- .2 Wastewater arising from waterborne equipment decontamination activities shall be sampled and analyzed in accordance with the EMP/WQMP. The Contractor is responsible for meeting performance monitoring criteria and objectives identified in these documents. The results of the chemical analyses will determine the appropriate disposal method (i.e., discharge to the marine environment or disposal at an on-site or off-site Wastewater Treatment and Disposal Facility).
- .3 Tug boats, work boats, survey boats, or other floating equipment that do not accumulate sediment on their surfaces do not need to be decontaminated.
- .4 After removal of the TRB system following completion of the work, the Contractor shall clean off all sediment and other objects that are attached to the TRB system including the TRB surface, anchors, lines, and other appurtenances, or dispose of the TRB system in the same manner as contaminated sediment. The Contractor shall handle, store, and transport the TRBs in the same manner as contaminated sediment prior to cleaning the TRBs. The Contractor shall prevent the removed sediment or other removed objects from entering the marine environment, and shall comply with water quality criteria of the EMP/WQMP during removal, transport, and cleaning of the TRBs and related components. All sediment and other objects that were cleaned off the surface of the TRB system shall be managed for disposal in accordance with the Specifications.
- .5 The exteriors of haul barges used to transport contaminated sediment off site shall be inspected and cleaned to remove dredged materials that may accumulate on the exterior of the haul barge, prior to transport off site.

- .6 Mechanically remove packed sediment, grit, and debris by scraping and brushing without using steam or high-pressure water to reduce the amount of water needed, and to reduce the amount of contaminated rinsewater generated.
- .7 Each piece of equipment may be inspected by the Departmental Representative after decontamination and prior to removal from the site and/or travel on remediated or other areas. The Departmental Representative will have the right to require that additional decontamination be completed if deemed necessary at the Contractor's own cost.
- .8 Take appropriate measures necessary to minimize drift of mist and spray during decontamination including provision of wind screens.
- .9 Collect decontamination wastewaters and sediments that accumulate within the watertight barge used for decontamination, or on other floating equipment. Transfer wastewaters to Contractor-supplied drums, wastewater storage tanks, or on-site treatment facility.
- .10 Dispose of sediments at the permitted Disposal Facilities and/or Hazardous Waste Management Facility (if applicable) used for the work.
- .11 Furnish and equip personnel engaged in equipment decontamination with protective equipment including suitable disposable clothing, respiratory protection, and face shields.

1.15 Upland Dewatering at the Contractor Off-Site Offload Facility

- .1 Upland dewatering of dredged sediments, hazardous waste, or debris will not be allowed at EGD.
- .2 Dewater various parts of work including, without limitation, dredged sediment, hazardous waste, debris, and temporary stockpile areas at the Contractor's Off-Site Offload Facility.
- .3 The Contractor is responsible for managing and monitoring its upland dewatering activities in accordance with the Laws and Regulations, as applicable to the site location.
- .4 Employ construction methods, plant procedures, and precautions such that work is stable, free from disturbance, and dry.
- .5 Upland dewatering methods: includes surface or free water control systems employing ditches, diversions, drains, pipes, and/or pumps; and other measures necessary to enable work to be carried out in dry conditions.
- .6 Provide sufficient and appropriate labour, plant, and equipment necessary to keep work free of water including standby equipment necessary for continuous operation of upland dewatering system.
- .7 Test and analyze water generated from upland dewatering activities and treat to meet required discharge or disposal requirements, in accordance with the Laws and Regulations.

1.16 Barge Passive Dewatering at the EGD Work Site

- .1 Refer to clauses related to barge passive dewatering in Section 35 20 23 (Dredging, Barge Dewatering and In-Water Transportation).
- .2 Wastewater arising from sediment passive dewatering activities on Contractor barges shall be sampled and analyzed in accordance with the EMP/WQMP. The Contractor shall ensure that the means and methods of sediment passive dewatering allow for safe access for the Environmental Monitor to sample the effluent water. The Contractor is responsible for meeting performance monitoring criteria and objectives identified in these documents. The results of the chemical analyses will determine the appropriate disposal method (i.e., discharge to the marine environment or disposal at an on-site or off-site Wastewater Treatment and Disposal Facility).

1.17 Progress Cleaning

- .1 Maintain cleanliness of work and surrounding the EGD Work Site and Contractor Off-Site Offload Facility to comply with Laws and Regulations. Although provincial laws and municipal bylaws generally do not apply on federal lands, the Contractor shall comply with provincial laws, municipal bylaws and the Laws and Regulations at the EGD Work Site, and all other locations used for this Contract, unless otherwise directed by the Departmental Representative.
- .2 Coordinate cleaning operations with disposal operations to prevent accumulation of dust, dirt, debris, rubbish, and waste materials.

1.18 Final Decontamination

- .1 Perform final decontamination of construction facilities, equipment, and materials that may have come in contact with potentially contaminated materials at Contractor-designated decontamination areas at the EGD Work Site and Off-Site Offload Facility prior to removal from the EGD Work Site and Contractor Off-Site Offload Facility.
- .2 Perform decontamination as specified to satisfaction of the Departmental Representative. The Departmental Representative will inform the Contractor to perform additional decontamination if required at the Contractor's own cost.

1.19 Removal and Disposal

- .1 Remove surplus materials and temporary facilities from the EGD Work Site.
- .2 Dispose of non-contaminated waste materials, litter, debris, and rubbish off site.
- .3 Do not burn or bury rubbish and waste materials at the EGD Work Site.
- .4 Do not dispose of volatile or hazardous wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
- .5 Do not discharge wastes into streams, watercourses, or stormwater systems.

- .6 Dispose of following materials at appropriate permitted Disposal Facility, Hazardous Waste Management Facility, or Wastewater Treatment and Disposal Facility identified by the Contractor and in accordance with the content of these Specifications:
 - .1 Debris including excess construction material.
 - .2 Non-contaminated litter and rubbish.
 - .3 Disposable PPE worn during final cleaning.
 - .4 Wastewater removed from wastewater storage tank.
 - .5 Wastewater generated from final decontamination operations including wastewater storage tank cleaning.
- .7 Minimize generation of Hazardous Waste to maximum extent practicable. Take necessary precautions to avoid mixing clean and contaminated wastes.

1.20 Record Keeping

- .1 Maintain bills of lading and waste manifests for minimum of 365 days (one year) from date of shipment or longer period required by the Laws and Regulations. These documents should also be provided to the Departmental Representative.

1.21 Environmental Management Plan

- .1 An EMP has been prepared for this Contract and is provided in an Appendix to the Specifications. Specific clauses related to Contractor completion of activities associated with this project are cited in this Section of the Specifications. The Contractor shall also be responsible for reviewing and understanding the EMP, and conducting all construction activities in accordance with the requirements of the EMP, Project Permits, and the Specifications. The Contractor shall use the EMP as a reference during development of the EPP.

1.22 Stockpiling Facility

- .1 Provide, maintain, and operate storage and stockpiling facilities at the Contractor's Off-Site Offload Facility as required, and in accordance with Laws and Regulations.

1.23 Wastewater Treatment and Disposal Facility:

- .1 Describe the Contractor's approach, equipment, and methods to install, maintain, and operate the Wastewater Treatment and Disposal Facility in the WWMDP as part of the EPP.
- .2 Design and Operating Criteria: Design water filtering plant(s) capable of filtering wastewater generated from barge passive dewatering activities, sanitary wastewater, and equipment decontamination activities to meet water quality performance criteria for discharge. Facilities must be capable of removing oil,

suspended solids, particulates, and asbestos fibers, and also pass water through a particulate filter prior to discharge.

- .1 Verify that discharges from the EGD Work Site meet the water quality performance objectives of the EMP/WQMP and Project Permits.
- .2 Verify that discharges from the Contractor's Off-Site Offload Facility are in compliance with permit requirements, the EMP/WQMP, and Laws and Regulations.
- .3 Design water filtering operations capable of receiving liquid or solid mixtures and not causing delay to operations.
- .3 Piping: Suitable material type, of sufficient diameter and structural thickness for purpose intended; satisfactorily tested for leaks with potable water in presence of the Departmental Representative before handling wastewater.
- .4 Installation: Provide labour, materials, and equipment and do work required for setup and construction of water filtering plant.
- .5 Initial Testing (if applicable): Performance of Wastewater Treatment and Disposal Facility provided by the Contractor may be inspected by the Departmental Representative. The Contractor shall submit treatment test results to the Departmental Representative and other permitting authorities as applicable for review and the Contractor shall submit the facility's permit to treat and dispose or discharge treated wastewater. The Contractor may use a new Wastewater Treatment and Disposal Facility that is constructed for project purposes or an existing permitted Wastewater Treatment and Disposal Facility.
- .6 Operation:
 - .1 On basis of analytical results reviewed by the Departmental Representative, make system modifications required for effluent to satisfy effluent criteria, or continue with normal dewatering operations.
 - .2 Operate Wastewater Treatment and Disposal Facility by experienced, qualified personnel in accordance with manufacturer's instructions and procedures submitted by the Contractor and reviewed by the Departmental Representative.
- .7 Decommissioning/dismantling:
 - .1 Decontaminate and remove salvageable components of water filtering plant including water filtering system, pumps, piping, and electrical equipment.
 - .2 Dispose of non-salvageable equipment and materials at the permitted Disposal Facility.

1.24 Upland Water Control at EGD Work Site

- .1 This Section applies to over-land water control (i.e., stormwater and surface water control) for management of construction water at the EGD Work Site.

- .2 The Contractor shall prepare and submit a SWPPP and submit to the Departmental Representative as part of the EPP. The SWPPP shall describe measures to:
 - .1 Protect the EGD Work Site from puddling or running water and grade areas to drain as necessary. Provide water barriers as necessary to protect the areas from soil erosion.
 - .2 Prevent surface water runoff from leaving work areas.
 - .3 Prevent discharge, directly or indirectly, of decontaminated water, surface water runoff, or groundwater that may have come in contact with potentially contaminated material, off site to municipal sewers or stormwater systems.
 - .4 Direct surface waters that have not contacted potentially contaminated materials to existing surface drainage systems.
 - .5 Control surface drainage including ensuring that gutters are kept open, water is not directed across or over pavements or sidewalks except through accepted pipes or properly constructed troughs, and runoff from unstabilized areas is intercepted and diverted to suitable outlet.
 - .6 Dispose of water in manner not injurious to public health or safety, to the environment, or to any part of work completed or under construction.
 - .7 Provide, operate, and maintain necessary equipment appropriately sized to keep excavations, staging pads, and other work areas free from water.
 - .8 Contain water from decontamination facilities. Transfer potentially contaminated decontamination waters to wastewater storage tanks separate from wastewater generated from personnel hygiene facilities.
 - .9 Have on hand sufficient pumping equipment, machinery, and tankage in good working condition for ordinary emergencies, including power outage, and competent workers for operation of pumping equipment.
 - .10 Contain and collect wastewaters and transfer such collected wastewaters to Contractor-supplied drums, wastewater storage tanks, or EGD Work Site treatment facility.

1.25 Temporary Erosion and Sediment Control at the EGD Work Site

- .1 The Contractor shall prepare and submit a TESCP and submit to the Departmental Representative as part of the EPP. The TESCP shall address potential erosion and sediment control measures if required for construction activities at the EGD Work Site, and discuss the following as applicable:
 - .1 Plan to execute construction by methods to control surface drainage from cuts and fills, borrow and waste disposal areas, stockpiles, staging areas, and other work areas. Prevent erosion and sedimentation.

- .2 Minimize amount of bare soil exposed at one time. Stabilize disturbed soils as quickly as practical. Strip vegetation, regrade, or otherwise develop to minimize erosion. Remove accumulated sediment resulting from construction activity from adjoining surfaces, drainage systems, and water courses, and repair damage caused by soil erosion and sedimentation as directed by the Departmental Representative.
- .3 Provide and maintain temporary measures that may include concrete blocks, silt fences, hay or straw bales, geotextiles, drains, berms, terracing, riprap, temporary drainage piping, dikes, and other construction required to prevent erosion and migration of silt, mud, sediment, and other debris off site or to other areas of site where damage might result, or that might otherwise be required by the Laws and Regulations. Make sediment control measures available during construction.
- .4 Hay or Straw Bale: Wire-bound or string-tied; securely anchored by at least two (2) stakes or rebars driven through bale 300 to 450 millimetres (mm) into ground; chinked (filled by wedging) with hay or straw to prevent water from escaping between bales; and entrenched minimum of 100 mm into ground.
- .5 Silt Fence: Assembled, ready-to-install unit consisting of geotextile attached to drivable posts. Material and installation methods shall sufficient to comply with WQMP requirements.
- .6 Geotextile: Uniform in texture and appearance, having no defects, flaws, or tears that would affect its physical properties; and containing sufficient ultraviolet ray inhibitor and stabilizers to provide minimum 2-year service life from outdoor exposure.
- .7 Net Backing: Industrial polypropylene mesh joined to geotextile at both top and bottom with double stitching of heavy-duty cord, with minimum width of 750 mm.
- .8 Posts: Sharpened wood, approximately 50 mm square, protruding below bottom of geotextile to allow minimum 450-mm embedment; post spacing 2.4 m, maximum. Securely fasten each post to geotextile and net backing using suitable staples.
- .9 Plan construction procedures to avoid damage to work or equipment encroachment onto water bodies or drainage ditch banks. In event of damage, promptly take action to mitigate effects. Restore affected bank or water body to existing condition.
- .10 Installation:
 - .1 Construct temporary erosion control items as indicated. Actual alignment and/or location of various items to the satisfaction of the Departmental Representative.
 - .2 Check erosion and sediment control measures daily after each rainfall.

- .3 Whenever sedimentation is caused by stripping vegetation, regrading, or other development, remove it from adjoining surfaces, drainage systems, and watercourses, and repair damage as quickly as possible.
- .4 Prior to or during construction, the Departmental Representative may require installation or construction of improvements to prevent or correct temporary conditions on site. Temporary improvements must remain in place and in operation as necessary or until otherwise directed by the Departmental Representative.
- .5 Repair or replace damaged bales, end runs, and undercutting beneath bales.
- .6 Unless otherwise directed by the Departmental Representative, remove temporary erosion and sediment control devices upon completion of work. Spread accumulated sediments to form a suitable surface for seeding or dispose of, and shape area to permit natural drainage to satisfaction of the Departmental Representative. Materials once removed become property of the Contractor.
- .11 Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
- .12 Do not disturb existing embankments or embankment protection.
- .13 Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.
- .14 If soil and debris from site accumulate in low areas, storm sewers, roadways, gutters, ditches, or other areas where, in the Departmental Representative's determination, it is undesirable, remove accumulation and restore area to original condition.

1.26 Aquatic Water Quality Control

- .1 Prepare, as part of the EPP, an AWQCP that describes how the Contractor will prevent resuspended sediment from leaving the EGD Work Site area during dredging and other aquatic construction activities within the EGD Work Site by use of the combination of the re-driven sheet pile perimeter wall and the third party engineer-designed TRB systems, operational controls, and Contractor BMPs during dredging and capping activities. The AWQCP shall also describe how the Contractor will comply with all permit requirements, Specifications, and EMP/WQMP requirements related to meeting water quality requirements during construction.
 - .1 Describe the Contractor's equipment, layout, operational controls, and BMPs that will be used to control water quality impacts.
 - .2 Describe the Contractor's anticipated contingency actions that the Contractor will implement as a result of water quality exceedances.

- .2 TRB system: Fabrication of the TRB system shall not begin until a TRB system control plan as part of the AWQCP, to be submitted in the EPP, has been reviewed and accepted by the Departmental Representative. At a minimum, the TRB system control plan shall contain the following information:
 - .1 A description and/or drawings describing how the TRB system will comply with the EMP, as well as how the TRB system will prevent marine animals from gaining water access to the TRBCA.
 - .2 The type and make of all materials and parts proposed for use as part of the TRB system.
 - .3 The re-driven sheet pile wall is designed to resist environmental forces (but not vessel impact) exerted as pressure distributions against its face. Provide written confirmation by the Contractor's third party engineer (stamped by a Professional Engineer) that the TRB system does not cause lateral live loading on the re-driven sheet pile perimeter wall that in any way damages or displaces the re-driven sheet pile perimeter wall. The Contractor shall repair the sheet pile perimeter wall at no cost to PWGSC if it is displaced, damaged, or dislodged due to the TRB system or the Contractor's construction activities prior to dismantling of the re-driven sheet pile perimeter wall as approved by the Departmental Representative.
 - .4 Detailed design drawings, developed by a third party engineer and stamped by a Professional Engineer, showing layout of TRB system, dimensions, and depictions of how system will interact with the Contractor's equipment. Drawings will include details on how the TRB system will work in conjunction with the sheet pile perimeter wall and transition to extend the full depth of the water column to the shoreline east of the terminus of the existing sheet pile perimeter wall. The TRB system in this area must also function such that the water quality criteria of the EMP/WQMP are met.
 - .5 The portion of the TRB system materials and components above the water line at all times shall be made visible at all times including day and night time hours, using the appropriate materials (e.g., reflectors and markings). The above water portion of the TRB system shall be clearly visible to construction, operational, and recreational vessels that may be operating near the TRBCA, and shall delineate the approximate location of the submerged steel sheet pile perimeter wall located at the TRBCA boundary. The Contractor's TRB system control plan shall describe these materials and components, and the plan must be accepted by the Departmental Representative prior to construction of the TRB system.
 - .6 TRB system anchoring plan.
 - .7 Details describing the BMPs (including use of additional TRBs) that will be implemented to prevent contamination of Contractor Subareas, as required.

- .8 Detailed construction schedule that identifies timing and sequencing for completion of TRB system design and fabrication activities, as they relate to other major elements of the work.
 - .9 Detailed drawings showing proposed locations for TRB system installation and operation during structure demolition and dredging activities.
 - .10 Methods and procedures for Contractor inspection, maintenance, and repair of TRB system during construction.
 - .11 Methods and procedures for relocating the TRB system (if necessary) as the Contractor moves equipment and sediment remediation operations throughout the EGD Work Site.
 - .12 Methods and procedures for preventing abrasion, impact damage, or displacement to the TRB system as a result of contact with the Contractor's floating construction equipment and vessels, including vessel propwash effects.
 - .13 Methods and procedures for cleaning and decontamination of the TRB system for disposal, as applicable.
 - .14 Refer also to the submittal requirements listed in Clause 1.5 of this Section of the Specifications.
- .3 Departmental acceptance of the TRB system control plan (as part of the AWQCP) does not remove the Contractor's liability for corrective action should the functionality of the TRB fail to meet the permit requirements or requirements of these Specifications.

2. PART 2 – PRODUCTS

2.1 Temporary Re-suspension Barrier System

- .1 The Contractor shall be responsible for design, procurement, installation, operation, maintenance, monitoring, repairs, cleaning, removal, and disposal of the TRB system required for the work. The Contractor shall engage a third party engineer to design and develop shop (fabrication) drawings of the TRB and TRB system. Drawings shall be stamped by a Professional Engineer.
- .2 Materials to be used in construction of the TRB system must be new.
- .3 The TRB system shall be used to contain re-suspended sediment generated during completion of in-water construction activities. The TRB system shall be procured by the Contractor, and will surround the in-water activities specified in Part 3 – Execution of this Section of the Specifications.
- .4 Submit design drawings of the TRB system in accordance with Clause 1.5 of this Section of the Specifications.
- .5 Submit shop drawings of the TRB system in accordance with Clause 1.5 of this Section of the Specifications.

3. PART 3 – EXECUTION

3.1 Notification of Non-Compliance

- .1 The Departmental Representative will notify the Contractor, in writing, of observed non-compliance with the Laws and Regulations, and other elements of the Contractor's EPP. Although provincial laws and municipal bylaws generally do not apply on federal lands, the Contractor shall comply with provincial laws, municipal bylaws and the Laws and Regulations at the EGD Work Site, and all other locations used for this Contract, unless otherwise directed by the Departmental Representative.
- .2 Any regulatory fees, penalties, or costs that result from non-compliance with these regulations shall be the sole responsibility of the Contractor to pay.
- .3 Notwithstanding this notification process, the Contractor shall be responsible for conducting all construction activities in a manner compliant with these regulations.
- .4 The Contractor shall inform the Departmental Representative of proposed corrective action after receipt of such notice, and take such action for acceptance by the Departmental Representative.
- .5 The Departmental Representative will issue a stop work order until satisfactory corrective action has been taken.
- .6 No time extensions shall be granted or equitable adjustments allowed to the Contractor for such suspensions.

3.2 Implementation

- .1 Coordination:
 - .1 At the Pre-Construction Meeting, the Departmental Representative and the Contractor shall discuss the Contractor's operations to develop mutual understandings relative to the administration of the environmental protection program.
- .2 Supervision:
 - .1 During the work, all activities, including those of subcontractors, shall be supervised by the Contractor to verify compliance with the intent and details of the EPP.
 - .2 The Contractor shall discuss environmental compliance at daily tailgate meetings and Weekly Progress Meeting for itself and its subcontractors to assure that all personnel working at the EGD Work Site are familiar with the environmental protection provisions.
 - .3 All equipment and materials for environmental protection shall be inspected every week, at a minimum, to verify that they are in proper order, being applied correctly, and have not deteriorated.

- .4 The Contractor shall provide to the Departmental Representative a written inspection report as part of the weekly construction report documenting the condition of the equipment and materials.
- .3 Working Practices:
 - .1 When using tug boats to assist the movement of floating equipment (e.g., marine derricks and barges) **inside** the TRBCA, the Contractor shall institute and enforce working practices (e.g., engine power, vessel speed, and propeller wash) that minimize re-suspension of contaminated sediments within the TRBCA.
 - .2 When using tug boats to assist the movement of floating equipment (e.g., marine derricks and barges) **outside** the TRBCA but within the EGD Work Site, the Contractor shall institute and enforce working practices (e.g., engine power, vessel speed, and propeller wash) that minimize propeller wash forces on the TRB, TRB support system, re-driven sheet pile wall, and that minimize re-suspension of the sediments outside of the TRBCA.

3.3 Temporary Re-suspension Barrier System Implementation

- .1 Design and Operating Criteria:
 - .1 The Contractor and the Contractor's third party engineer shall design and install the TRB system such that all water quality criteria per the Specifications, EMP/WQMP, and Project Permits are met.
 - .2 The Contractor and the Contractor's third party engineer shall design and install the TRB system such that it encloses the whole of the TRBCA, except as allowed in Clause 3.3.1.3 of this Section of the Specifications.
 - .3 Partial enclosure of the TRBCA by the TRB system will be permitted only under the following circumstances:
 - .1 In-water construction activities are to be performed only in the portion of the TRBCA identified by the Contractor.
 - .2 The Contractor has fulfilled all requirements stipulated by the Specifications related to submittal of methods and procedures for design, procurement, installation, operation, maintenance, monitoring, repairs, cleaning, removal, and disposal of the TRB system, addressing partial enclosure of the TRBCA.
 - .3 The Departmental Representative has accepted the Contractor's TRB submittal addressing partial enclosure of the TRBCA.
 - .4 The Contractor has fulfilled, and continues to fulfill all requirements stipulated by the Specifications and its submitted methodology related to installation and operation of the TRB system.

- .4 The Contractor and the Contractor's third party engineer shall select appropriate materials for use in design, installation, and maintenance of the TRB system such that performance of the system meets the requirements of the Specifications, including TRB system requirements described in Section 31 62 17 (Steel Sheet Piling), EMP/WQMP, and Project Permits regarding water quality requirements.
- .5 The Contractor shall thoroughly investigate the tidal, wind, and sea state conditions in Esquimalt Harbour when providing performance criteria to the third party engineer who will design (and potentially install) the TRB system. Some types of TRB system are commonly known as silt curtains, which vary in material durability, permeability, and strength, and may not be suitable for different sea state conditions.
- .6 The third party engineer, employed by the Contractor to design (and potentially install) the TRB system, will design the system to work in combination with the re-driven sheet pile perimeter wall that will remain in place during Under-Pier Dredging and capping activities. The combined sheet pile wall and Contractor-procured TRB system shall be designed to prevent re-suspended contaminated sediment that results from demolition, dredging, hazardous waste removal, debris removal, vessel movement within the EGD Work Site, and capping activities from being transported out of the TRBCA into adjacent remediated or other areas within the EGD Waterlot.
- .7 The TRB system shall be designed by the Contractor's third party engineer in a manner that will minimize the potential for marine mammals to become trapped between the TRB system and the sheet pile wall. The TRB system should be designed to restrict or deter marine mammals and fish from entering the TRBCA.
- .8 The Contractor's third party engineer shall design the TRB system such that the above-water portion of the TRB system is visible (including day and night time hours) to construction, operational, and recreational vessels that may be operating near the TRBCA, and accurately delineates the approximate location of the submerged steel sheet pile perimeter wall located at the TRBCA boundary.
- .9 The combined enclosure system (i.e., re-driven sheet pile wall and TRB) shall be designed, installed, operated, and moved such that minimal dispersion of re-suspended sediment in the water column occurs, and to meet the water quality requirements provided in this Specification, and within the EMP/WQMP and Project Permits.
- .10 The TRB system shall be designed so that its anchoring system does not pose a navigation hazard to vessels using the portion of the EGD Work Site that is outside the TRBCA or result in interference with dredging activities that are require for completion within the TRBCA as part of this Contract.

- .11 The TRB system shall be designed to prevent water from flowing over the top of the enclosure barrier at all tidal conditions. The TRB system shall extend to a distance below the water surface so that, in combination with the re-driven sheet pile perimeter wall, sufficient overlap is achieved between the top of the sheet pile wall and the bottom of the TRB system at any tidal stage, to effectively prevent re-suspended sediment from being transported out of the TRBCA by natural currents (e.g., tidal action or waves) or human-induced currents (e.g., propeller wash from vessels within the EGD Work Site). The Contractor and the Contractor's third party engineer shall determine the criteria for sufficient overlap. At no time shall a vertical gap between the top of the re-driven sheet pile wall and the bottom of the TRB systems occur.
- .12 The installation and anchoring design for the TRB system shall accommodate the potential need to relocate Contractor equipment if so directed by the Departmental Representative, and as required for the work. EGD operational needs shall take precedence over Contractor work in this regard.
- .13 The design of the TRB system shall accommodate the potential need for the Departmental Representative sampling vessel, approximately an eight (8)-metre long vessel, to occasionally operate within the TRBCA. The TRB system must be able to be temporarily opened or partially relocated to allow to the sampling vessel to enter and exit the TRBCA or enclosed Contractor Subarea.
- .14 The Contractor shall comply with the decision framework for TRB system opening as described in the WQMP. The TRB system shall not be opened to allow the Contractor's equipment to enter or exit the TRBCA until the Contractor can demonstrate empirically that the water quality performance criteria for release per the water quality requirements defined in the Specifications and the Contract documents (Tables 01 35 13.43-2, 01 35 13.43-5 and 01 35 13.43-6) have been met, unless otherwise approved by the Departmental Representative. The Contractor's Appropriately Qualified Person (AQP) shall collect samples to establish their own Internal Assessment Point (IAP) criteria that will result in compliance with the water quality performance criteria at the Exterior Assessment Points (EAPs). The Sample must be at least 5 litres (L) in volume and collected using the collection, handling, and chain of custody procedures. As described in the WQMP:
 - .1 The Contractor shall notify the Departmental Representative prior to 02:00 pm the work day preceding its intention to open the TRB system such that the EM can verify that monitoring personnel and supplies are in place. The Contractor shall include details for proposed daily or routine openings of the TRB system, as applicable, in the Construction Work Plan;
 - .2 The EM will assess conditions at Near-field Reference location to establish ambient total suspended solids (TSS)/turbidity

- concentrations (if not already available as part of other Project monitoring), collect water samples at EAP25 and EAP100, and notify the Departmental Representative (to relay to the Contractor) if any adjustments to the TSS/turbidity criteria are necessary based on exterior turbidity;
- .3 The Contractor's AQP shall designate at least one (1) location to use as the IAP inside the TRBCA closest to the TRB system opening. The Contractor shall assess conditions at the IAP and notify the Departmental Representative and EM if the IAP is compliant;
 - .4 The Contractor shall notify the EM and the Departmental Representative of its intent to open the TRB system and will establish an appropriate Activity Zone (AZ) around the TRB system opening and verify that all non-Contractor personnel have exited the AZ prior to opening the TRB and related vessel activity. As soon as practical, the Contractor shall close the TRB system. The EM may elect to adjust sampling if the TRB system remains open for extended durations of time (e.g., multiple hours) at the discretion of the EM;
 - .5 The Contractor shall verify that the EGD Work Site outside of the TRB opening is safe for the EM to enter and conduct sampling, and notify the EM when it is safe to conduct compliance monitoring;
 - .6 The EM will assess in-situ water quality at EAP25 and EAP100 and collect samples at three (3) depths at each station;
 - .7 The EM will review the data when available to determine if contaminants had been released in quantities above the modeled scenario at 25 m and/or exceeded water quality criteria at 100 m and provide the results in a data summary report to the Departmental Representative;
 - .8 If criteria are exceeded at EAP25, the EM will notify the Departmental Representative, who will notify the Contractor. The Contractor shall take the appropriate management actions, as required, and,
 - .9 The criteria for TRB opening must be re-assessed by the EM, Departmental Representative, and Contractor after an exceedance at EAP100.
- .2 Provide daily monitoring and inspection of the TRB system to confirm that the TRB system is properly installed and is effectively containing re-suspended sediment.
 - .3 The Contractor shall conduct monthly dive survey inspections of the TRB system including the re-driven sheet pile perimeter wall in addition to dive surveys at the request of Departmental Representative and prior to the start of in-water construction

activities. The Contractor shall verify that the TRB system is functional as designed by the Contractor's third party engineer to meet water quality criteria. The Contractor shall submit video with commentary and observations for each dive survey of the TRB system.

- .4 Should the Contractor's monitoring and inspection, or the Departmental Representative's environmental monitoring, indicate that the TRB system has become dislodged or displaced, is damaged, or is improperly installed, the Contractor shall take immediate action to repair the TRB system, adjust use of the TRB system, or any additional actions necessary to comply with water quality requirements provided in the Specifications, requirements of the EMP/WQMP, and permit requirements, all at the Contractor's own cost. Such measures may include:
 - .1 Adding additional resuspension control measures to increase effectiveness of the TRB system.
 - .2 Slowing down work to reduce the amount of re-suspended sediment, working during specific tidal cycles (e.g., slack tide) to reduce the exchange of water from outside and inside the TRBCA.
 - .3 Changing out dredging or other equipment to try to reduce re-suspended sediment generated during completion of the required construction activities.
- .5 The Contractor shall establish a safe working area near the TRBCA during removal of the TRB system and extraction of the re-driven sheet pile wall and during quality assurance dive surveys performed by the Departmental Representative.

3.4 Contingency Action for Management of Potential Recontamination Outside of the TRBCA

- .1 The Departmental Representative will conduct and issue to the Contractor pre-construction sampling of surface seabed (upper 100 mm) conditions immediately outside of the TRBCA, but within the EGD Work Site, to establish baseline environmental conditions of the surface sediments in this area of the EGD Work Site. After dredging and capping activities are completed within the TRBCA, the surface seabed outside of the TRBCA, but within the EGD Work Site, will be re-sampled to determine whether the surface sediment chemical concentrations remained the same, or whether there is evidence of loss of contaminated sediment (i.e., recontamination) from within the TRBCA, as shown on the Drawings.
- .2 The Departmental Representative will review the pre-construction and post-dredging/capping sampling data, plus water quality monitoring results and Contractor and Departmental Representative daily and weekly reports, to determine whether the increased chemical concentrations in areas immediately outside of the TRBCA, but within the EGD Work Site, as shown on the Drawings, are due to the Contractor's operations associated with the project, or due to other causes. The Departmental Representative will notify the Contractor of the results of this determination immediately following review of sample data.

- .3 The Contractor shall be solely responsible to conduct contingency actions, at the Contractor's own cost, to clean up any newly contaminated areas associated with the Contractor's work and activities, identified by the Departmental Representative outside the TRBCA and within the EGD Work Site. The Departmental Representative will direct the Contractor to conduct one of the following actions, after identifying and reviewing the extent of new contamination as necessary:
 - .1 Placing Residuals Management Cover Material over newly contaminated areas, as shown on the Drawings; or,
 - .2 Performing thin layer Residuals Contingency Re-Dredging to remove new residuals contamination; or,
 - .3 Combination of the two methods.

3.5 Protection of Aquatic Water Resources

- .1 General
 - .1 Compliance with requirements of any permits and clearances obtained for the work is the Contractor's responsibility.
 - .2 Water discharges from barges must pass through filter fabric, or other filtering medium and additional treatment (if necessary) to remove suspended solids before discharge to waters contained within the TRBCA.
 - .3 Discharge of effluent from the Contractor's construction activities shall meet all water quality criteria per the Specifications, EMP, and Project Permits. Site-specific water quality requirements for the project are provided in the tables in this Section and are also included in the EMP/WQMP.
 - .4 All wastewater generated by the Contractor's construction activities shall be analyzed and assessed to determine the appropriate disposal method (i.e., discharge to marine environment or disposal at an on-site or off-site Wastewater Treatment and Disposal Facility) prior to discharging or disposing of wastewater.
- .2 Disposal
 - .1 Except as provided in the Contract, disposal of any wastes, effluents, trash, grease, chemicals, or other contaminants in water bodies shall not be allowed.
 - .2 If any waste material is dumped in unauthorized areas, the material shall be removed and the area restored to its pre-project condition at the Contractor's own expense.

3.6 Aquatic Water Quality Monitoring

- .1 An EM, on behalf of the Departmental Representative, will perform water quality monitoring, consistent with requirements of the Specifications and general

- procedures described within the EMP/WQMP, and will report to the Departmental Representative.
- .2 The Contractor shall familiarize itself with water quality requirements provided in the tables below and within the EMP, and with other PWGSC monitoring plans and activities, as they pertain to this Contract.
 - .3 In no event does the Departmental Representative's monitoring activities alleviate the Contractor's responsibility to monitor its own operations to verify that the Contractor is meeting water quality requirements. The Contractor shall verify it is meeting water quality requirements throughout the work, as part of Contractor quality control activities, and shall submit all water quality data collected during monitoring activities in accordance with the requirements of the Specifications or at the request of the Departmental Representative.
 - .4 Comply with Project Permits and approvals and the requirements of the EMP when conducting the work. Site-specific water quality requirements for the project are provided in the tables in this Section of the Specifications and are also included in the EMP/WQMP.
 - .5 The Contractor shall provide safe access to the EM to conduct water quality monitoring at the specified distances from the work activity.
 - .6 Water quality shall be controlled and monitored by the Contractor in accordance with the following performance criteria:
 - .1 Potential releases of Deleterious Substances (i.e., suspended sediments, cementitious materials, waters not meeting the Water Quality Performance Criteria (Tables 01 35 13.43-1 through -6) and any other toxic substances, as defined under CEPA Schedule 1) shall be controlled and monitored by the Contractor during the work.
 - .2 The Contractor shall demonstrate that the work site meets all water quality performance criteria (i.e., Quality Control). The Departmental Representative will conduct external monitoring at designated locations (i.e., Quality Assurance).
 - .3 In the interest of avoiding unnecessary shutdowns due to water quality exceedances outside of the EGD Work Site, it is recommended that the Contractor conduct independent monitoring to verify compliance with water quality criteria as defined in the tables in this Section and the EMP/WQMP.
 - .7 Any exceedance of the water quality requirements provided in the following tables, or as described in the EMP/WQMP, may result in a requirement to stop work or modify work activities at the discretion of the Departmental Representative.
 - .8 Tables 01 35 13.43-1 through -6 provide the general water quality requirements from the WQMP.

**Table 01 35 13.43-1: Water Quality Performance Criteria
 Activities within the TRBCA¹**

Parameter	Early Warning Point (EWP) (25 m outside of TRB)	Compliance Point (CP) (100 m from TRB)
Total Suspended Solids (mg/L)	<p><5 mg/L over NFR when NFR is between 0-25 mg/L ^{2,3}</p> <p><10 mg/L over NFR when NFR is ≤100 mg/L ^{2,3}</p> <p>Increase of <10% over NFR when NFR is >100 mg/L ^{2,3}</p> <p>TSS exceedances at the EWP correlated with Project activities within the TRBCA may result in management actions to better contain silt.</p>	<p><5 mg/L over NFR when NFR is between 0-25 mg/L ^{2,3}</p> <p><10 mg/L over NFR when NFR is ≤100 mg/L ^{2,3}</p> <p>Increase of <10% over NFR when NFR is >100 mg/L ^{2,3}</p> <p>TSS exceedances at the CP correlated with Project activities within the TRBCA may result in work stoppage until the problem has been addressed.</p>
Turbidity ⁴ (NTU)	<p>Maximum increase of 8 NTU over NFR ⁴ for a short-term exposure (e.g. <24 hours) and 2 NTU for longer term exposure (e.g. 30 day) when NFR turbidity is <8 NTU</p> <p>Maximum increase of the greater of 8 NTU or 10% over NFR when NFR Turbidity is >8 NTU</p>	<p>Maximum increase of 8 NTU over NFR ⁴ for a short-term exposure (e.g. 24 hours) and 2 NTU for longer term exposure (e.g. 30 day) when NFR turbidity is <8 NTU</p> <p>Maximum increase of the greater of 8 NTU or 10% over NFR when NFR turbidity is >8 NTU</p>
Dissolved Oxygen (mg/L) ⁵	<p>Instantaneous minimum (acute): 5 mg/L</p> <p>Mean concentration (chronic): 8 mg/L</p>	<p>Instantaneous minimum (acute): 5 mg/L</p> <p>Mean concentration (chronic): 8 mg/L</p>
pH ^{2,6}	<p style="text-align: center;">7.0-8.7</p> <p>pH exceedances at the EWP correlated with Project activities would require corrective actions by the contractor</p>	<p style="text-align: center;">7.0-8.7</p> <p>pH exceedances at the CP correlated with Project activities would require corrective actions by the contractor</p>
Metals – various (mg/L)	See 'Release Criteria' in Table 01 35 13.43-5	See 'Compliance Criteria' in Table 01 35 13.43-5
PAHs – various (µg/L)	See 'Release Criteria' in Table 01 35 13.43-6	See 'Compliance Criteria' in Table 01 35 13.43-6

CP – Compliance Point; mg/L – milligrams per litre; µg/L – micrograms per litre; NFR – Near-Field Reference; NTU – nephelometric turbidity units; EWP – Early Warning Point; TRB – Temporary Re-suspension Barrier; TSS – Total Suspended Solids.

Notes:

- Refer to Figure A4 (Appendix 1) for decision-making framework for exceedances of water quality performance criteria for *in situ* monitoring.
- (1) Includes sheet pile wall re-drive and removal, TRB removal, TRB support pile installation and removal.
- (2) Based on *Canadian Environmental Quality Guidelines Water Quality for the Protection of Aquatic Life Marine* (CCME, 2014).
- (3) Based on *BCMOE Ambient Water Quality Guidelines for Marine Turbidity, Benthic and Suspended Sediments* (BCMOE, 2014).
- (4) Turbidity is to be used as an *in situ* approximation of TSS. The TSS/turbidity relationship will be evaluated and adjusted as necessary based on samples collected in the field. The interim values presented in this table should be used unless values are adjusted from field data. The baseline monitoring program indicated that ambient turbidity in Esquimalt Harbour is relatively low (mean = 3.8 NTU; Golder, 2012c); however, intermittent increases to 400 NTU were observed related to vessel operations and storm events. Turbidity will be evaluated for the Project as induced turbidity above ambient as measured at the time of sampling per Golder (2012c) and SLR (2013).
- (5) Based on *BCMOE Ambient Water Quality Guidelines for Marine Dissolved Oxygen* (BCMOE, 2014).
- (6) The range of pH specified for protection of marine waters is 7.0 – 8.7 unless it can be demonstrated that existing pH levels are the result of natural processes (BCMOE, 2014; CCME, 2014).

**Table 01 35 13.43-2: Water Quality Performance Criteria
 Opening of the Temporary Re-Suspension Barrier**

Parameter	Interior Assessment Point ¹ (IAP) (prior to opening TRB)	Receiving Environment After TRB closed ¹¹ Distance from TRB	
		25 m (EAP ₂₅) ³	100 m (ECP) ¹²
Total Suspended Solids² (mg/L)	To be determined by Contractor. TSS criteria to open TRB to be based on modelling of expected metal and PAH concentrations. Must not be acutely lethal.	68 mg/L	<5 mg/L over NFR when NFR is between 0-25 mg/L ^{2,4} <10 mg/L over NFR when NFR is ≤100 mg/L ^{2,4} Increase of <10% over NFR when NFR is >100 mg/L ^{2,4}
Turbidity ⁶ (NTU)	To be determined by Contractor. Turbidity criteria to open TRB to be based on modelling of expected metal and PAH concentrations. Must not be acutely lethal.	34 NTU	Maximum increase of 8 NTU over NFR ⁵ for a short-term exposure (e.g. 24 hours) and 2 NTU for longer term exposure (e.g. 30 day) when NFR turbidity is <8 NTU Maximum increase of the greater of 8 NTU or 10% over NFR when NFR turbidity is >8 NTU
Dissolved Oxygen⁷ (mg/L)	≥5 mg/L	≥5 mg/L	≥5 mg/L
pH ^{8,9}	7.0-8.7	7.0-8.7	7.0-8.7
Metals – various (mg/L)	See 'Release Criteria' in Table 01 35 13.43-5 ¹⁰	See 'Release Criteria' in Table 01 35 13.43-5	See 'Compliance Criteria' in Table 01 35 13.43-5
PAHs – various (µg/L)	See 'Release Criteria' in Table 01 35 13.43-6 ¹⁰	See 'Release Criteria' in Table 01 35 13.43-6	See 'Compliance Criteria' in Table 01 35 13.43-6

EAP₂₅ – Exterior Assessment Point, 25 m; ECP – Exterior Compliance Point; IAP – Interior Assessment Point; mg/L – milligrams per litre; µg/L – micrograms per litre; NFR – Near-Field Reference; NTU – nephelometric turbidity units; PAH – Polycyclic Aromatic Hydrocarbon; TRB – Temporary Re-suspension Barrier; TSS – Total Suspended Solids.

Notes:

- Refer to Figure A5 (Appendix 1) for decision-making framework for exceedances of water quality performance criteria for opening the TRB.
- (1) Turbidity, dissolved oxygen and pH assessments to be made using *in situ* methods; *in situ* PAH and metals determination may be used if desired. Laboratory tests will be used to provide feedback after the fact for future TRB openings.
- (2) TSS values may need to be revised in the field to account for other Water Quality Parameters.
- (3) Exceedances at EAP₂₅ to be modelled to 100 m to calculate likelihood of exceeding ECP performance criteria and recommend management actions, if required.
- (4) Based on *Canadian Environmental Quality Guidelines Water Quality for the Protection of Aquatic Life Marine* (CCME, 2014).
- (5) Based on *BCMOE Ambient Water Quality Guidelines for Turbidity, Benthic and Suspended Sediments* (BCMOE, 2014).
- (6) The baseline monitoring program indicated that ambient turbidity in Esquimalt Harbour is relatively low (mean = 3.8 NTU; Golder, 2012c); however, intermittent increases to 400 NTU were observed related to vessel operations and storm events. Turbidity will be evaluated for the Project as induced turbidity above ambient as measured at the time of sampling per Golder (2012c) and SLR (2013). Turbidity is to be used as an *in situ* approximation of TSS. The TSS/turbidity relationship will be verified and adjusted as necessary based on laboratory data. These values should be used until field verification is possible.
- (7) Based on *BCMOE Ambient Water Quality Guidelines For Dissolved Oxygen* (BCMOE, 2014).
- (8) Based on *Canadian Environmental Quality Guidelines Water Quality for the Protection of Aquatic Life Marine* (CCME, 2014).
- (9) The range of pH specified for protection of marine waters is 7.0 – 8.7, unless it can be demonstrated that such pH is a result of natural processes (BCMOE, 2014; CCME, 2014).
- (10) Contractor must demonstrate that IAP water meets criteria established by the Contractor's appropriately qualified person prior to TRB opening.
- (11) TRB is to be closed as soon as possible after vessel passage to minimize the discharge of potential contaminants out of the TRBCA. If TRB is to be opened for extended periods of time sampling will occur while the TRB is open (sampling frequency to be based on length of time the TRB will be open) in addition to after it has been closed.
- (12) ECP TSS and turbidity modelled based on 10x safety factor of acute toxicity levels.

Table 01 35 13.43-3: Water Quality Performance Criteria Dewatering Barge Effluent Outside TRBCA from Dredged Material within TRBCA		
Parameter	Barge Effluent¹	Dilution Zone Compliance Point (DZCP) 100 m from Point of Discharge
Total Suspended Solids	TSS values as compliance limits for discharge are not commonly specified ²	5 mg/L over NFR when NFR is between 0-25 mg/L ^{3,4} <10 mg/L over NFR when NFR is 26 to ≤100 mg/L ^{3,4} Increase of <10% over NFR when NFR is >100 mg/L ^{3,4}
Turbidity ⁵	Turbidity values as compliance limits for discharge are not commonly specified ²	Maximum increase of 2 NTU over NFR when NFR turbidity is <8 NTU Maximum increase of the greater of 8 NTU or 10% over NFR when NFR turbidity is >8 NTU
Dissolved Oxygen	≥5 mg/L ⁶	≥ 5mg/L
pH	7.0-8.7 ^{7,8}	7.0-8.7 ^{7,8}
Metals – various	See 'Release Criteria' in Table 01 35 13.43-5 ⁹	See 'Compliance Criteria' in Table 01 35 13.43-5 ¹⁰
PAHs – various	See 'Release Criteria' in Table 01 35 13.43-6 ⁹	See 'Compliance Criteria' in Table 01 35 13.43-6 ¹⁰

DZCP – Dilution Zone Compliance Point; mg/L – milligrams per litre; µg/L – micrograms per litre; NFR – Near-Field Reference; NTU – nephelometric turbidity units; PAH – Polycyclic Aromatic Hydrocarbon; TRBCA – Temporary Re-suspension Barrier Containment Area; TSS – Total Suspended Solids

Notes:

- Refer to Figure A4 (Appendix 1) for decision-making framework for exceedances of water quality performance criteria for *in situ* monitoring.
- (1) There is to be no discharge without treatment outside of the TRBCA. Passive dewatering may occur within the TRBCA if water performance criteria outside the TRBCA are maintained (Table 4-4).
- (2) Discharge not subject to turbidity or TSS criteria; however, may not influence TSS or turbidity at any nearby monitoring locations (i.e., those within 100 m of discharge).
- (3) Based on *Canadian Environmental Quality Guidelines Water Quality for the Protection of Aquatic Life Marine* (CCME, 2014).
- (4) Based on *BCMOE Ambient Water Quality Guidelines for Turbidity, Benthic and Suspended Sediments* (BCMOE, 2014).
- (5) The baseline monitoring program indicated that ambient turbidity in Esquimalt Harbour is relatively low (mean = 3.8 NTU; Golder, 2012c); however, intermittent increases to 400 NTU were observed related to vessel operations and storm events. Turbidity will be evaluated for the Project as induced turbidity above ambient as measured at the time of sampling per Golder (2012c) and SLR (2013).
- (6) Based on *BCMOE Ambient Water Quality Guidelines For Dissolved Oxygen* (BCMOE, 2014).
- (7) Based on *BCMOE Ambient Water Quality Guidelines For Dissolved pH* (BCMOE, 2014).
- (8) The range of pH specified for protection of marine waters is 7.0 – 8.7, unless it can be demonstrated that such pH is a result of natural processes (BCMOE, 2014; CCME, 2014).
- (9) Effluent exceeding these criteria may not be discharged.
- (10) Exceedances of these criteria will result in stoppage of discharge and management actions to prevent further releases.

Table 01 35 13.43-4: Water Quality Performance Criteria Prior to Decommissioning Temporary Re-Suspension Barrier & Sheet Pile Wall (within TRBCA)¹	
Parameter	Inside TRBCA
Total Suspended Solids (mg/L)	<5 mg/L over NFR when NFR is between 0-25 mg/L ^{1,2} <10 mg/L over NFR when NFR is ≤100 mg/L ^{1,2} Increase of <10% over NFR when NFR is >100 mg/L ^{1,2} TSS exceedances at the CP correlated with Project activities within the TRBCA may result in work stoppage until the problem has been addressed
Turbidity ³ (NTU)	Maximum increase of 8 NTU over NFR ³ for a short-term exposure (e.g. 24 hours) when NFR turbidity is <8 NTU Maximum increase of the greater of 8 NTU or 10% over NFR when NFR turbidity is >8 NTU
Dissolved Oxygen (mg/L)	minimum: 5 mg/L ⁴
pH	7.0-8.7 ^{2,5}
Metals – various (mg/L)	See 'Compliance Criteria' in Table 01 35 13.43-5 Results to be confirmed analytically
PAHs – various (µg/L)	See 'Compliance Criteria' in Table 01 35 13.43-6 Results to be confirmed analytically

mg/L – milligrams per litre; µg/L – micrograms per litre; NFR – Near-Field Reference; NTU – nephelometric turbidity units; PAH – Polycyclic Aromatic Hydrocarbon; SPW – Sheet Pile Wall; TRB – Temporary Re-suspension Barrier; TRBCA – Temporary Re-suspension Barrier Containment Area

Notes:

- (1) The TRB and/or SPW will not be decommissioned until these criteria are met within the TRBCA and can be demonstrated to the DR and EM.
- (2) Based on *Canadian Environmental Quality Guidelines Water Quality for the Protection of Aquatic Life Marine* (CCME, 2014).
- (3) The baseline monitoring program indicated that ambient turbidity in Esquimalt Harbour is relatively low (mean = 3.8 NTU; Golder, 2012c); however, intermittent increases to 400 NTU were observed related to vessel operations and storm events. Turbidity will be evaluated for the Project as induced turbidity above ambient as measured at the time of sampling per Golder (2012c) and SLR (2013).
- (4) Based on BC MOE *Ambient Water Quality Guidelines for Marine Dissolved Oxygen* (BCMOE, 2014).
- (5) The range of pH specified for protection of marine waters is 7.0 – 8.7 unless it can be demonstrated that existing pH levels are the result of natural processes (BCMOE, 2014; CCME, 2014).

Table 01 35 13.43-5: Water Quality Performance Criteria		
Total Metals		
Parameter (as total) ¹	Release Criteria ^{2, 3} (25 m from point of release)	Compliance Criteria ^{4, 5} (100 m from point of release)
Arsenic (µg/L)	125	12.5
Copper (µg/L)	30	3
Zinc (µg/L)	100	10

CP – Compliance Point; EAP₂₅ – Exterior Assessment Point, 25 m; ECP – Exterior Compliance Point; EWP – Early Warning Point; IAP – Interior Assessment Point; µg/L – micrograms per litre; TRB – Temporary Re-suspension Barrier.

Notes:

- (1) The selection of this subset of metals is discussed in Golder (2012c).
- (2) The performance criteria for release are based on 10x ambient water quality guidelines.
- (3) At EWP or EAP₂₅ based on if the TRB is opened or closed at time of measurement.
- (4) Compliance performance criteria are based on ambient water quality guidelines (BCMOE, 2014).
- (5) At CP or ECP based on if the TRB is opened or closed at time of measurement.

Table 01 35 13.43-6: Water Quality Performance Criteria		
Total Polycyclic Aromatic Hydrocarbons		
PAH Congeners ¹	Release Criteria ^{2, 3} (25 m from point of release)	Compliance Criteria ^{4, 5} (100 m from point of release)
Acenaphthene (µg/L)	510	51
Anthracene (µg/L)	5	0.5
Benzo(a)anthracene (µg/L)	1.8	0.18
Benzo(b)fluoranthene (µg/L)	8.6	0.86
Benzo(a)pyrene (µg/L)	5.6	0.56
Benzo(g,h,i)perylene (µg/L)	1	0.1
Chrysene (µg/L)	8.6	0.86
2-Methylnaphthalene (µg/L)	58	5.8
Naphthalene (µg/L)	100	10
Phenanthrene (µg/L)	40	4
Pyrene (µg/L)	12.8	1.28

CP – Compliance Point; EAP₂₅ – Exterior Assessment Point, 25 m; ECP – Exterior Compliance Point; EWP – Early Warning Point; IAP – Interior Assessment Point; µg/L – micrograms per litre; TRB – Temporary Re-suspension Barrier.

Notes:

- (1) The selection of this subset of PAHs is discussed in Golder (2012c).
- (2) The values are based on a combination of literature review and quantitative structure-activity relationship (QSAR) as described in Golder (2012b).
- (3) At EWP or EAP₂₅ based on if the TRB is opened or closed at time of measurement.
- (4) Compliance Criteria are based on the Release Criteria with a 10-fold safety factor applied.
- (5) At CP or ECP based on if the TRB is opened or closed at time of measurement.

3.7 Protection of Fish and Wildlife

- .1 All work shall comply with the work window timing requirements described in Section 01 11 55 (General Instructions) and the EMP.
- .2 All work shall be performed and all steps taken to prevent interference or disturbance to fish and wildlife. The Contractor shall avoid removal of the TRB system and sheet pile perimeter wall outside of the marine fisheries timing windows to avoid interference with herring spawn, and shall comply with the BMPs of the EMP concerning herring spawn. The Contractor shall visually inspect the TRB system and sheet pile perimeter wall during removal to avoid interference or disturbance to herring spawn. The Contractor shall immediately notify the Departmental Representative of any observed herring spawn.
- .3 Water flows or habitat outside the EGD Work Site that are critical to fish or wildlife shall not be altered or disturbed.
- .4 The Contractor shall immediately cease dredging or other in-water operations if fish kill or distressed fish are observed, and immediately notify the Departmental Representative.
- .5 The Contractor shall immediately cease dredging or other in-water operations if abalone are observed within the TRBCA or affixed to the TRB system including the sheet pile perimeter wall, and immediately notify the Departmental Representative.
- .6 The Contractor shall immediately cease dredging or other in-water operations if a marine mammal is observed within the TRBCA and immediately notify the Departmental Representative.

3.8 Dust Control

- .1 Dust control shall be performed as the work proceeds, whenever a dust nuisance or hazard occurs.

3.9 Maintenance or Pollution Control Facilities

- .1 The Contractor shall maintain all constructed facilities and portable pollution control devices for the duration of the Contract or for that length of time construction activities create the particular pollutant.

3.10 Training of Contractor Personnel

- .1 Contractor personnel shall be trained in environmental protection and pollution control as required by the Laws and Regulations. Although provincial laws and municipal bylaws generally do not apply on federal lands, the Contractor shall comply with provincial laws, municipal bylaws and the Laws and Regulations at the EGD Work Site, and all other locations used for this Contract, unless otherwise directed by the Departmental Representative.

- .2 The Contractor shall conduct environmental protection and pollution control meetings for all Contractor personnel.
- .3 The training and meeting agenda shall include methods of detecting and avoiding pollution, familiarization with pollution standards, both statutory and contractual, and installation and maintenance of facilities and instruments required for monitoring purposes to ensure adequate and continuous environmental protection and pollution control. Anticipated hazardous or toxic chemicals or wastes, and other regulated contaminants, shall also be discussed.

END OF SECTION

1. PART 1 – GENERAL

1.1 References

- .1 Government of Canada:
 - .1 Canada Labour Code – Part II
 - .2 Canada Occupational Health and Safety Regulations.
- .2 National Building Code of Canada (NBC):
 - .1 Part 8, Safety Measures at Construction and Demolition Sites.
- .3 Canadian Standards Association (CSA):
 - .1 CSA Z797, Code of Practice for Access Scaffold.
 - .2 CSA S269.1, Falsework for Construction Purposes.
 - .3 CSA S350, Code of Practice for safety in Demolition of Structures.
 - .4 CSA Z1006-10 – Management of Work In Confined Space.
- .4 National Fire Code of Canada:
 - .1 Part 5 – Hazardous Processes and Operations and Division B as applicable and required.
- .5 American National Standards Institute (ANSI):
 - .1 ANSI A10.3, Operations – Safety Requirements for Powder-Actuated Fastening Systems.
- .6 Province of British Columbia:
 - .1 Workers Compensation Act Part 3 Occupational Health and Safety.
 - .2 Occupational Health and Safety Regulation.
- .7 Departmental:
 - .1 Preliminary Job Hazard Analysis Check List (Sample – For Reference Only).
- .8 EGD Site Specific:
 - .1 EGD Best Management Practices for Fire Prevention, PWGSC, Environmental Services, January 26, 2009.
 - .2 South Jetty confined space / restricted access space hazard reports (by Golder Associates), see Specification Appendix.

1.2 Related Sections

- .1 Refer to the following Sections as required:

- .1 Section 01 11 55 (General Instructions)
- .2 Section 01 33 00 (Submittal Procedures)
- .3 Section 01 51 00 (Temporary Facilities)
- .4 Section 02 41 13 (Selective Site Demolition)
- .5 Section 02 41 16.01 (Structure Demolition)

1.3 Workers' Compensation Board Coverage

- .1 Comply fully with the Workers' Compensation Act, Laws and Regulations and orders made pursuant thereto, and any amendments up to the completion of the work.
- .2 Maintain Workers' Compensation Board coverage during the term of the Contract, until and including the date that the Certificate of Final Completion is issued.

1.4 Compliance with Regulations

- .1 PWGSC may terminate the Contract without liability to PWGSC where the Contractor, in the opinion of PWGSC, refuses to comply with a requirement of the Workers' Compensation Act or the Occupational Health and Safety Regulations.
- .2 It is the Contractor's responsibility to ensure that all workers are qualified, competent and certified to perform the work as required by the Workers' Compensation Act or the Occupational Health and Safety Regulations.

1.5 Submittals

- .1 Make submittals in accordance with Section 01 33 00 (Submittal Procedures).
- .2 Work affected by submittals stipulated by this Section of the Specification shall not proceed until review by Departmental Representative is complete.
- .3 Submit the following:
 - .1 Contractor's construction safety manual.
 - .2 Site-specific project Health and Safety Plan.
 - .3 Copies of reports or directions issued by Federal and Provincial health and safety inspectors.
 - .4 Copies of incident and accident reports.
 - .5 Complete set of Material Safety Data Sheets (MSDS), and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements.
 - .6 Emergency procedures.

- .4 Prior to the start of the work, the Departmental Representative will review the Contractor's site-specific project Health and Safety Plan and emergency procedures, and provide comments to the Contractor within five (5) working days after receipt of the plan. Revise the plan as appropriate and resubmit to the Departmental Representative for review upon request. Departmental Representative review does not constitute acceptance nor relieve the Contractor of its legal obligations for the provision of health and safety on the project.
- .5 Medical surveillance: where prescribed by Laws and Regulations or safety program, submit certification of medical surveillance for site personnel prior to commencement of work, and submit additional certifications for any new site personnel to the Departmental Representative.
- .6 Submission of the Contractor's construction safety manual and site-specific project Health and Safety Plan, and any revised version, to the Departmental Representative is for information and reference purposes only. It shall not:
 - .1 Be construed to imply approval by the Departmental Representative.
 - .2 Be interpreted as a warranty of being complete, accurate and legislatively compliant.
 - .3 Relieve the Contractor of its legal obligations for the provision of health and safety on the project.

1.6 Responsibility

- .1 Assume responsibility as the prime Contractor for work under this Contract.
- .2 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of the work.
- .3 Comply with and enforce compliance by employees with safety requirements of Contract documents, Laws and Regulations, and with the site-specific Health and Safety Plan. Although provincial laws and municipal bylaws generally do not apply on federal lands, the Contractor shall comply with provincial laws, municipal bylaws and the Laws and Regulations at the EGD Work Site, and all other locations used for this Contract, unless otherwise directed by the Departmental Representative.

1.7 Health and Safety Coordinator

- .1 The Contractor shall designate a Health and Safety Coordinator (and designee) in its Health and Safety Plan. The Health and Safety Coordinator must:
 - .1 Be a Registered Occupational Hygienist.
 - .2 Be responsible for completing all Contractor and subcontractor(s) workers' health and safety training, and ensuring that personnel that do not

successfully complete the required training are not permitted to enter the site to perform work.

- .3 Be responsible for implementing, daily enforcing, and monitoring the Contractor's compliance with the site-specific project Health and Safety Plan.
- .4 Be on site during execution of work. If the Contractor's work hours and schedule necessitate use of additional personnel to support the Health and Safety Coordinator, identify those personnel in the Health and Safety Plan.

1.8 General Conditions

- .1 Provide safety barricades and lights around the EGD Work Site (as required) and the Contractor Off-Site Offload Facility (as required) to provide a safe working environment for workers and protection for pedestrian and vehicular traffic.
- .2 Refer to Section 01 11 55 (General Instructions) for site access requirements for entry into, and exit from the EGD Facility.
- .3 Ensure that non-authorized persons are not allowed to circulate in designated construction areas of the EGD Work Site and the Contractor Off-Site Offload Facility.
 - .1 Provide appropriate means by use of barricades, fences, warning signs, traffic control personnel, and temporary lighting as required.
 - .2 Secure site(s) at night time as deemed necessary to protect site against entry.
- .4 Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect other dock users.
- .5 Provide secure, rigid guard rails and barricades around deep excavations, open shafts, pipe piles, open stair wells, and open edges of floors and roofs. Provide as required by governing authorities.
- .6 Erect temporary enclosure around the Contractor's upland work area at the EGD Work Site and the Contractor Off-Site Offload Facility (as shown on the Drawings) using 1.8 m fencing. Provide access gates as required. Maintain fence in good repair.
- .7 Maintain access to property including overhead clearances for use by emergency response vehicles.

1.9 Project / EGD Work Site and Contractor Off-Site Offload Facility Conditions

- .1 Work at site will involve contact with:
 - .1 PWGSC staff and other Federal employees.
 - .2 EGD (federal) operations staff.

- .3 Ship repair contractors.
- .4 Other contractors.
- .5 Work over water and under water (for protection against drowning, refer to COHS Section A Part X11-Safety Materials, Equipment, Devices and Clothing – Section 12.11 inclusive).
- .6 Overhead cranes.
- .7 Work at heights.
- .8 Unpredictable weather conditions.
- .9 Threat of tsunami and earthquakes.
- .10 Confined space and restricted access spaces.
- .11 Work with hazardous substances.

1.10 Regulatory Requirements

- .1 Comply with specified Laws and Regulations to ensure safe operations at the EGD Work Site and the Contractor Off-Site Offload Facility.
- .2 In event of conflict between any provision of the above authorities, the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, the Departmental Representative will advise on the course of action to be followed.

1.11 Work Permits

- .1 Obtain specialty trade permit(s) related to project before start of work.

1.12 Filing of Notice

- .1 The Contractor is to complete and submit a Notice of Project as required by Laws and Regulations, before work commences.
- .2 Provide copies of all notices to the Departmental Representative.

1.13 Health and Safety Plan

- .1 The site-specific project Health and Safety Plan shall be prepared by a certified Industrial Hygienist and submitted to the Departmental Representative within fifteen (15) working days following Contract award.
- .2 Conduct a site-specific hazard assessment for the EGD Work Site and Contractor Off-Site Offload Facility based on review of Contract documents, required work, and both project work sites. Identify any known and potential health risks and safety hazards. The Preliminary Job Hazard Analysis Check List is provided for reference as an Appendix to the Specifications.

- .3 Develop, implement, and enforce a site-specific project Health and Safety Plan based on hazard assessment, including, but not limited to, the following:
 - .1 Primary requirements:
 - .1 Contractor's safety policy.
 - .2 Health and safety requirements of the EGD Facility.
 - .3 Identification of applicable compliance obligations.
 - .4 Definition of responsibilities for project safety / organization chart for project.
 - .5 General safety rules for project.
 - .6 Job-specific safe work procedures.
 - .7 Inspection policy and procedures.
 - .8 Incident reporting and investigation policy and procedures.
 - .9 Occupational Health and Safety Committee / Representative procedures.
 - .10 Occupational Health and Safety meetings.
 - .11 Occupational Health and Safety communications and record-keeping procedures.
 - .2 Summary of health risks and safety hazards resulting from analysis of hazard assessment, with respect to site tasks and operations which must be performed as part of the work.
 - .3 List hazardous materials to be brought on site as required by work.
 - .4 Indicate engineering and administrative control measures to be implemented at the site for managing identified risks and hazards.
 - .5 Identify personal protective equipment (PPE) to be issued to and used by workers.
 - .6 Identify personnel and alternates responsible for site safety and health.
 - .7 Identify personnel training requirements and training plan, including site orientation for new workers.
- .4 Develop the plan in collaboration with all subcontractors. Ensure that work and activities of subcontractors are included in the hazard assessment and are reflected in the plan.
- .5 Revise and update the site-specific project Health and Safety Plan as required, and re-submit to the Departmental Representative.
- .6 Departmental Representative's review: the review of the Contractor's site-specific project Health and Safety Plan by Public Works and Government Services Canada (PWGSC) shall not relieve the Contractor of responsibility for errors or

omissions in the final site-specific project Health and Safety Plan or of responsibility for meeting all requirements of construction and Contract documents.

1.14 Emergency Procedures

- .1 List standard operating procedures and measures to be taken in emergency situations. Include an evacuation plan and emergency contacts (i.e., names and telephone numbers) of:
 - .1 Designated personnel from own company.
 - .2 Regulatory authorities applicable to work and as per Laws and Regulations.
 - .3 Local emergency resources.
 - .4 The Departmental Representative and other PWGSC staff as required.
- .2 Include the following provisions in the emergency procedures:
 - .1 Notify workers and the first-aid attendant of the nature and location of the emergency.
 - .2 Evacuate all workers safely.
 - .3 Check and confirm the safe evacuation of all workers.
 - .4 Notify the fire department or other emergency responders.
 - .5 Notify adjacent workplaces or residences that may be affected if the risk extends beyond the workplace.
 - .6 Notify the Departmental Representative and site staff.
- .3 Provide written rescue and evacuation procedures as required for, but not limited to:
 - .1 Work at high angles.
 - .2 Work in confined spaces or where there is a risk of entrapment.
 - .3 Work with hazardous substances.
 - .4 Underground work or under-pier work.
 - .5 Demolition of structures.
 - .6 Work on, over, under and adjacent to water.
 - .7 Workplaces where there are persons who require physical assistance to be moved.
- .4 At the EGD Work Site, follow and comply with emergency exit routes to provide quick and unimpeded exit. At both the EGD Work Site and the Contractor Off-Site Offload Facility, design and mark emergency exit routes to provide quick and unimpeded exit.

- .5 At least once each year, emergency drills must be held to ensure awareness and effectiveness of emergency exit routes and procedures, and a record of the drills must be kept.
- .6 Revise and update emergency procedures as required, and re-submit to the Departmental Representative.

1.15 Hazardous Products

- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials, and regarding labeling and provision of Material Safety Data Sheets (MSDS) acceptable to the Departmental Representative and in accordance with the Canada Labour Code.
- .2 Where use of hazardous and toxic products cannot be avoided:
 - .1 Advise the Departmental Representative beforehand of the product(s) intended for use. Submit applicable MSDS and WHMIS documents as per Section 01 33 00 (Submittal Procedures).
 - .2 In conjunction with the Departmental Representative, schedule to carry out work during “off hours” when there are fewer dock users.
 - .3 Provide adequate means of ventilation as required.

1.16 Off-site Contingency and Emergency Response Plan

- .1 Prior to commencing work involving handling of contaminated, Deleterious, toxic, or hazardous materials, develop an off-site contingency and emergency response plan.
- .2 The off-site contingency and emergency response plan must provide immediate response to serious site occurrences such as explosion, fire, spills, or migration of contaminated, Deleterious, toxic, or hazardous material from the EGD Work Site or from the Contractor Off-Site Offload Facility or from in-water or upland transport.

1.17 Personnel Health, Safety, and Hygiene

- .1 Training: verify that personnel entering the EGD Work Site are trained in accordance with specified personnel training requirements. Training sessions must be completed by the Health and Safety Officer.
- .2 Levels of Protection: establish levels of protection for each work area based on planned activity and location of activity.
- .3 Personal Protective Equipment: as required for the work.
- .4 Furnish site personnel with appropriate PPE. Verify that safety equipment and protective clothing is kept clean and maintained.

- .5 Develop protective equipment usage procedures and verify that procedures are strictly followed by site personnel; include the following procedures at a minimum:
 - .1 Verify that prescription eyeglasses worn are safety glasses and do not permit contact lenses on site within work zones.
 - .2 Verify that footwear is steel-toed safety shoes or boots and is covered by rubber overshoes 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 Verify that site personnel have passed a respirator fit test prior to entering potentially contaminated work areas.
 - .6 Verify that facial hair does not interfere with proper respirator fit.

1.18 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 Laws and Regulations.
- .2 Develop, implement, and maintain respirator program.
- .3 Monitor, evaluate, and provide respiratory protection for site personnel.
- .4 Verify that levels of protection as listed have been chosen consistent with site-specific potential airborne hazards associated with major contaminants identified on site.
- .5 In the absence of additional air monitoring information or substance identification, retain an industrial hygiene specialist to determine minimum levels of respiratory protection required.
- .6 Immediately notify the Departmental Representative when level of respiratory protection required increases.
- .7 Verify appropriate respiratory protection during work activities. As a minimum requirement, verify that persons entering potentially contaminated work areas are supplied with, and use, appropriate respiratory protection.

1.19 Heat Stress/Cold Stress

- .1 Implement heat stress or cold stress monitoring program as applicable and include in the site-specific Health and Safety Plan.

1.20 Personnel Hygiene and Personnel Decontamination Procedures

- .1 Provide suitable containers for storage and disposal of used disposable PPE.

- .2 Provide potable water and suitable sanitation facility.

1.21 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; 9 kg ABC type dry chemical fire extinguishers as required.

1.22 Asbestos Hazard

- .1 Refer to the EGD Asbestos Management Plan (included in an Appendix to the Specifications) for known locations where asbestos may be encountered.
- .2 Modifications to spray-applied or trowel-applied asbestos surfaces can be hazardous to health.
- .3 Remove, handle, transport, and dispose of in accordance with Worksafe B.C. Regulations Part 6 Asbestos.

1.23 PCB Removals

- .1 Mercury-containing fluorescent tubes and ballasts, which contain polychlorinated biphenyls (PCBs), are classified as hazardous waste.
- .2 Remove, handle, transport, and dispose of in accordance with Laws and Regulations. Specific handling, transport, and disposal provisions may be specified by the Laws and Regulations depending on the concentration of PCBs in water, wastewater, sediment, soil, or other wastes or materials.
- .3 The Contractor shall conduct testing to determine PCB concentrations in water, wastewater, sediment, soil, wastes, and other materials as required in order to ensure that the work carried out by the Contractor under this Contract is compliant with the Laws and Regulations.

1.24 Removal of Lead-Containing Paints

- .1 All paints containing TCLP lead concentrations above 5 ppm are classified as hazardous.
- .2 Carry out demolition activities involving lead-containing paints in accordance with Laws and Regulations.

1.25 Electrical Safety Requirements

- .1 Comply with authorities and ensure that, when installing new facilities or modifying existing facilities, all electrical personnel are completely familiar with existing and new electrical circuits and equipment and their operation.

- .1 Before undertaking any work, coordinate required energizing and de-energizing of new and existing circuits with the Departmental Representative.
- .2 Maintain electrical safety procedures and take necessary precautions to ensure safety of all personnel working under this Contract, as well as safety of other personnel on site.
- .3 Develop, implement, and enforce a communication plan with the Departmental Representative and EGD operations staff for all electrical work and lockout procedures.

1.26 Electrical Lockout

- .1 Develop, implement, and enforce use of established procedures to provide electrical lockout and to ensure the health and safety of workers for every event where work must be done on any electrical circuit or facility.
- .2 Prepare the lockout procedures in writing, listing step-by-step processes to be followed by workers, including how to prepare and issue the request authorization form. Have procedures available for review upon request by the Departmental Representative.
- .3 Keep the documents and lockout tags at the site and list in a logbook for the full duration of the Contract. Upon request, make such data available for viewing by the Departmental Representative or by any authorized safety representative.

1.27 Overloading

- .1 Ensure no part of work is subjected to a load that will endanger its safety or will cause permanent deformation.

1.28 Falsework

- .1 Design and construct falsework in accordance with CSA S269.1 (Falsework for Construction Purposes).

1.29 Scaffolding

- .1 Design, construct and maintain scaffolding in a rigid, secure and safe manner, in accordance with CSA Z797 (Code of Practice for Access Scaffold) and B.C. Occupational Health and Safety Regulations.

1.30 Confined Spaces and Restricted Access Spaces

- .1 Carry out work in confined spaces in accordance with Worksafe B.C. Part 9 Confined Spaces and CSA Z1006-10 Management of Work in Confined Space.

- .2 The existing utilidor catwalks, graving dock service tunnel, and the under-pier foreshore areas under the timber jetties, steel-piled jetty and east approach timber jetty, are all considered as restricted access spaces for EGD (federal) personnel only.
- .3 The Contractor is responsible for assessing and monitoring the EGD Work Site for confined spaces as the project evolves. The Contractor is obliged to follow WorkSafeBC regulations. Coordinate all confined space entry work with the Departmental Representative through the Contractor's confined space entry permit system.
- .4 If entry into confined spaces outside the EGD Work Site is required for the work, coordinate entry into those confined spaces with the Departmental Representative, conform with all applicable EGD requirements and maintain radio contact with the EGD Pump House supervisor at all times. The Contractor is required to provide a reasonable amount of time to the Departmental Representative for making arrangements for entry and/or access to confined spaces or restricted access spaces located within the EGD Facility but outside the EGD Work Site.
- .5 Submit a Confined Space Entry Plan and a Confined Space Work Plan to the Departmental Representative at least seven (7) days prior to each planned entry into any confined space within the EGD Work Site (or outside the EGD Work Site as indicated in the preceding clause), as required for the work. The confined space entry and work plans are to include all measures the Contractor will take to conform with all Laws and Regulations, EGD requirements, and WorkSafeBC confined space regulations. The entry and work plans shall include reference to training and certifications of workers, and describe the confined space rescue procedures, along with any other pertinent or required information.

1.31 Powder-Actuated Devices

- .1 Use powder-actuated devices in accordance with ANSI A10.3 only after receipt of written permission from the Departmental Representative.

1.32 Fire Safety and Hot Work

- .1 Obtain the Departmental Representative's authorization before any welding, cutting, or any other hot work operations can be carried out on site.
- .2 Coordinate all hot work with the Departmental Representative through the Contractors' hot work permit system. Maintain current (up to date) EGD hot work permits as necessary for each construction activity in accordance with the EGD fire BMPs. EGD may issue activity-specific hot work permits, or a blanket hot work permit on a monthly basis. The Contractor is to liaise with the Departmental Representative on issuance of hot work permits.
- .3 Hot work includes cutting/melting with use of torch, flame heating roofing kettles, or other open flame devices and grinding with equipment which produces sparks.

1.33 Fire Safety Requirements

- .1 Store oily or paint-soaked rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
- .2 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.

1.34 Fire Protection and Alarm System

- .1 Fire protection and alarm systems shall not be:
 - .1 Obstructed.
 - .2 Shut off.
 - .3 Left inactive at the end of a working day or shift.
- .2 Do not use fire hydrants, standpipes and hose systems for purposes other than firefighting.
- .3 Be responsible/liable for costs incurred from the fire department, the building owner and the tenants, resulting from false alarms.

1.35 Unforeseen Hazards

- .1 Should any unforeseen or peculiar safety-related factor, hazard or condition (including identification of unexploded ordinance) become evident during performance of the work, immediately stop work and advise the Departmental Representative verbally and in writing.

1.36 Posted Documents

- .1 Post legible versions of the following documents on site:
 - .1 Site-specific project Health and Safety Plan.
 - .2 Sequence of work.
 - .3 Emergency procedures.
 - .4 Site drawing showing project layout, locations of the first-aid station, evacuation route and marshalling station, and the emergency transportation provisions.
 - .5 Notice of Project, per WorkSafeBC requirements.
 - .6 Floor plans or site plans.
 - .7 Notice as to where a copy of the Workers' Compensation Act and Regulations are available on the work site for review by employees and workers.

- .8 Workplace Hazardous Materials Information System (WHMIS) documents.
- .9 Material Safety Data Sheets (MSDS).
- .10 List of names of Health and Safety Coordinator, Joint Health and Safety Committee members, or Health and Safety Representative, as applicable.
- .2 Post all Material Safety Data Sheets (MSDS) on site, in a common area, visible to all workers and in locations accessible to tenants when work of this Contract includes construction activities adjacent to occupied areas.
- .3 Postings should be protected from the weather, and visible from the street or the exterior of the principal construction site shelter provided for workers and equipment, or as approved by the Departmental Representative.

1.37 Meetings

- .1 Attend Pre-Construction Meeting and all subsequent meetings called by the Departmental Representative.
- .2 All personnel employed by the Contractor and its subcontractors shall attend the EGD Safety Orientation presentation prior to starting work at the EGD Work Site. Duration of Safety Orientation is approximately 30 minutes.
- .3 Ensure that all EGD Work Site or Contractor Off-Site Offload Facility personnel attend a daily health and safety “tailgate” or “toolbox” meeting, which will include:
 - .1 Sign-in of all attendees.
 - .2 Planned work activities and environmental considerations for that shift.
 - .3 Hazards associated with these work activities, including environmental hazards (e.g., potential for hypothermia, heat exhaustion, or heat stroke).
 - .4 Appropriate job-specific safe work procedures.
 - .5 Required personal protective equipment (PPE).
 - .6 Appropriate emergency procedures.
- .4 Retain records of all health and safety meetings conducted at the EGD Work Site or Contractor Off-Site Offload Facility during completion of the work, and retain as corporate records for a minimum of seven (7) years after work is completed.

1.38 Utility Clearance

- .1 The Contractor is solely responsible for all utility detection and clearances prior to starting the work.
- .2 The Contractor shall not rely upon Drawings, Reference Drawings, or other information provided for utility locations.

- .3 Refer to the Drawings and individual sections of the Specifications for specific requirements for pre-locating existing services at the EGD Facility, before undertaking any demolition or excavation work.

1.39 Correction of Non-Compliance

- .1 Immediately address health and safety non-compliance issues identified by the Departmental Representative.
- .2 Provide the Departmental Representative with written report of action taken to correct non-compliance with health and safety issues identified.
- .3 The Departmental Representative may issue a “stop work order” if non-compliance of health and safety Laws and Regulations or requirements of the Specifications is not corrected immediately or within posted time. The Contractor and its subcontractor(s) will be responsible for any costs arising from such a “stop work order.”

2. PART 2 – PRODUCTS – NOT USED

3. PART 3 – EXECUTION – NOT USED

END OF SECTION

1 PART 1 – GENERAL

1.1 Description

- .1 This Section describes environmental procedures that are required for the Contract. The Contractor shall be responsible for adhering to these special procedures while completing all work under this Contract.
- .2 The Contractor shall review, understand, and comply with by the Environmental Management Plan (EMP) and the Project Permits. The EMP is included as an Appendix of the Specifications.
- .3 The Contractor shall review, understand, and comply with by the EGD Environmental Best Management Practices (EBMPs) and the EGD Environmental Policy throughout the work. The EGD EBMPs and Environmental Policy are included as reference documents to the Specifications.
- .4 Environmental Pollution and Damage arising from construction activities shall be prevented, abated, controlled, and minimized by complying with the Laws and Regulations concerning environmental pollution control and abatement, as well as the specific requirements in the Project Permits. The Contractor shall comply with all permit requirements. Although provincial laws and municipal bylaws generally do not apply on federal lands, the Contractor shall comply with provincial laws, municipal bylaws and the Laws and Regulations at the EGD Work Site, and all other locations used for this Contract, unless otherwise directed by the Departmental Representative.
- .5 The Contractor is responsible for Environmental Protection during all construction activities at all locations where it performs work. Work locations include, but are not limited to, the EGD Work Site, Contractor Off-Site Offload Facility, and during barge transport over water and land-based transportation of dredged material. This Section primarily addresses work conducted at the EGD Work Site, but the Contractor is responsible for complying with Laws and Regulations at all locations that are used.
- .6 The Specifications assume that dredged sediment, hazardous waste, and debris will be directly transported from the EGD Work Site via waterborne transport (i.e., barge) to the Contractor's Off-Site Offload Facility, temporarily stockpiled (if applicable) within an Off-Site Staging and Stockpile Area, dewatered (if applicable), re-handled, and loaded into trucks or railcars for upland transportation to a Disposal Facility. The Contractor's Off-Site Offload Facility shall be operated and maintained by the Contractor. As part of the Construction Work Plan submittal, the Contractor shall provide to the Departmental Representative ownership or lease documentation to demonstrate that the activities to be conducted at the Contractor's Off-Site Offload Facility are allowed or accepted by the property owner. These activities include the offloading (and temporary stockpiling if applicable) of contaminated sediments, hazardous

wastes, and debris at the Off-Site Staging and Stockpile Area, and reloading of material to transportation equipment for off-site disposal at a Disposal Facility.

1.2 Measurement and Payment Procedures

- .1 No separate payment will be made for work associated with environmental procedures and sustainability. Activities associated with environmental procedures and sustainability shall be considered incidental to the work.

1.3 Related Sections

- .1 Section 01 11 55 (General Instructions)
- .2 Section 01 33 00 (Submittal Procedures)

1.4 Definitions

- .1 Refer to Section 01 11 55 (General Instructions) for all definitions related to the Contract.

1.5 Submittals

- .1 Submittals shall be in accordance with Section 01 33 00 (Submittal Procedures).
- .2 The Contractor shall submit an Environmental Protection Plan (EPP) for review and acceptance by the Departmental Representative within twenty-eight (28) calendar days following Contract award. The EPP shall present the procedures by which the Contractor shall establish and maintain quality control for Environmental Protection of all items of the work, and the means and methods that the Contractor will use to comply with the Specifications, the EMP, and all Project Permit requirements. This plan shall address all construction activities. The EPP shall present a comprehensive overview of known or potential environmental issues.
- .3 Address topics at a level of detail commensurate with environmental issues and required construction tasks.
- .4 Address all topics that the Specifications and EMP require the Contractor to discuss in the EPP.
- .5 See Section 01 35 13.43 (Special Procedures for Contaminated Sites) for additional information and requirements to be included in the EPP.
- .6 At a minimum, the EPP shall contain the following information:
 - .1 Organization chart and names of persons responsible for EPP compliance.
 - .2 Names and qualifications of persons responsible for manifesting waste to be removed from site.

- .3 Upland Work: See Section 01 35 13.43 (Special Procedures for Contaminated Sites) for upland work submittal requirements as part of the EPP.
- .4 In-Water Work:
 - .1 Describe all methods, procedures, and best management practices to comply with water quality performance criteria objectives per the EMP/WQMP and Section 01 35 13.43 (Special Procedures for Contaminated Sites), these Specifications and all requirements of Project Permits, and contingency measures that the Contractor will take to meet requirements if exceedances occur.
 - .2 Provide details of the type of drying amendment and appropriate dosage to facilitate dewatering, if amendments are proposed for use by the Contractor.
 - .3 The Contractor shall detail the methods that it will use to monitor its haul barges for leakage during transport of dredged material to the Contractor's Off-Site Offload Facility. No discharge of sediment or associated water is permitted during transportation of dredge material.
- .5 Pollution Control Plan:
 - .1 Submit a Pollution Control Plan as a section of the EPP that includes the following at a minimum:
 - .1 Procedures, response actions, and reports to be used in the event of an unforeseen spill of regulated substance. Spill response procedures shall be completed in accordance with the EGD Spill Contingency Plan and Laws and Regulations.
 - .2 Procedures for in-water refueling of marine equipment within the EGD Work Site and within Esquimalt Harbour. In-water refueling of marine equipment within the EGD Work Site shall be completed in accordance with the EBMPs.
 - .3 The name of the individual who will be responsible for implementing and supervising the spill containment and cleanup.
 - .4 Training requirements for the Contractor's personnel and methods of accomplishing the training.
 - .5 Non-hazardous and hazardous solid waste disposal plan, in compliance with the EMP, identifying methods and locations for solid waste disposal including structure demolition debris and other debris generated during dredging activities.

- .6 Identification of potentially hazardous substances to be used on the job site, including intended actions to prevent introduction of such materials into air, water, or ground; and detailed provisions for compliance with Laws and Regulations for storage and handling of these materials. Although provincial laws and municipal bylaws generally do not apply on federal lands, the Contractor shall comply with provincial laws, municipal bylaws and the Laws and Regulations at the EGD Work Site, and all other locations used for this Contract, unless otherwise directed by the Departmental Representative.
- .6 Wastewater Management and Disposal Plan (WWMDP)
 - .1 Submit a WWMDP as a section of the EPP that includes the following at a minimum:
 - .1 Identify methods and procedures for management and/or discharge of waste waters that are generated from dredged sediment passive dewatering activities on barges and at the Contractor's Off-Site Offload Facility.
 - .2 Identify methods and procedures for management and/or discharge of waste waters that are generated from other construction activities, such as cleanup water, decontamination water, personnel and equipment decontamination facilities, and water used in flushing of lines.
 - .2 See Section 01 35 13.43 (Special Procedures for Contaminated Sites) for additional requirements regarding wastewater management and disposal.
- .7 Stormwater Pollution Prevention Plan (SWPPP):
 - .1 Submit a SWPPP as a section of the EPP.
 - .2 See Section 01 35 13.43 (Special Procedures for Contaminated Sites) for additional requirements regarding the SWPPP.

1.6 Environmental Responsibility

- .1 The Contractor shall demonstrate in the performance of the work that it is environmentally responsible by complying with Laws and Regulations; following all Departmental Representative instructions and policies, practices, and procedures established by the Departmental Representative with respect to the environment that are communicated by the Departmental Representative to the Contractor from time to time; being observant for, and immediately notifying the Departmental Representative of, any environmental problems that develop at the EGD Work Site or the Contractor's Off-Site Offload Facility or during in-water and upland transport; and taking all reasonable and necessary measures in the

performance of the work to avoid causing negative impacts to the environment. Where negative impacts occur, the Contractor shall immediately advise the Departmental Representative and shall be solely liable to undertake all reasonable and necessary measures to minimize the effect of such negative impacts.

- .2 Maintain key pollution control systems in working condition throughout the project and undertake all works such that there are no unauthorized discharges of liquids or solids to the marine environment, or of gas to the atmosphere.
- .3 Maintain a neat work area free of unnecessary debris, tools, equipment, or materials; dispose of sewage, refuse, and chemical wastes in compliance with the EGD EBMPs and Laws and Regulations; and remove all tools, equipment, supplies, and wastes from the site upon completion of the work.
- .4 Maintain all equipment and machinery in good working order and free of leaks or excess oil, grease, and debris. Verify that appropriately equipped spill kits are available on all equipment at the EGD Work Site and the Contractor's Off-Site Offload Facility, and verify that workers and supervisory staff are knowledgeable with the provisions of the EPP and EMP and are adequately trained to implement the measures contained therein.

1.7 Fires

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

1.8 Disposal of Non-Sediment Wastes

- .1 Do not bury rubbish and waste materials on the EGD Work Site.
- .2 Do not dispose of waste or volatile materials, such as mineral spirits, oil, or paint thinner into waterways, storm sewers, or sanitary sewers.
- .3 Do not discharge wastes into streams or waterways.
- .4 The Contractor is responsible for storing, separating, handling, transporting, and disposing of all waste materials in accordance with Laws and Regulations, and at appropriate Disposal Facilities or transfer stations.
- .5 Disposal/recycling of other waste generated during the project shall be done in compliance with Laws and Regulations and the facilities used will need to be reviewed by the Departmental Representative.

1.9 Vehicular Access and Parking

- .1 Maintenance and use:
 - .1 Prevent contamination of access roads. Immediately scrape up debris or material on access roads that is suspected to be contaminated from Contractor activities as determined by the Departmental Representative; transport and place into a designated area approved by the Departmental Representative. Clean access roads at least once per shift.

- .2 The Departmental Representative, at the Departmental Representative's sole discretion, may collect soil samples for chemical analyses from traveling surfaces of constructed and existing access routes prior to, during, and upon completion of the work. Excavate and dispose of soil contaminated by the Contractor's activities at the Contractor's own cost.
- .2 Vehicles and equipment shall be in good working order and not be leaking any fuel or fluids.
- .3 Traffic management measures (such as a 'flag person') shall be implemented if required at site access points to direct traffic.

1.10 Upland Equipment Decontamination

- .1 Refer to Section 01 35 13.43 (Special Procedures for Contaminated Sites) for environmental procedures requirements regarding upland equipment decontamination.

1.11 Upland Drainage

- .1 Comply with the Temporary Erosion and Sedimentation Control (TESC) Plan, as prepared for and provided in the EPP and described in Section 01 35 13.43 (Special Procedures for Contaminated Sites), for work to be completed at the EGD Work Site and at the Contractor's Off-Site Offload Facility. Implement monitoring and reporting requirements to verify that control measures are in compliance with the TESC Plan and Laws and Regulations. Although provincial laws and municipal bylaws generally do not apply on federal lands, the Contractor shall comply with provincial laws, municipal bylaws and the Laws and Regulations at the EGD Work Site, and all other locations used for this Contract, unless otherwise directed by the Departmental Representative.
- .2 Comply with the SWPPP, as prepared for and provided in the EPP and described in Section 01 35 13.43 (Special Procedures for Contaminated Sites), for work to be completed at the Contractor's Off-Site Offload Facility. Implement monitoring and reporting requirements to verify that control measures are in compliance with the SWPPP and the Laws and Regulations.
 - .1 Do not allow water containing suspended materials to enter into waterways, sewers, or drainage systems.
 - .2 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.12 Surface Water Quality

- .1 Materials and equipment shall be regularly inspected, maintained, operated, and stored in a manner that prevents deleterious substances (e.g., petroleum products, silt, etc.) from entering the watercourse.

1.13 Work Adjacent to Waterways

- .1 Applies to work to be performed at the EGD Work Site and at the Contractor's Off-Site Offload Facility:
 - .1 Do not use waterway beds for borrow material.
 - .2 Do not dump excavated fill, waste material, or debris in waterways.
 - .3 Special care shall be exercised while working near the water's edge, including implementation of site-specific erosion and sediment control measures. Silt fences shall be used to minimize soil or intertidal sediment transport into the waterway.

1.14 Pollution Control

- .1 See Section 01 35 13.43 (Special Procedures for Contaminated Sites) for requirements regarding pollution control.

1.15 Spills or Release of Deleterious Substances

- .1 The Contractor shall immediately contain and assess the spill, provide appropriate notifications, and take the necessary steps to prevent further discharge. The Contractor is responsible for immediate cleanup of the spill and restoration of the area to the satisfaction of the Departmental Representative and other regulatory authorities, where involved.
- .2 The Contractor shall follow the procedures for spill reporting as outlined in its Pollution Control Plan included in the EPP.
- .3 All workers shall be fully aware of the spill prevention and response procedures including notification of the Departmental Representative.
- .4 Report all spills in accordance with the British Columbia Spill Reporting Regulations, EBMPs, EGD Spill Contingency Plan, Fisheries Act, and EMP.
- .5 The Departmental Representative shall be immediately informed of all spills that occur at the EGD Work Site and at the Contractor's Off-Site Offload Facility.
- .6 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.
- .7 Spill kits will be kept at the EGD Work Site and at the Contractor's Off-Site Offload Facility during all project phases.
- .8 The Contractor shall take due care to verify no deleterious materials, including sediment-laden runoff, leave the EGD Work Site or the Contractor's Off-Site Offload Facility or enter any surface water or stormwater at or near the EGD Work Site or the Contractor Off-Site Offload Facility.
- .9 If the Contractor is planning to discharge any Deleterious Substances, including water discharge (effluent) or sediment-laden runoff (including concrete, runoff

- coming in contact with uncured concrete, and any other sediment-laden runoff), leaving the EGD Work Site or the Contractor's Off-Site Offload Facility, the Contractor is responsible for verifying that appropriate permits are in place and that the discharge meets the permit requirements.
- .10 Equipment fuelling or lubricating shall occur at the EGD Work Site in accordance with EBMPs. Refueling at the Contractor's Off-Site Offload Facility shall be in accordance with facility permit requirements and in a designated area with proper controls to prevent the release of deleterious substances, and shall be conducted away from any surface water drains or collection points.
 - .11 The use of any paints, corrosion protective coatings, wood preservatives, or other potentially Deleterious Substances that may be applied to surfaces that will have contact with the marine environment, shall be in accordance with the EMP, EBMPs, environmental protection measures outlined in the EPP, as well as Laws and Regulations pertaining to the activity. The application of paints, corrosion protective coatings, wood preservatives, or other potentially Deleterious Substance should occur away from water wherever possible to prevent accidental release of Deleterious Substances by runoff or overspray.
 - .12 Any equipment remaining on site overnight shall have appropriately placed drip pans or other spill or leak containment measures.
 - .13 Measurements for the containment of potentially harmful toxic substances due to the rinse, cleaning water, or solvents for glues, wood preservatives, and other potentially harmful or toxic substances shall be identified and implemented by the Contractor to prevent leakage, loss, or discharge into the storm drain system or into the marine environment. Protect roadways at the EGD Work Site, Contractor's Off-Site Offload Facility and during upland transport from tracking of mud, soil, sediment, and debris throughout the work.
 - .14 Prevent discharges containing asphalt, grout, concrete, or other waste materials from reaching storm drains or the marine environment. This includes, but is not limited to the following:
 - .1 Minimizing the washing of sand or gravel from new asphalt, debris from drilling or cutting, or other materials into storm drains and the marine environment by sweeping.
 - .2 Application of fog seals, tack coats, or other coatings, if required, during periods when rainfall is unlikely to occur during application.
 - .3 Cleaning equipment off site.
 - .4 Protection of drainage structures with filter fences if required.
 - .15 During the purging of tanks and associated lines, procedures must prevent the release of any fuels to the surface, surface water, catch basins, or soils within or surrounding the EGD Work Site or the Contractor Off-Site Offload Facility. Requirements under "Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products" (Section 9.6) shall be followed. The Contractor will adhere to current

polychlorinated biphenyl (PCB) regulations for the disposal of excavated material (e.g., regulations for sediments with PCBs greater than 50 parts per million [ppm]).

- .16 During installation of in-water piles and/or the filling of piles with concrete, the Contractor shall prevent the discharge of any Deleterious Substances, including water discharge (effluent), sediment, or other materials generated from installation. Where potentially deleterious materials are generated, they must be removed and/or treated. The Contractor shall complete construction activities in accordance with the EMP, EBMPs, environmental protection measures outlined in the EPP, as well as Laws and Regulations pertaining to the installation of in-water piles.

1.16 Noise and Lighting Control

- .1 The Contractor shall comply with EBMPs regarding noise control while conducting activities at the EGD Work Site and identify measures for noise control in the EPP, as per the EMP.
- .2 The EGD Environmental Policy states that the EGD will “meet or exceed applicable federal, provincial and municipal legislation and regulations...related to [their] identified environmental aspects”; therefore, the Contractor is to adhere to City of Colwood noise bylaws at the EGD Work Site boundary and comply with an 85 A-weighted decibel (dBA) limit (as previously required by the Township of Esquimalt bylaw) for the construction zone. The Contractor shall undertake noisier activities during daytime hours whenever possible, and may be required to modify activities or schedules based on noise monitoring and resident feedback. Site-specific noise legislation for the project is provided in the table below and is included in the EMP.

Table 01 35 43-1

Legislation	Application to the Project
City of Colwood Bylaw No. 38	The Bylaw to Regulate Noise within the City of Colwood prohibits the disturbance of the quiet, peace, rest, enjoyment, comfort or convenience of the neighbourhood or of persons in the vicinity, and stipulates the following construction hours: <ul style="list-style-type: none"> • between 7:00 a.m. and 7:00 p.m. Monday to Saturday; and, • between 8:00 a.m. and 5:00 p.m. on Sundays and statutory holidays.

- .3 All construction equipment shall be operated with exhaust systems in good repair to minimize noise.
- .4 Periodically check to verify that noise control devices (i.e., mufflers and silencers) on construction equipment are properly maintained.

- .5 The Contractor shall implement use of lighting shrouds for work to be completed during night-time hours to minimize lighting disruptions to local residents.

1.17 Notification

- .1 The Departmental Representative will notify the Contractor, in writing, of observed noncompliance with Laws and Regulations, and other elements of the Contractor's EPP or the EMP. Notwithstanding this notification process, the Contractor shall be responsible for conducting all construction activities in a manner compliant with the Laws and Regulations. Although provincial laws and municipal bylaws generally do not apply on federal lands, the Contractor shall comply with provincial laws, municipal bylaws and the Laws and Regulations at the EGD Work Site, and all other locations used for this Contract, unless otherwise directed by the Departmental Representative.
- .2 The Contractor shall inform the Departmental Representative of proposed corrective action after receipt of such notice, and take such action for approval by the Departmental Representative.
- .3 The Departmental Representative will issue a stop work order until satisfactory corrective action has been taken.
- .4 No time extensions shall be granted or equitable adjustments allowed to the Contractor for such suspensions.

1.18 Species at Risk and Marine Wildlife

- .1 Refer to the EMP for information on Species at Risk (SAR) that have a potential to occur within or adjacent to the EGD Work Site.
- .2 Marine mammal monitoring will be implemented by the PWGSC Environmental Monitor during construction activities, with a process in place to temporarily stop works if marine mammals are observed, as per the EMP.
 - .1 If any marine mammal enters the marine mammal safety perimeter during in-water activities, the Contractor shall immediately notify the Departmental Representative. The marine mammal safety perimeter is defined as 500 metres (m) from active operations for cetaceans and 25 m from active operations for pinnipeds. The Departmental Representative will assess active operations and determine if work delay or shut-down is necessary until the marine mammal(s) vacate the marine mammal safety perimeter.
 - .2 Marine mammal species that have the potential to occur in the EGD Work Site area include, but are not limited to, stellar sea lion, grey whale, harbour porpoise, harbour seal, killer whale, river otters, and other cetaceans and pinnipeds. Additional information for these mammals is provided in the EMP. Under no circumstances will any Contractor personnel or the Environmental Monitor attempt to capture or molest any marine mammal.

- .3 If a marine mammal becomes trapped within the Temporary Re-suspension Barrier (TRB) or Temporary Re-suspension Barrier Containment Area (TRBCA), the Contractor shall immediately cease work and notify the Departmental Representative. Work shall not resume until the marine mammal has been visually confirmed outside of the TRBCA and the TRB has been inspected for deficiencies (and repairs necessary for performance of the TRB are made).
- .4 Marine mammals must not be permitted to enter the TRBCA. Should a marine mammal enter the TRBCA, the Contractor (at its own expense) shall cease all in-water activities until instructed to resume by the Departmental Representative.
- .3 Should a SAR be encountered, measures are to be implemented to avoid destruction, injury, or interference with the species, its residence, and/or its habitat (e.g., through siting, timing, or design changes). If the foregoing cannot be avoided, the Contractor shall cease work and contact the Departmental Representative for advice regarding mitigation measures.

1.19 Migratory Birds/Wildlife Habitat

- .1 Verify that all works are in compliance with the Migratory Birds Convention Act and Canada Wildlife Act. If the Contractor, in the course of its work, identifies nesting birds within the EGD Work Site, notify the Departmental Representative immediately.
- .2 Restrict vehicle movements to construction areas and access roads and avoid harassment of animals.

1.20 Sustainable Remediation

- .1 A sustainable remediation section shall be submitted by the Contractor as a subsection of the EPP. The sustainable remediation section shall describe the sustainable remediation strategies and/or technologies used during completion of this work. It shall include a description of all of the sustainable remediation elements incorporated into the Contractor's approach, whether required by the Contract documents or independently proposed by the Contractor, including, but not limited to, energy use reduction controls and tracking measures; transportation minimization and sustainable transportation evaluation; emission reduction controls and policies; recycling, reuse, and waste minimization; use of local materials, facilities, and work force; and/or justification for any proposed approach that does not meet the minimum sustainable remediation requirements and/or preferences included in the Contract documents.
- .2 The sustainable remediation section of the EPP will be reviewed by the Departmental Representative as part of the pre-construction submittal requirements of the Specifications. Final acceptance of the EPP by the Departmental Representative will constitute acceptance of the sustainable remediation requirements.

- .3 The Contractor must include the following as a part of its sustainable remediation section within the EPP:
 - .1 Management of energy and air emissions.
 - .2 Water management approach.
 - .3 Waste management plan including material consumption, waste generation, waste reduction, and disposal procedures. This plan shall consider both Contractor- and project-generated waste.
 - .4 Consideration of ecological impacts (including on-site traffic pattern and speed control management).
 - .5 Post-work documentation.
- .4 Energy and Air Emissions Management:
 - .1 The Contractor shall provide documentation that supports good vessel, engine, and equipment maintenance, and properly train operators to run equipment efficiently.
 - .2 The Contractor shall provide a list of equipment to be used, including expected fuel usage and hours of operation, as well as a list of fuels and hydraulic oils that will be used in equipment.
 - .3 Fuel and hydraulic oil requirements include, but are not limited to, the following:
 - .1 Ensure hydraulic machinery, if required, uses environmentally-sensitive hydraulic fluids that are non-toxic to aquatic life and that are readily or inherently biodegradable.
 - .4 All personal vehicles should be turned off when not in use or when the driver leaves the unit for any length of time, except:
 - .1 In the event of the use of a power tailgate when the electrical system alone would not support its operation; such as in cold weather or low electrical supply conditions.
 - .2 In extreme winter weather situations where a vehicle not idling would create an operational safety problem (e.g., severe fogging or icing of windshield).
 - .5 Car share and carpool programs are strongly encouraged.
 - .6 The Contractor shall minimize idling to control air pollution due to exhaust emissions and reduce fuel usage.
 - .1 When the equipment is forced to remain motionless due to traffic conditions or mechanical difficulties outside of the operator's control.
 - .2 When it is necessary for safe operation of the machine or to verify that the machine is in good working order or complies with other

- conditions specified by the machine manufacturer's manual or other technical document prescribed for that machine.
- .3 When testing, servicing, repairing, or for diagnostic purposes, including regeneration of a diesel particulate filter.
 - .4 When necessary to serve the purpose of the machine in the course of its operation, including during the operation of a crane, cement mixer, cherry picker, boom lift, or similar machine.
 - .5 In the performance of emergency work or for public safety purposes; or in accordance with an approved written anti-idling procedure.
 - .6 Idling limits will be enforced by the Departmental Representative.
 - .7 Turning off diesel combustion engines on construction equipment not in active use, and on trucks that are idling while waiting to load or unload material for five (5) minutes or more.
 - .8 The Contractor shall place diesel equipment away from the general public and sensitive receptors.
 - .9 The Contractor shall use, to the extent practicable, machines with automatic idle-shutdown devices and auxiliary power systems that meet California Air Resources Board (CARB) equipment specifications to power cab heating and air conditioning when equipment is unengaged.
 - .10 The Contractor shall retrofit machinery and heavy equipment for diesel-engine emission control and exhaust treatment technologies such as particulate filters and oxidation catalysts, to the extent practicable.
 - .11 The Contractor shall use cleaner engines, cleaner or alternative fuels, and cleaner diesel control technology on diesel-powered equipment with engines greater than 50 horsepower whether the equipment is owned or rented, to the extent practicable.
 - .12 The Contractor will be encouraged to use cleaner engines, cleaner or alternative fuels, and cleaner diesel control technology on vessels and vehicles.
 - .13 The Contractor shall limit EGD Work Site vehicle speeds to posted EGD Facility speed limits.
 - .14 The Contractor shall use rail, when feasible and cost effective, for the transportation of materials to minimize greenhouse gas emissions.

- .5 Water Management:
 - .1 The Contractor shall minimize fresh water and potable water consumption and maximize use of non-potable water and water reuse during daily operations and treatment processes.
 - .2 The Contractor shall explore the utilization of rumble grates with a closed-loop greywater washing system (or an advanced, self-contained wheel washing system) to minimize vehicle tracking of sediment and soil across non-work areas or off site.
- .6 Material Consumption and Waste Generation and Disposal Management:
 - .1 The Contractor shall maximize diverting the total project waste, excluding contaminated sediment, soil, and other material, from the Disposal Facility, in order of preference by: 1) weight; and 2) volume, whichever is most feasible to measure, by seeking opportunities to reduce, reuse, and/or recycle demolition materials that are not considered contaminated or hazardous substances. The Contractor shall dispose of uncontaminated recyclable or salvable demolition materials by a combination of salvage, reuse, or recycling at a Disposal Facility or other authorized facility, as accepted by the Departmental Representative. Other innovative approaches to achieve the minimum diversion rate are encouraged and should be specified and described in the sustainable remediation section of the EPP.
 - .2 Waste material management hierarchy can be viewed as: reuse on-site, recycle on-site, reuse off-site, and recycle off-site.
 - .3 Minimum diversion rate may be achieved by recovering and recycling the following materials, components, and fixtures:
 - .1 Concrete and concrete blocks.
 - .2 Ferrous metal.
 - .3 Non-ferrous metals: Copper, aluminum, etc.
 - .4 Untreated lumber.
 - .5 Plywood and particle board.
 - .6 Paper and cardboard.
 - .7 Non-contaminated soil and topsoil.
- .7 Ecological Impacts Management:
 - .1 The Contractor shall clean all equipment prior to each arrival at the EGD Work Site and check to verify that no invasive vegetative species are present on the equipment during the performance of the work.
 - .2 The Contractor shall establish minimally-intrusive and well-designed traffic patterns for on-site activities and plans to minimize on-site impacts and reduce off-site traffic congestion.

- .3 Temporary erosion and sediment control measures, as described in Section 01 35 13.43 (Special Procedures for Contaminated Sites) and this Specification, for stormwater runoff and erosion control shall be in place as part of passive dewatering operations on the Contractor's waterborne equipment, and at the Staging and Stockpile Area(s) located at the Contractor's Off-Site Offload Facility.
- .8 Following completion of the work, the Contractor shall submit all relevant documentation regarding completion of sustainable remediation requirements including, but not limited to, the following:
 - .1 Records of equipment maintenance throughout completion of the work, including documentation of types of oils used.
 - .2 Documentation of carpool or rideshare programs use, as applicable.
 - .3 Description of equipment retrofit activities completed for this Contract.
 - .4 Documentation of rail transportation use for transportation of materials, as applicable.
 - .5 Estimate of water volume captured and/or recycled during completion of the work.
 - .6 Documentation of material volumes or tonnages brought to recycling facilities or treatment facilities for disposal.
 - .7 Estimate of material volumes or tonnages for materials re-used at the EGD Work Site (e.g., riprap armour rock).

2. PART 2 – PRODUCTS – NOT USED

3. PART 3 – EXECUTION – NOT USED

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section describes Contractor requirements for quality control, including coordination with material suppliers, testing firms, and other entities that may be employed by PWGSC or the Departmental Representative during completion of the work. The intent of this Section is to require the Contractor to establish a necessary level of quality control that will:
 - .1 Provide sufficient information to assure both the Contractor and the Departmental Representative that the Specification requirements are and have been met.
 - .2 The Contractor shall establish, provide, and maintain a Construction Quality Control (CQC) Plan as specified herein, detailing the methods and procedures that will be taken to assure that all materials and completed construction elements conform to the Drawings, the Specifications, and other requirements. Although guidelines are established and certain minimum requirements are specified herein and elsewhere in the Specifications, it is the responsibility of the Contractor to ensure that construction and construction quality control are accomplished in accordance with the stated purpose and in accordance with the Specifications as described herein.
 - .3 The Contractor shall be prepared to discuss and present, at the Pre-Construction Meeting, its understanding of the quality control requirements. The Contractor shall not begin any construction until the CQC Plan has been reviewed and accepted by the Departmental Representative.

1.2 Measurement and Payment

- .1 Quality control is considered incidental to the work and will not be measured separately. No separate payment will be made under this Section.

1.3 Related Sections

- .1 Section 01 11 55 (General Instructions)
- .2 Section 01 35 13.43 (Special Procedures for Contaminated Sites)
- .3 Section 01 35 43 (Environmental Procedures and Sustainability)
- .4 Section 02 21 13 (Surveying and Positioning Control)
- .5 Section 35 20 23 (Dredging, Barge Dewatering and In-Water Transportation)
- .6 Section 35 20 23.01 (Offloading, Upland Transportation and Disposal)
- .7 Section 35 37 10 (Engineered Capping)

1.4 Definitions – Not Used

1.5 Submittals

- .1 Within twenty-one (21) working days following Notice of Award, submit the CQC Plan for review and acceptance by the Departmental Representative. The Contractor's CQC Plan shall include:
 - .1 Reporting and Document Control Plan describing procedures for communicating progress testing, and other data with the Departmental Representative.
 - .2 Survey and Positioning Control Plan. See Specification Section 02 21 13 (Surveying and Positioning Control) for additional details regarding this submittal.
 - .3 Personnel, procedures, methods, instructions, records, and forms to be used to control the work and verify that the work conforms to the Contract documents.
 - .4 Description of the CQC organization, including an organization chart showing the various CQC team members, along with their designated responsibilities and lines of authority. At a minimum, identify the Superintendent, Site Supervisor(s), CQC Supervisor, Surveyor, or Engineer, and Health and Safety Coordinator.
 - .5 Acknowledgement that the CQC staff will conduct inspections for all aspects of the work specified, and shall report to the CQC Supervisor, or someone of higher authority in the Contractor's organization.
 - .6 The name, qualifications, duties, responsibilities, and authorities of each person assigned a primary CQC function.
 - .7 Testing methods, schedules, and procedures used to report CQC information to the Departmental Representative, including samples of the various reporting forms.
- .2 Submit four (4) copies of all inspection and laboratory test reports to the Departmental Representative within two (2) days following completion of inspection or receipt of analytical data from a testing laboratory.
- .3 Provide copies to subcontractor of work being inspected or tested.

1.6 References – Not Used

1.7 Quality Control Organization

- .1 CQC Supervisor: As part of the CQC Plan, the Contractor shall identify an individual within its organization, located at the EGD Work Site, who shall be responsible for overall management of the CQC as part of the Contract, and have the authority to act in all CQC matters for the Contractor.

- .2 Personnel: A staff shall be maintained under the direction of the CQC Supervisor to perform all CQC activities. The actual number of 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.

1.8 Inspection

- .1 The Contractor will allow the Departmental Representative access to the work. If part of the work is in preparation at locations other than the EGD Work Site (i.e., the Contractor Off-Site Offload Facility), the Contractor shall allow access to such work whenever and wherever it is in progress.
- .2 Give timely notice requesting inspection if work at the EGD Work Site or at the Contractor Off-Site Offload Facility is designated for special tests, inspections, or reviews by Departmental Representative, as required by the Specifications or by Laws and Regulations.
- .3 If the Contractor covers, or permits to be covered, work that has been designated for special tests, inspections, or reviews before such is made, uncover such work, have inspections or tests satisfactorily completed, and make good such work.

1.9 Independent Inspection Firms

- .1 Independent inspection/testing firms will be engaged by the Departmental Representative for purpose of inspecting or testing portions of work, as applicable. Cost of such services will be borne by PWGSC.
- .2 Employment of inspection/testing firms does not relax responsibility to perform work in accordance with Contract documents and Laws and Regulations.
- .3 If defects are revealed during inspection or testing, additional inspection or testing will be required to ascertain full degree of defect. Correct defect and irregularities as advised by the Departmental Representative at no cost to PWGSC. The Contractor shall pay costs for re-testing and re-inspection as necessary.

1.10 Access to Work

- .1 Allow inspection or testing firms access to EGD Work Site and off-site facilities (i.e., the Contractor Off-Site Offload Facility) as applicable.
- .2 The Contractor shall make accessible to the Departmental Representative all construction equipment that is employed for completion of the work.
- .3 The Contractor shall cooperate to provide reasonable facilities for such access.

1.11 Procedures

- .1 Notify appropriate entity and the Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.
- .2 Submit samples or materials required for testing, as requested in the Specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in work.
- .3 Provide labour and facilities to obtain and handle samples and materials at the EGD Work Site and the Contractor Off-Site Offload Facility. Provide sufficient space to store samples as necessary.
- .4 Complete required materials testing as described in the Specifications for which the work applies. Results of laboratory testing shall be reviewed by the Departmental Representative to determine compliance with the requirements of the work.

1.12 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 the 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 the opinion of the Departmental Representative, it is not expedient to correct defective work or work not performed in accordance with the Contract documents, PWGSC will deduct from the Tender Price the difference in value between work performed and that called for by Contract documents, the amount of which will be determined by the Departmental Representative.

2. PART 2 – PRODUCTS – NOT USED

3. PART 3 – EXECUTION – NOT USED

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section covers mobilization and demobilization for the work.
- .2 Mobilization shall include the following activities:
 - .1 All pre-construction submittals;
 - .2 Establishment of necessary site offices;
 - .3 Site preparation for working and lay down areas at the EGD Work Site and the Contractor Off-Site Offload Facility, including site perimeter fencing;
 - .4 Workshops and other temporary facilities (as covered by Section 01 51 00 Temporary Facilities), including utility connections;
 - .5 Set up of site survey control monuments;
 - .6 Development and implementation of all environmental protection measures;
 - .7 All work required to prepare and move to the Work Site the Contractor's dredging plant and equipment, pile-driving derricks and equipment to be used for placing Engineered Capping materials;
 - .8 Moving all other major equipment required for the work to the EGD Work Site and the Contractor Off-Site Offload Facility, as appropriate;
 - .9 Preparation of formwork for precast concrete components;
 - .10 Making ready for work; and,
 - .11 The cost of maintaining bonds and insurance as required.
- .3 Demobilization shall include the following activities:
 - .1 Project closeout and required closeout submittals;
 - .2 All things necessary to remove all construction equipment, plant and excess materials from the EGD Work Site and the Contractor Off-Site Offload Facility;
 - .3 Dismantling and removal of all temporary facilities; and,
 - .4 Clean up of the EGD Work Site and Contractor Off-Site Offload Facility to a condition satisfactory to the Departmental Representative at completion of the work.
- .4 Items which are not to be included in mobilization and demobilization are any portion of the work covered by other Tender item(s) or other incidental work which is specified as being included in other Tender item(s).

1.2 Related Sections

- .1 Section 01 51 00 (Temporary Facilities)

1.3 Measurement and Payment Procedures

- .1 Mobilization and demobilization will not be measured for payment.
- .2 Mobilization will be paid for at the Lump Sum price tendered for MOBILIZATION. Payment shall include for all costs in connection with mobilization as described in Clause 1.1.2 of this Section. The Lump Sum tendered for Mobilization shall be paid on completion of all applicable items listed in Clause 1.1.2 to the satisfaction of the Departmental Representative.
- .3 Supply and set up of plant and equipment not specifically noted in Clause 1.1.2 of this Section shall be deemed to be incidental to the work and shall not be covered by the Lump Sum tendered for Mobilization.
- .4 Demobilization will be paid for at the Lump Sum price tendered for DEMOBILIZATION. Payment shall include for all costs in connection with demobilization as described in Clause 1.1.3 of this Section. The Lump Sum tendered for Demobilization shall be paid on completion of all applicable items listed in Clause 1.1.3 to the satisfaction of the Departmental Representative.

1.4 References – Not Used

1.5 Definitions – Not Used

1.6 Submittals – Not Used

2. PART 2 – PRODUCTS – NOT USED

3. PART 3 – EXECUTION – NOT USED

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section presents requirements for establishment of temporary facilities as part of the work including Contractor access to the EGD Work Site, locations for materials delivery, On-Site Staging Area and storage, and utility connections that will be made available during the work. The On-Site Staging Area is also referred to as the On-Site Laydown / Office Area.
- .2 Locations for materials delivery, On-Site Staging Area, and temporary utility connections, and the locations where temporary facilities will be made available to the Contractor at the EGD Work Site during the work are shown on the Drawings.
- .3 Install, maintain, and operate all temporary facilities and controls as long as needed for the safe and proper completion of the work.
- .4 Locations at the EGD Work Site for construction of temporary facilities will be made available to the Contractor on June 1, 2015.

1.2 Measurement and Payment Procedures

- .1 No measurement or payment will be made under this Section. Include all costs for temporary facilities in the tendered price for MOBILIZATION, as described in Section 01 50 00 (Mobilization and Demobilization).

1.3 Related Sections

- .1 Section 01 11 55 (General Instructions)
- .2 Section 01 35 13.43 (Special Procedures for Contaminated Sites)
- .3 Section 01 50 00 (Mobilization and Demobilization)
- .4 Section 01 74 11 (Cleaning)

1.4 Definitions

- .1 Refer to Section 01 11 55 (General Instructions) for all definitions associated with this Contract.

1.5 Submittals

- .1 The Contractor shall submit layout drawings for the EGD Work Site, On-Site Staging Area and Contractor Off-Site Offload Facility to the Departmental Representative in accordance with schedule requirements presented in Section 01 35 13.43 (Special Procedures for Contaminated Sites) as part of the Environmental Protection Plan.

1.6 References – Not Used

1.7 Access and Delivery

- .1 The designated entry and exit of the Contractor's vehicles to the EGD Work Site will be via the main EGD gate on Admirals Road, along the South Access Road, and along the deck of the South Jetty, as shown on the Drawings. Access alongside the graving dock and the North Landing Wharf will be only by special permission from the Departmental Representative.
- .2 Refer to the Reference Drawings for imposed loading restrictions on existing jetty structures.
- .3 Vehicular movement in and out of the EGD Facility will pass through check points and be monitored by EGD security. All Contractor's and subcontractor's staff must carry current photo identification and a valid EGD Contractor access pass or complete a sign-in process as administered by EGD Facility security for Contractor's and subcontractor's staff that do not have a valid EGD Contractor access pass.
- .4 The Contractor is required to use only the designated entrance to access the EGD Work Site as shown on the Drawings, for deliveries to the site, and for access to the Contractor's temporary site offices and to the On-Site Staging Area.
 - .1 Maintain for duration of Contract.
 - .2 Repair damage resulting from Contractor's use.
- .5 Use of the EGD Facility will be granted to the Contractor through the Departmental Representative.
 - .1 The upland areas made available to the Contractor for this Contract are to be used for office space, equipment staging, and loading/unloading purposes only.
 - .2 All export of dredged sediment, structural debris and other debris shall be performed by barge.
 - .3 All import of materials, including Engineered Capping materials, shall be performed by barge.
 - .4 Parking for the Contractor's and subcontractor's personnel shall be in the Contractor's car park located adjacent to Munroe Head just to the north of the EGD Facility. Security has been instructed to have unauthorized vehicles towed at the Contractor's expense. The Contractor's construction equipment and vehicles used for delivery, service, and emergency purposes only may be parked temporarily within the EGD Work Site, but must be marked with the company name. No overflow parking outside the EGD Work Site will be allowed within the EGD Facility.
- .6 Provide and maintain access roads, sidewalk crossing ramps, and construction runways as may be required for access to the work. All roadways and walkways

outside of the Contractor's EGD Work Site must be kept clear of materials and equipment at all times.

- .7 Provide and maintain competent flag operators, traffic signals, barricades and flares, lights, or lanterns as may be required to perform work and to protect other users of the EGD Facility.

1.8 Storage Facilities and Site Office Space

- .1 Storage and EGD Work Site office space will be limited to the designated On-Site Staging Area, as shown on the Drawings. The Contractor shall place temporary fencing in accordance with requirements provided in Section 01 35 33 (Health and Safety), and such that the location of temporary fencing does not restrict or limit access to the EGD Facility buildings. The Departmental Representative must accept the layout drawings for the On-Site Staging Area (including proposed location for temporary fencing) prior to construction of the On-Site Staging Area.
- .2 Provide space within the Contractor's On-site Laydown / Office Area for the office of the Departmental Representative's consultant team, as indicated on the Drawings. The consultant team's office will be provided by others. Provide means of access (gate keys for security perimeter) for designated consultant team personnel.

1.9 Access to Waterborne Equipment

- .1 Provide access to waterborne equipment (e.g., marine derricks, barges and tugboats) from the upland portion of the EGD Work Site. The Contractor shall assess conditions of the EGD Work Site to determine its method of access to waterborne equipment. Methods of access to waterborne equipment may include ladders, ramps, gangways, temporary floats, or other marine vessels.

1.10 Power

- .1 Electrical power and lighting is available at the EGD Facility and may be used for construction purposes at no extra cost to the Contractor, provided that warranties are not affected thereby, and electrical components used for temporary power are replaced when damaged. Do not use emergency power or uninterruptible power supply (UPS) panels for this purpose.
- .2 The proximity and hence ease of use of available electrical power and lighting will be adversely affected once the timber jetty structures are demolished, the high mast light is dismantled, and the service kiosks are removed.

1.11 Compressed Air

- .1 Compressed air service is available at the EGD Facility and may be used for construction purposes at no extra cost to the Contractor.

- .2 The proximity and hence ease of use of available compressed air service will be adversely affected once the timber jetty structures are demolished and the service kiosks are removed.

1.12 Water Supply

- .1 Water supply is available at the EGD Facility and may be used for construction purposes at no cost to the Contractor.
- .2 The proximity and hence ease of use of available water supply will be adversely affected once the timber jetty structures are demolished and the service kiosks are removed.

1.13 Sanitary Facilities

- .1 The Contractor is responsible for providing its own washroom facilities for its crew and subcontractors. The Contractor's washrooms shall be located within the EGD Work Site.

1.14 Scaffolding

- .1 Construct and maintain scaffolding in a rigid, secure, and safe manner.
- .2 Erect scaffolding independent of walls. Remove promptly when no longer required.

1.15 Removal of Temporary Facilities

- .1 Remove temporary facilities from the EGD Work Site when directed by the Departmental Representative.
- .2 Clean and repair damage caused by installation or use of temporary facilities.

1.16 Cleanup

- .1 Conduct all project cleanup activities in accordance with Section 01 74 11 (Cleaning).
- .2 Remove construction debris, waste materials, and packaging material from the EGD Work Site daily.
- .3 Clean dirt or mud tracked onto paved or surfaced roadways.
- .4 Store materials resulting from work activities that are salvageable.

1.17 Signs and Notices

- .1 Signs and notices for safety and instruction shall be in both official languages or graphic symbols conforming to CAN/CSA-Z321.

- .2 Maintain signs and notices in good condition for duration of project, and dispose of off-site on completion of project or when directed by the Departmental Representative.

2. PART 2 – PRODUCTS – NOT USED

3. PART 3 – EXECUTION – NOT USED

END OF SECTION

1. PART 1 – GENERAL

1.1 Products, Materials and Equipment

- .1 Use new products, materials, and equipment unless otherwise specified. The term “products” is referred to throughout the Specifications.
- .2 Use products of one manufacturer for material and equipment of the same type or classification unless otherwise specified.
- .3 Unless otherwise specified, comply with manufacturer’s latest printed instructions for materials and installation methods.
- .4 Notify the Departmental Representative in writing of any conflict between these Specifications and manufacturer’s instructions. The Departmental Representative will designate which document is to be followed.
- .5 Provide metal fastenings and accessories in the same texture, colour, and finish as base metal in which they occur.
 - .1 Prevent electrolytic action between dissimilar metals.
 - .2 Use non-corrosive fasteners, anchors, and spacers for securing exterior work.
- .6 Fastenings which cause spalling or cracking are not acceptable.
- .7 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
- .8 Use heavy hexagon heads, semi-finished unless otherwise specified.
- .9 Bolts may not project more than one (1) diameter beyond nuts.
- .10 Types of washers as follows:
 - .1 Plain type washers: Use on equipment and sheet metal.
 - .2 Soft gasket lock type washers: Use where vibrations occur.
 - .3 Resilient washers: Use with stainless steel.
- .11 Deliver, store, and maintain packaged material and equipment with manufacturer’s seals and labels intact.
- .12 Prevent damage, adulteration, and soiling of products during delivery, handling, and storage. Immediately remove rejected products from site.
- .13 Store products in accordance with suppliers’ instructions.
- .14 Touch up damaged factory finished surfaces to the Departmental Representative’s satisfaction:
 - .1 Use primer or enamel to match original.
 - .2 Do not paint over nameplates.

1.2 Quality of Products

- .1 Products, materials and equipment (referred to as products) incorporated into work shall be new, not damaged or defective, and of the best quality (compatible with the Specifications) for the purpose intended. If requested, furnish evidence as to type, source, and quality of the products provided.
- .2 Defective products will be rejected regardless of previous inspections.
 - .1 Inspection does not relieve responsibility, but is precaution against oversight or error.
 - .2 Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
- .3 Retain purchase orders, invoices, and other documents to prove that all products utilized in this Contract meet the requirements of the Specifications. Produce documents when requested by the Departmental Representative.
- .4 Should any dispute arise as to quality or fitness of products, the decision rests strictly with the Departmental Representative based upon the requirements of the Contract documents.
- .5 Unless otherwise indicated in the Specifications, maintain uniformity of manufacture for any particular or like item throughout the project.
- .6 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.3 Availability of Products

- .1 Immediately upon signing the Contract, review product delivery requirements and anticipate foreseeable supply lead times for any items.
- .2 If delays in supply of products are foreseeable, notify the Departmental Representative of such in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of the work.
- .3 In event of failure to notify the Departmental Representative at the start of work and should it subsequently appear that the work may be delayed for such reason, the Departmental Representative reserves the right to substitute more readily available products of similar character, at no increase in either the Contract price or the Contract time.

1.4 Manufacturer's Instructions

- .1 Unless otherwise indicated in the Specifications, install or erect products in accordance with the manufacturer's instructions.
 - .1 Do not rely on labels or enclosures provided with products.

- .2 Obtain written instructions directly from the manufacturer.
- .2 Notify the Departmental Representative in writing of conflicts between the Specifications and the manufacturer's instructions so that the Departmental Representative may establish the course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes the Departmental Representative to require removal and re-installation at no increase in either the Contract price or the Contract time.

1.5 Contractor's Options for Selection of Products for Tendering

- .1 Products specified by "Prescriptive" Specifications: select any product meeting or exceeding the Specifications.
- .2 Products specified under "Acceptable Products" (used for complex mechanical or electrical systems, for example): Select any one of the indicated manufacturers, or any other manufacturer meeting or exceeding the Prescriptive Specifications and indicated Products.
- .3 Products specified by performance and referenced standard: Select any product meeting or exceeding the referenced standard.
- .4 Products specified as "Approved Products" to meet particular design requirements or to match existing materials: Use only the specified Approved Product. Alternative products may be considered provided full technical data is received in writing by the Departmental Representative in accordance with "Special Instructions to Tenderers."
- .5 When products are specified by a referenced standard or by Performance Specifications, upon request of the Departmental Representative obtain from manufacturer an independent laboratory report showing that the product meets or exceeds the specified requirements.

1.6 Substitution after Contract Award

- .1 No substitutions are permitted without prior written acceptance of the Departmental Representative.
- .2 Proposals for substitution may only be submitted after Contract award. Such request must include statements of respective costs of items originally specified and the proposed substitution.
- .3 Proposals will be considered by the Departmental Representative if:
 - .1 Products selected by Tenderer from those specified are not available;
 - .2 Delivery date of products selected from those specified would unduly delay completion of Contract, or

- .3 Alternative product to that specified, which is brought to the attention of considered by the Departmental Representative, and which is considered by the Departmental Representative as equivalent to the product specified, and will result in a credit to the Contract amount.
- .4 Should the proposed substitution be accepted either in part or in whole, assume full responsibility and costs when substitution affects other work on the project. Pay for design or drawing changes required as result of substitution.
- .5 Amounts of all credits arising from approval of the substitutions will be determined by the Departmental Representative, and the Contract price will be reduced accordingly.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section provides general requirements for maintaining project cleanliness during completion of the work and requirements for final cleaning prior to project closeout and demobilization from the EGD Work Site and the Contractor Off-Site Offload Facility.

1.2 Measurement and Payment Procedures

- .1 Cleaning is considered incidental to the work and will not be measured separately. No measurement or payment will be made under this Section.

1.3 Related Sections – Not Used

1.4 Definitions – Not Used

1.5 Submittals – Not Used

1.6 References – Not Used

1.7 Project Cleanliness

- .1 Maintain work in tidy condition, free from accumulation of waste products and debris, including that caused by the EGD Facility or other contractors.
- .2 Clean interior areas prior to finishing work, and maintain areas free of dust and other contaminants during finishing operations.
- .3 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .4 Schedule cleaning operations so that resulting dust, debris, and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems, nearby structures and equipment, and adjacent water bodies.
- .5 Use cleaning solutions and procedures which are not harmful to health, are not injurious to plants or animals, and do not endanger wildlife or marine environment.
- .6 Remove waste materials from the EGD Work Site and Contractor Off-Site Offload Facility at daily regularly scheduled times or dispose of as directed by the Departmental Representative. Do not burn waste materials.
- .7 Make arrangements with, and obtain permits from, authorities having jurisdiction for disposal of waste and debris.

- .8 Provide containers at the EGD Work Site and Contractor Off-Site Offload Facility for collection of waste materials and debris.
- .9 Dispose of waste materials and debris off site in accordance with these Specifications.
- .10 Do not dispose of toxic cleaning solutions into marine environment.

2. PART 2 – PRODUCTS – NOT USED

3. PART 3 – EXECUTION – NOT USED

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section describes waste management and disposal procedures for structures demolition work.

1.2 Measurement and Payment Procedures

- .1 No separate payment will be made for work associated with waste management and disposal. Activities associated with waste management and disposal shall be considered incidental to the work.

1.3 Related Sections

- .1 Section 01 11 55 (General Instructions)
- .2 Section 02 41 16.01 (Structure Demolition)

1.4 Definitions

- .1 Refer to Section 01 11 55 (General Instructions) for all definitions related to this Contract.

1.5 Submittals

- .1 Prepare a Waste Reduction Work Plan (WRWP), to be submitted as part of the Environmental Protection Plan (EPP), and that includes a written report describing opportunities for reduction, re-use, or recycling of materials.
- .2 The Contractor shall provide specific information including end-use information for any materials that are intended to be recycled and/or re-used as part of this Contract as part of the EPP for Departmental Representative review and acceptance.
- .3 Prepare a Materials Source Separation Program (MSSP) Plan, to be submitted as part of the EPP, and which consists of a series of ongoing activities to separate re-usable and recyclable waste material into material categories from other types of waste at the point of generation.
- .4 Upon request by the Departmental Representative, prepare and submit a Waste Audit (WA), which relates to projected waste generation and involves controlled separation of waste.

1.6 Materials Source Separation

- .1 Before project start-up, prepare MSSP. Provide separate containers for re-usable and/or recyclable materials of the following:

- .1 Metals.
 - .2 Wood.
 - .3 Plastics.
 - .4 Other materials as indicated in Technical Sections.
- .2 Implement MSSP for waste generated on the project in compliance with approved methods and as accepted by the Departmental Representative.
 - .3 Locate containers to facilitate deposit of materials without hindering daily operations.
 - .4 Locate separated materials in areas that minimize material damage.

1.7 Diversion of Materials

- .1 Create a list of materials to be separated from the general waste stream and stockpiled in separate containers, to the acceptance of the Departmental Representative and consistent with fire regulations.
 - .1 Mark containers.
 - .2 Provide instruction on disposal practices.

1.8 Storage, Handling and Application

- .1 Do work in compliance with WRWP.
- .2 Handle waste materials not re-used, salvaged, or recycled in accordance with the Laws and Regulations.
- .3 Materials in separated condition: Collect, handle, store on site, and transport off site to an approved and authorized recycling facility.
- .4 Materials must be immediately separated into required categories for re-use or recycling.
- .5 Unless specified otherwise, materials for removal become the Contractor's property.
- .6 On-site sale of salvaged or recyclable material is not permitted.
- .7 Provide the Departmental Representative with receipts indicating the quantity and type of materials delivered to a landfill.
- .8 Provide the Departmental Representative with receipts indicating the quantity and type of materials sent for recycling.

- 2. PART 2 – PRODUCTS – NOT USED**
- 3. PART 3 – EXECUTION – NOT USED**

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section provides project closeout requirements for post-construction submittals that the Contractor is required to submit to the Departmental Representative following completion of the work.
- .2 This Section also presents process and requirements for inspection and declaration that the work has been completed as required by the Contract documents. Upon formal review and acceptance of the work by the Departmental Representative, the work will be determined to be complete and the Contractor shall then demobilize from the EGD Work Site.

1.2 Measurement and Payment Procedures

- .1 No measurement or payment will be made under this Section. Include all costs for closeout submittals in the tendered price for DEMOBILIZATION, as described in Section 01 50 00 (Mobilization and Demobilization).

1.3 Related Sections

- .1 Section 01 50 00 (Mobilization and Demobilization)
- .2 Section 01 11 55 (General Instructions)

1.4 Definitions – Not Used

1.5 Submittals – Not Used

1.6 References – Not Used

1.7 Inspection and Declaration

- .1 Inspection by the Contractor: the Contractor shall conduct inspection of work, identify deficiencies and defects, and repair as required to conform to requirements of the Contract documents.
- .2 Notify the Departmental Representative, in writing, of satisfactory completion of Contractor inspection and that corrections have been made.
- .3 Request inspection by the Departmental Representative.
- .4 Inspection by the Departmental Representative: the Departmental Representative, accompanied by the Contractor, will inspect the work to identify defects or deficiencies in the work and then compile a deficiency list describing all noted defects and deficiencies.

- .5 The Contractor shall correct work accordingly, as advised by the Departmental Representative, at no cost to PWGSC.
- .6 Final Inspection: When items noted above are completed, request Final Inspection of work by the Departmental Representative, accompanied by the Contractor. If work is still deemed incomplete by the Departmental Representative, complete outstanding items and request re-inspection. Repeat this process until the work is complete to the Departmental Representative's satisfaction.

1.8 Submission

- .1 Prepare instructions and data by personnel experienced in maintenance and operation of described products.
- .2 Revise content of documents as required before final submittal.
- .3 Two (2) weeks before substantial performance of the work, submit to the Departmental Representative four (4) final copies of all Record Drawings and other required post-construction documentation (e.g., operation and maintenance manuals).
- .4 Ensure spare parts, maintenance materials and special tools provided are new, neither damaged nor defective, and of same quality and manufacture as products provided in work.
- .5 If requested, furnish evidence as to type, source, and quality of products provided.
- .6 Defective products will be rejected, regardless of previous inspections. Replace products at the Contractor's expense.

1.9 Format

- .1 Organize data in the form of an instructional manual.
- .2 Binders: Vinyl, hard covered, three (3) "D" ring, loose leaf 219 x 279 mm with spine and face pockets.
- .3 Cover: Identify each binder with typed or printed title "Project Record Documents"; list title of project and identify subject matter of contents.
- .4 Arrange content by systems under section numbers and sequence of table of contents.
- .5 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .6 Text: Manufacturer's printed data, or typewritten data.
- .7 Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

1.10 Contents, Each Volume

- .1 Table of contents – provide the following:
 - .1 Title of project.
 - .2 Date of submission.
 - .3 Names, addresses, and telephone numbers of the Consultant and the Contractor with name of responsible parties.
 - .4 Schedule of products and systems, indexed to content of volume.
- .2 For each product or system, list the names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
- .3 Product data: Mark each sheet to clearly identify products and component parts, and data applicable to installation. Delete inapplicable information.
- .4 Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

1.11 Record Documents (for “as-built” purposes)

- .1 Contract Drawings and shop drawings: Legibly mark each item to record actual construction, including:
 - .1 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
 - .2 Field changes of dimension and detail.
 - .3 Changes made by change orders.
 - .4 Details not on original Contract drawings.
 - .5 References to related shop drawings and modifications.
- .2 Contract Specifications: Legibly mark each item to record actual construction, including:
 - .1 Manufacturer, trade name, and catalogue number of each “Product / Material” actually installed, particularly optional items and substitute items.
 - .2 Changes made by change orders.
- .3 Record of “as-built” Information:
 - .1 Record changes in red ink. Refer also to Section 01 11 55 (General Instructions) for preparation of record documents.
 - .2 Before final inspection at completion of the project, using the hardcopy set of Contract Drawings, Specifications, and shop drawings that have been marked-up by the Contractor with “as-built” information throughout the

- project, neatly transfer all annotations to the second set of Contract Drawings, Specifications, and shop drawings (as preparation for the record documents).
- .4 Submit “Record” information for all elements of the work as required by the Specifications. Record information shall include, but not be limited to, the following:
 - .1 Pre-Construction Survey for the entire EGD Work Site.
 - .2 Post-Construction Surveys for completion of work elements. Surveys shall be those used for the basis of measurement and payment of the work.
 - .3 Any additional “Record” information provided as part of Daily and Weekly Construction Reports.
 - .4 Record Drawings as described elsewhere in this Section.
 - .5 Submit the record documents (the complete record of “as-built” information) for review and approval of the Departmental Representative. If corrections are required, make such corrections to the Departmental Representative’s satisfaction, and re-submit for review and approval of the Departmental Representative.
 - .6 The Departmental Representative will arrange for the Consultant to prepare final AutoCAD record drawings from the Contractor’s reviewed and approved record documents.

1.12 Equipment and Systems

- .1 Operating procedures – include the following:
 - .1 Start-up, break-in, and routine normal operating instructions and sequences.
 - .2 Regulation, control, stopping, shutdown, and emergency instructions.
 - .3 Summer, winter, and any special operating instructions.
- .2 Maintenance requirements – list routine procedures.
- .3 Provide servicing and lubrication schedule and list of lubricants required.
- .4 Include manufacturer’s printed operation and maintenance instructions.
- .5 Include sequence of operation by controls manufacturer.
- .6 Provide original manufacturer’s parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- .7 Provide installed control diagrams by controls manufacturer.
- .8 Provide the Contractor’s coordination drawings with installed colour coded piping diagrams.
- .9 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

- .10 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- .11 Additional requirements: as specified in individual Specification Sections.

1.13 Manufacturer's Documentation Reports

- .1 When specified in individual Sections of the Specifications, require manufacturer to provide authorized representative to demonstrate operation of equipment and system, instruct the Departmental Representative's indicated facility's personnel, and provide detailed written report that demonstration and instructions have been completed.
- .2 The Departmental Representative will provide list of personnel to receive instructions, and will coordinate their attendance at agreed-upon times.

1.14 Spare Parts

- .1 Provide spare parts in quantities specified in individual Sections of the Specifications.
- .2 Provide items of same manufacture and quality as items in work.
- .3 Deliver to on-site location as directed; place and store.
- .4 Receive and catalogue all items. Submit inventory listing to the Departmental Representative. Include approved listings in maintenance manual.
- .5 Obtain receipt for delivered products and submit to the Departmental Representative.

1.15 Maintenance Materials

- .1 Provide maintenance and extra materials in quantities specified in individual Sections of the Specifications.
- .2 Provide items of same manufacture and quality as items in work.
- .3 Deliver to on-site location as directed; place and store.
- .4 Receive and catalogue all items. Submit inventory listing to the Departmental Representative. Include approved listings in maintenance manual.
- .5 Obtain receipt for delivered products and submit to the Departmental Representative.

1.16 Special Tools

- .1 Provide special tools in quantities specified in individual Sections of the Specifications.
- .2 Provide items with tags identifying their associated function and equipment.

- .3 Deliver to location as directed; place and store.
- .4 Receive and catalogue all items:
 - .1 Submit inventory listing to the Departmental Representative.
 - .2 Include approved listings in maintenance manual.

1.17 Warranties, Bonds, Test Reports, Inspection Reports

- .1 Separate each document with index tab sheets keyed to table of contents listing.
- .2 List subcontractor, supplier, and manufacturer with name, address, and telephone number of responsible principal.
- .3 Obtain warranties, bonds, test results, inspection reports executed in duplicate by subcontractors, suppliers, manufacturers, and inspection firms within ten (10) days after completion of the applicable item of work.
- .4 Except for items put into use with the Departmental Representative's permission, leave date of beginning of time of warranty until the date of substantial performance is determined.
- .5 Verify that documents are in proper form, contain full information, and are notarized.
- .6 Co-execute submittals when required.
- .7 Retain warranties and bonds until time specified for submittal.

1.18 Completion

- .1 Submit a written certificate that the following actions have been performed:
 - .1 Work has been completed and inspected for compliance with the Contract documents.
 - .2 Defects have been corrected and deficiencies have been completed.
 - .3 Equipment and systems have been tested, adjusted and balanced, and are fully operational.
 - .4 Certificates required by the Boiler Inspection Branch, Fire Commissioner of Canada, and utility companies have been submitted.
 - .5 Operation of systems has been demonstrated to the EGD personnel indicated by the Departmental Representative.
 - .6 Work is complete and ready for final inspection.

- 2. PART 2 – PRODUCTS – NOT USED**
- 3. PART 3 – EXECUTION – NOT USED**

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section covers general requirements relating to commissioning of project's components and systems, specifying general requirements for Performance Verification (PV) of components, equipment, sub-systems, systems, and integrated systems.

1.2 Related Sections

- .1 Section 01 33 00 (Submittal Procedures)
- .2 Section 22 15 00 (Compressed Air)
- .3 Section 22 33 18 (Drainage Waste Piping – Plastic)
- .4 Section 26 05 00 (Common Work Results for Electrical)
- .5 Section 26 05 27 (Grounding)
- .6 Section 28 31 00 (Fire Detection and Alarm)
- .7 Section 33 11 16 (Water Utility Distribution Piping)

1.3 Acronyms

- .1 AFD - Alternate Forms of Delivery, service provider.
- .2 BMM - Building Management Manual.
- .3 Cx - Commissioning.
- .4 EMCS - Energy Monitoring and Control Systems.
- .5 O&M - Operation and Maintenance.
- .6 PI - Product Information.
- .7 PV - Performance Verification.
- .8 TAB - Testing, Adjusting and Balancing.

1.4 Measurement and Payment Procedures

- .1 Payment for commissioning shall be at the Lump Sum price tendered for COMMISSIONING, which shall cover the work activities listed in this Section. Payment shall include for all costs in connection with commissioning.

1.5 General

- .1 Cx is a planned program of tests, procedures and checks carried out systematically on systems and integrated systems of the finished project. Cx is performed after systems and integrated systems are completely installed, functional, and the Contractor's PV responsibilities have been completed and approved. Objectives:
 - .1 Verify installed equipment, systems and integrated systems operate in accordance with contract documents and design criteria and intent.
 - .2 Effectively train O&M staff.
 - .3 The Contractor is to assist in Cx process, operating equipment and systems, troubleshooting, and making adjustments as required.

1.6 Non-Conformance with Performance Verification Requirements

- .1 Should equipment, system components, and associated controls be incorrectly installed or malfunction during Cx, correct deficiencies, re-verify equipment and components within the non-functional system, including related systems as deemed required by the Departmental Representative to ensure effective performance.
- .2 Costs for corrective work, additional tests, inspections, to determine acceptability and proper performance of such items to be borne by the Contractor.

1.7 Pre-CX Review

- .1 During Construction: Coordinate provision, location, and installation of provisions for Cx.
- .2 Before start of Cx:
 - .1 Ensure installation of related components, equipment, sub-systems, and systems is complete.
 - .2 Fully understand Cx requirements and procedures.
 - .3 Understand completely design criteria and intent and special features.
 - .4 Submit complete start-up documentation to the Departmental Representative.
 - .5 Ensure systems have been cleaned thoroughly.
 - .6 Ensure "As-Built" system schematics are available.
- .3 Inform the Departmental Representative in writing of discrepancies and deficiencies on finished works.

1.8 Conflicts

- .1 Report conflicts between requirements of this Section and other Sections to the Departmental Representative before start-up and obtain clarification.
- .2 Failure to report conflict and obtain clarification will result in application of most stringent requirement.

1.9 Submittals

- .1 Submittals: in accordance with Section 01 33 00 (Submittal Procedures).
 - .1 Submit proposed Cx procedures to the Departmental Representative and obtain written approval at least four (4) weeks prior to start of Cx.
 - .2 Documentation to be provided for all electrical and mechanical systems.

1.10 Commissioning Documentation

- .1 The Departmental Representative will review and approve Cx documentation.
- .2 Provide completed and approved Cx documentation to the Departmental Representative.

1.11 Commissioning Schedule

- .1 Provide adequate time for Cx activities prescribed in Technical Sections and Commissioning Sections including:
 - .1 Approval of Cx reports.
 - .2 Verification of reported results.
 - .3 Repairs, re-testing, re-commissioning, re-verification.
 - .4 Training.

1.12 Starting and Testing

- .1 The Contractor assumes liabilities and costs for inspections, including disassembly and re-assembly after approval, starting, testing, and adjusting, including supply of testing equipment.

1.13 Witnessing of Starting and Testing

- .1 Provide fourteen (14) days notice prior to commencement.
- .2 The Departmental Representative will witness start-up and testing.

- .3 The Contractor's Cx Agent is to be present at tests performed and documented by sub-trades, suppliers, and equipment manufacturers.

1.14 Manufacturer's Involvement

- .1 Obtain manufacturer's installation, start-up and operations instructions prior to start-up of components, equipment and systems and review with the Departmental Representative.
 - .1 Compare completed installation with manufacturer's published data, record discrepancies, and review with manufacturer.
 - .2 Modify procedures detrimental to equipment performance and review same with manufacturer before start-up.

1.15 Procedures

- .1 Verify that equipment and systems are complete, clean, and operating in normal and safe manner prior to conducting start-up, testing and Cx.
- .2 Conduct start-up and testing in following distinct phases:
 - .1 Included in delivery and installation:
 - .1 Verification of conformity to Specifications, approved shop drawings, and completion of PI report forms.
 - .2 Visual inspection of quality of installation.
 - .2 Start-up: follow accepted start-up procedures.
 - .3 Operational testing: document equipment performance.
 - .4 System PV: include repetition of tests after correcting deficiencies.

1.16 Operation and Maintenance of Equipment and Systems

- .1 After start-up, operate and maintain equipment and systems as directed by equipment/system manufacturer.
- .2 Operate and maintain systems for length of time required for commissioning to be completed.
- .3 After completion of commissioning, operate and maintain systems until substantial completion.

1.17 Test Results

- .1 If start-up, testing and/or PV produce unacceptable results, repair, replace or repeat specified starting and/or PV procedures until acceptable results are achieved.
- .2 Provide labour and materials, assume costs for re-commissioning.

1.18 Start of Commissioning

- .1 Notify the Departmental Representative at least fourteen (14) days prior to start of Cx.
- .2 Start Cx after elements of building affecting start-up and performance verification of systems have been completed.

1.19 Commissioning Performance Verification

- .1 Carry out Cx under actual operating conditions, over entire operating range, in all modes.
- .2 Cx procedures to be repeatable and reported results are to be verifiable.
- .3 Follow equipment manufacturer's operating instructions.

1.20 Witnessing Commissioning

- .1 The Departmental Representative will witness activities and verify results.

1.21 Deficiencies, Faults, Defects

- .1 Correct deficiencies found during start-up and Cx to satisfaction of the Departmental Representative.
- .2 Report problems, faults, or defects affecting Cx to the Departmental Representative in writing. Stop Cx until problems are rectified. Proceed only with written approval from the Departmental Representative.

1.22 Completion of Commissioning

- .1 Upon completion of Cx, leave systems in normal operating mode.
- .2 Cx to be considered complete when contract Cx deliverables have been submitted and accepted by the Departmental Representative.

1.23 Maintenance Materials, Spare Parts, Special Tools

- .1 Supply, deliver, and document maintenance materials, spare parts, and special tools as specified in contract.

1.24 Occupancy

- .1 Cooperate fully with the Departmental Representative during stages of acceptance and occupancy of facility.

2. PART 2 – PRODUCTS – NOT USED

3. PART 3 – EXECUTION – NOT USED

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 Local survey control and upland benchmark locations are shown on the Drawings. The Contractor shall refer to provided benchmark location information to help establish survey and positioning control for the Contract work.
- .2 The Drawings represent conditions existing on the date of the surveys shown on the Drawings and are for information purposes only. The Drawings serve as the basis for the estimated quantities of materials as described in the Tender documents.
- .3 The Contractor may complete Progress Surveys using in-house survey resources. The Contractor shall employ a third-party (i.e., do not use the Contractor's own survey crew to manage survey work) licensed professional surveyor, member of the Association of British Columbia Land Surveyors (ABCLS), or professional engineer employed by the Contractor that is licensed to perform bathymetric and topographic surveys in British Columbia to conduct Pre-Construction and Post-Construction Surveys.
- .4 Methods and procedures for hydrographic surveys shall be in accordance with or exceed the accuracy requirements of "Navigation and Dredging Support Surveys" per the Hydrographic Surveying Engineering and Design Manual (EM 1110-2-1003) as prepared by U.S. Army Corps of Engineers (USACE), dated January 1, 2002. Should there be discrepancies between the Hydrographic Surveying Engineering and Design Manual and these Specifications, the more strict survey requirements shall take precedence unless the Contractor obtains clarification from the Departmental Representative otherwise.
 - .1 A copy of the Engineering and Design – Hydrographic Surveying Manual (EM 1110-2-1003) can be viewed and downloaded from: http://publications.usace.army.mil/publications/eng-manuals/EM_1110-2-1003_pfl/toc.htm
- .5 Methods and procedures for topographic surveys shall be in accordance with or exceed the accuracy requirements of the Engineering and Design – Control and Topographic Surveying Manual (EM 1110-1-1005) as prepared by USACE, dated January 1, 2007. Should there be discrepancies between the Engineering and Design – Control and Topographic Surveying and these Specifications, the more strict survey requirements shall take precedence unless the Contractor obtains clarification from the Departmental Representative otherwise.
 - .1 A copy of the Engineering and Design – Control and Topographic Surveying Manual (EM 1110-1-1005) can be viewed and downloaded from: http://publications.usace.army.mil/publications/eng-manuals/EM_1110-1-1005_sec/toc.htm
- .6 The Contractor shall perform the Pre-Construction Survey prior to conducting any dredging or debris removal work.

- .7 The Contractor shall perform Post-Construction (final) Surveys following Departmental Representative acceptance of the work, based on Progress Survey results. Final measurement and payment for the work will be determined using the Contractor's survey results.
- .8 The Departmental Representative may conduct its own Pre-Construction Survey to compare against the Contractor's Pre-Construction Survey for quality assurance. If there are discrepancies between the two Pre-Construction Surveys, the Contractor's surveyor shall coordinate with the Departmental Representative's surveyor to determine which survey is inaccurate, and if the Departmental Representative determines that the Contractor's survey means and methods are inaccurate, the Contractor shall adjust and correct its surveying means and methods at the Contractor's own cost.
- .9 The Departmental Representative may review the Contractor's survey work or conduct additional surveys throughout the construction work as a quality assurance check of the Contractor's Progress Survey and Post-Construction Survey work.
- .10 The Contractor shall provide a safe working environment for the Departmental Representative as required to conduct all quality assurance surveys.
- .11 The Contractor shall establish its survey and positioning control to provide an accurate method of horizontal and vertical control before any in-water work starts.
- .12 The Contractor shall provide daily progress surveying and positioning control, as described further in this Section, to provide quality control of the work and to calculate or verify volumes, areas, limits, positions, and other aspects of the work.
- .13 Progress Survey data collected by the Contractor shall be used for work progress tracking and reporting in the Daily Construction Report and Weekly Construction Report.
- .14 The Contractor shall conduct Post-Construction Surveys for each Contractor-defined dredging or capping subarea after the Contractor has completed work in a subarea and the Post-Construction Surveys will be used as the basis for measurement and payment and acceptance of the work.
- .15 The Contractor shall calculate completed in-situ quantities for dredging and capping placement, based on survey results, for progress reporting and measurement and payment purposes.
- .16 This work includes furnishing all labour, materials, tools, equipment, and incidentals required for surveying in support of the overall project as described in the Contract documents and in the Specifications.

1.2 Measurement and Payment Procedures

- .1 Surveying will not be measured individually.
- .2 Surveying will be paid for at the unit price, per each day of surveying, tendered for SURVEYS. Each day of surveying may consist of multiple surveys as determined

by the Contractor's construction schedule. Payment shall include all costs in connection with collection, processing, and reporting of all survey data (pre-construction, progress, and post-construction) that shall be used to calculate or verify progress and measurement and payment volumes, areas, limits, positions, and other aspects of the work, and calculating quantities for progress reporting and measurement and payment purposes, as described in these Specifications.

- .3 Surveying that is conducted outside of the TRBCA but within the EGD Work Site for work conducted due to recontamination (Residuals Management Cover Placement and/or Residuals Contingency Re-dredging) will not be payable.

1.3 Related Sections

- .1 Section 01 11 55 (General Instructions)
- .2 Section 35 20 23 (Dredging, Barge Dewatering and In-Water Transportation)
- .3 Section 35 37 10 (Engineered Capping)
- .4 Section 35 37 10.01 (Residuals Management Cover Placement)

1.4 Definitions

- .1 See Section 01 11 55 (General Instructions) for all definitions related to the Contract documents.

1.5 Submittals

- .1 As part of the Quality Control Plan, in accordance with Section 01 33 00 (Submittal Procedures), the Contractor shall prepare a Survey and Positioning Control Plan that describes the means and methods that will be implemented for all surveying activities required for the work. In-water construction activities shall not begin until: 1) the Quality Control Plan has been reviewed and accepted by the Departmental Representative. At a minimum, the Survey and Positioning Control Plan shall contain the following information:
 - .1 Description of the approach that will be utilized for completion of all project surveys and positioning control activities (i.e., on-site base stations or CanNet technologies). The Contractor shall maintain a consistent approach for completion of all surveys and positioning control activities unless otherwise approved by the Departmental Representative.
 - .2 Description of survey equipment proposed for use in collection of all survey data for the work.
 - .3 Process for completion of all Pre-Construction, Progress, and Post-Construction Surveys as required by and described within the Specifications.
 - .4 Process for inclusion of daily Progress Survey data, including all electronic information and data from survey instruments, as part of Daily

- and Weekly Construction Report submittal requirements as described in the Specifications.
- .5 Procedures and quantity calculation methods for calculating Progress Surveys and Post-Construction Survey.
- .2 Pre-Construction, Progress, and Post-Construction Surveys.
 - .1 Surveys shall be completed using the project horizontal (Universal Transverse Mercator) and vertical (Chart Datum) datums.
 - .2 The Contractor's licensed professional surveyor shall stamp all Departmental Representative-accepted Pre-Construction and Post-Construction Surveys. The licensed surveyor does not need to stamp the Progress Surveys.
 - .3 Submit all surveys in hard copy drawing format and electronic drawing format as described below to the Departmental Representative.
 - .4 Submit Pre-Construction Survey and calculated quantities to the Departmental Representative at least ten (10) working days prior to start of in-water construction activities.
 - .5 Submit daily Progress Surveys and calculated quantities to the Departmental Representative as part of the Contractor's Daily Construction Report.
 - .6 Submit Post-Construction Surveys and calculated quantities to the Departmental Representative within seventy-two (72) hours after completing the Post-Construction Survey, and as part of the Contractor's Weekly Construction Report or Contractor request for information (RFI) submittal.
 - .3 Hard Copy Drawing Requirements:
 - .1 Provide plan view contour drawing, using 0.2-metre contour intervals (using even number intervals).
 - .2 Provide plan view spot elevation drawing.
 - .3 Provide cross sections through the area where work was completed at no greater than 10-metre spacing between cross sections unless otherwise accepted by the Departmental Representative. Cross section information shall show the pre-construction elevations, progress or post-construction elevations, and the design template (elevations and grades).
 - .4 Indicate on drawing, at a minimum, the date of survey, datums, extent of survey coverage, elevation markings (for spot elevations and contour lines), location of cross sections, scale bar, and licensed professional surveyor stamp (for Pre-Construction and Post-Construction Surveys).
 - .4 Electronic Drawing Requirements:
 - .1 Submit all survey data in AutoCAD Civil3D 2012 format or older format if acceptable to the Departmental Representative. All AutoCAD drawings

- submitted by the Contractor shall be in conformance to PWGSC National Computer Aided Design and Drafting (CADD) Standard.
- .2 Submit all survey data in a separate ASCII text file with XYZ spot elevation data.
 - .3 The Departmental Representative will provide the Contractor with the EGD Work Site basemap file in *.dwg format for Contractor use.
- .5 Quantity Calculations:
- .1 The Contractor shall submit its quantity (volume) calculations to the Departmental Representative for review and acceptance. The Contractor shall also submit supporting information to help the Departmental Representative verify that the Contractor's calculated quantities are accurate. Supporting information may include, but is not limited to, certified weight tickets, barge tonnage estimates (based on barge displacement measurements), and other field inspection information that the Contractor may elect to use for quality control purposes.
 - .2 Quantities shall be computed to the nearest in-situ cubic metre based on comparison to the Contractor's Pre-Construction Survey or relevant Progress Surveys. Quantities shall be broken down by each bid item listed in the Unit Price Table. Each quantity shall also be broken down into payable quantities, and Excessive Overdredging or Excessive Over-Placement quantities.
 - .3 Quantities shall be computed using Triangulated Irregular Network (TIN) or similar three-dimensional calculation methods using generated surfaces from the survey data. The Contractor shall describe its quantity calculation method(s) in the Survey and Positioning Control Plan. Double end area method will not be an acceptable quantity calculation method.
 - .4 Quantities calculations shall be submitted on a daily and weekly basis as part of the Daily Construction Report and Weekly Construction Report.

2. PART 2 – PRODUCTS – NOT USED

3. PART 3 – EXECUTION

3.1 Survey Equipment

- .1 The Contractor's third party licensed surveyor shall use multi-beam survey equipment for the Pre-Construction and Post-Construction Surveys. If multi-beam survey equipment is considered by the Contractor to not be feasible for use at the site due to site bathymetry, obstructions, or access, the Contractor shall notify the Departmental Representative during the bidding period before final questions are due, and propose an alternate surveying method as part of its question to the Departmental Representative. The Departmental Representative will review any

concerns raised about surveying method and will issue a clarification or addendum to either keep this requirement or modify the survey equipment requirement.

- .2 The Contractor shall employ an accepted method to locate and control horizontal position that can include: Real Time Kinematic Global Positioning System (RTK-GPS) or Differential Global Positioning System (DGPS). If the Contractor proposes to use an alternative positioning method, that method must be submitted to the Departmental Representative and accepted prior to start of work.
- .3 Bed elevations, converted to the project vertical datum, shall be determined using spot elevation measurements and survey control points.
- .4 Accuracy for measured elevations shall be +/- 0.1 metres; accuracy of horizontal position shall be +/- 1 metres at the 95% confidence interval.

3.2 Ranges and Tide Gauges

- .1 The Contractor shall furnish, set, and maintain in good order, all ranges, buoys, tide gauges, tide board, and other markers necessary to define the work and to facilitate inspection. The Contractor shall establish and maintain a tide gauge or board in a location where it may be clearly seen during in-water construction operations and inspections. The Contractor shall also install an automatic recording tide gauge with water level sensor. The tide gauge shall provide a continuous recording of tidal change for every 15-minute interval or each 0.03 metre change, whichever occurs first. Tidal changes shall be recorded in Chart Datum, with these changes visually provided to the dredging and material placement equipment operator at all times during the construction activities to allow proper adjustment of dredge and placement elevations.

3.3 Conduct of Work

- .1 Layout of Work:
 - .1 The Contractor shall establish an accurate method of horizontal and vertical control before the work begins. Survey control points shown on the Drawings are provided for reference purposes only to assist the Contractor in establishing horizontal and vertical control.
 - .2 The proposed method and maintenance of the horizontal control system shall be subject to the acceptance of the Departmental Representative and if, at any time, the method fails to provide accurate location of the work, the Contractor may be required to suspend its operations until such time that accurate control is established.
 - .3 The Contractor shall lay out its work using control points established by the Contractor as part of the work, and shall be responsible for all measurements taken to establish these points.

- .4 The Contractor shall furnish, at its own expense, all stakes, templates, platforms, equipment, range markers, transponder stations, and labour as may be required to lay out the work shown on the Drawings.
 - .5 It shall be the responsibility of the Contractor to maintain all points established for the work until authorized to remove them. If such points are destroyed by the Contractor or disturbed through its negligence prior to an authorized removal, they shall be replaced by the Contractor, at the Contractor's own cost.
- .2 Positioning Methods:
- .1 Observation data will be recorded electronically or in standard surveying field book format.
 - .2 Observed ranges shall be corrected for scale, calibration, and automatic variations when present.
 - .3 Accuracy of horizontal position shall be within +/- 1 metre.
 - .4 Accuracy for vertical positioning shall be +/- 0.1 metre.
 - .5 The Contractor shall provide verification of positioning accuracy throughout completion of in-water construction activities, and submit documentation as part of the Weekly Construction Report.

3.4 Pre-Construction, Progress, and Post-Construction Surveys

- .1 Pre-Construction Survey:
 - .1 The Contractor shall conduct a pre-construction multi-beam bathymetric survey and supplemental surveys as necessary to fully identify pre-construction elevations and grades throughout the under-pier area of the EGD Work Site. Bathymetric survey equipment may not be suitable for surveying the upper slope areas, and the Contractor may have to conduct a supplemental topographic survey. This Pre-Construction Survey shall be completed and submitted to the Departmental Representative at least ten (10) working days prior to the start of dredging activities, and will be used as the basis for measurement and payment purposes.
 - .2 The Pre-Construction Survey shall cover all areas inside the EGD Work Site including the Temporary Re-suspension Barrier Containment Area (TRBCA) as shown on the Drawings. The Contractor shall also be responsible for surveying a width of 25 metres immediately outside the TRBCA (extending outside of the EGD Work Site) for verification of seabed elevations and to verify that placement of Engineered Cap materials inside the TRBCA (as part of the work of this Contract) will meet top of existing armour grades outside the TRBCA.
 - .3 If vessels or other obstructions prevent the Contractor from being able to fully survey all of the under-pier area of the EGD Work Site, the Contractor shall coordinate with the Departmental Representative to

determine whether to rely upon the Contract Drawings in those areas or to rely upon initial Progress Survey in those areas to supplement the Pre-Construction Survey.

.2 Progress Surveys:

- .1 The Contractor shall provide daily (or less frequent only if accepted by the Departmental Representative) measurements of the previous day's work, using multi-beam survey equipment. The survey's spot elevation spacing shall be determined by the Contractor and shall provide sufficient density of spot elevation data to provide adequate information for the Contractor to provide quality control of its work. The Departmental Representative shall be satisfied as to the survey's data density, and if not satisfied may advise the Contractor to increase the survey data density at the Contractor's own cost.
- .2 The survey data will accompany the Contractor's Daily Construction Report submitted to the Departmental Representative, including all electronic information and data from survey instruments.
- .3 Survey results may be used to adjust construction procedures to ensure that the configuration of the work conforms to the Drawings and permit requirements. The Contractor may be required to adjust its construction procedures to ensure compliance with the Drawings and permit requirements, at the Contractor's own cost.
- .4 Dredging Progress Surveys:
 - .1 The Contractor shall complete Progress Surveys on a daily basis to document daily progress for completion of dredging activities. Results of daily Progress Surveys should accurately depict the daily progress of the dredging work and shall be submitted as part of the Contractor's Daily and Weekly Construction Reports.
 - .2 When dredging is determined to be completed by the Contractor within each Contractor Subarea, the Contractor will conduct its Progress Survey over that entire Contractor Subarea to document that the dredging subarea is completed and submit to the Departmental Representative to review.
 - .3 If all of the required dredging within a Contractor Subarea has not been satisfactorily completed, as determined by the Departmental Representative, the Contractor shall correct the deficiencies indicated in the survey, re-survey the subarea, and the Departmental Representative will review the re-survey to confirm that dredging within that Contractor Subarea has been satisfactorily completed. The cost for Contractor re-survey will not be cause for additional compensation to the Contractor.
 - .4 The Contractor's Progress Surveys will be used to determine post-dredge elevations and for computing progress dredge volumes that

are reported in the Daily Construction Report and Weekly Construction Report.

- .5 The Departmental Representative reserves the right to conduct its own surveys during construction to verify the Contractor's survey work. In the event of a discrepancy, the Departmental Representative may choose to retain another surveyor mutually acceptable to both the Contractor and the Departmental Representative to resolve the discrepancy.
- .5 Capping Progress Surveys:
 - .1 Following completion of all dredging activities within each Contractor Subarea and acceptance of the work by the Departmental Representative, the Departmental Representative will advise the Contractor to place capping materials in that subarea.
 - .2 The Contractor shall complete Capping Progress Surveys on a daily basis to document daily progress for completion of material placement activities. Results of Capping Progress Surveys should accurately depict the daily progress of the material placement work and shall be submitted as part of the Contractor's Daily and Weekly Construction Reports.
 - .3 The Contractor and the Departmental Representative shall follow the same procedures regarding acceptance of the work as described above for Dredging Progress Surveys.
- .6 Residuals Management Cover Progress Surveys:
 - .1 Following collection of confirmational sediment samples in areas outside of the TRBCA, but within the EGD Work Site, the Departmental Representative may advise the Contractor to place Residuals Management Cover Materials in designated areas where recontamination has occurred. The cost for Contractor's acquisition and placement of Residuals Management Cover Materials will not be cause for additional compensation to the Contractor.
 - .2 The Contractor shall complete Residuals Management Cover Progress Surveys on a daily basis to document daily progress for completion of material placement activities. Results of Residuals Management Cover Progress Surveys should accurately depict the daily progress of the material placement work and shall be submitted as part of the Contractor's Daily and Weekly Construction Reports. The cost for Contractor's surveying of Residuals Management Cover Materials will not be cause for additional compensation to the Contractor.

- .3 The Contractor and the Departmental Representative shall follow the same procedures regarding acceptance of the work as described above for Dredging and Capping Progress Surveys.
- .7 Residuals Contingency Re-dredging Surveys outside the TRBCA:
 - .1 Following collection of confirmational sediment samples in areas outside of the TRBCA, but within the EGD Work Site, the Departmental Representative may advise the Contractor to conduct Residuals Contingency Re-dredging in designated areas where recontamination has occurred. The cost for Contractor's re-dredging of these areas will not be cause for additional compensation to the Contractor.
 - .2 The Contractor shall complete Residuals Contingency Re-dredging Surveys on a daily basis to document daily progress for completion of dredging activities. Results of Residuals Contingency Re-dredging Surveys should accurately depict the daily progress of the dredging work and shall be submitted as part of the Contractor's Daily and Weekly Construction Reports. The cost for Contractor's surveying of Residuals Contingency Re-dredging will not be cause for additional compensation to the Contractor.
 - .3 The Contractor and the Departmental Representative shall follow the same procedures regarding acceptance of the work as described above for Dredging and Capping Progress Surveys.
- .3 Post-Construction Surveys:
 - .1 Dredging Post-Construction Surveys:
 - .1 Following completion of Required Dredging work, and Contingency Re-Dredging work (as necessary), within each Contractor-defined dredging subarea and Departmental Representative acceptance of the work completion, based upon review of the Progress Surveys in that dredging subarea, the Contractor shall conduct a Post-Construction Survey (for Required Dredging, and where designated by the Departmental Representative for Contingency Re-Dredging, as appropriate) of the dredging subarea that will be used for final measurement and payment for required dredging work.
 - .2 Results of this survey will be compared to the monthly progress reports provided by the Contractor.
 - .3 This Post-Construction Survey will be used as the Pre-Construction Survey for capping material placement activities.
 - .4 The Departmental Representative reserves the right to conduct its own Post-Construction Survey during construction to verify the Contractor's survey work. In the event of a discrepancy, the Departmental Representative may choose to retain another

surveyor mutually acceptable to both the Contractor and the Departmental Representative to resolve the discrepancy.

- .2 Capping Post-Construction Surveys:
 - .1 Following completion of each capping layer (sand, filter material and armour rock material placement) within each Contractor-defined subarea and Departmental Representative acceptance of the work completion, based upon review of Progress Surveys in that subarea, the Contractor shall conduct a Post-Construction Survey of the capping work that will be used for final measurement and payment purposes.
 - .2 Results of these surveys will be compared with the monthly progress reports provided by the Contractor.
 - .3 The Contractor and the Departmental Representative shall follow the same procedures regarding acceptance of the work as described above for Dredging Post-Construction Surveys.
- .3 Residuals Management Cover Post-Construction Surveys:
 - .1 In the event that placement of Residuals Management Cover Material is required in areas outside of the TRBCA but within the EGD Work Site due to recontamination, the Contractor shall conduct a Residuals Management Cover Post-Construction Survey following placement of the material. The cost for Contractor's surveying of Residuals Management Cover Materials will not be cause for additional compensation to the Contractor.
 - .2 Results of these surveys will be compared to the monthly progress reports provided by the Contractor.
 - .3 The Contractor and the Departmental Representative shall follow the same procedures regarding acceptance of the work as described above for Dredging and Capping Construction Surveys.
- .4 Residuals Contingency Re-dredging Post-Construction Surveys:
 - .1 In the event that Residuals Contingency Re-dredging is required in areas outside of the TRBCA but within the EGD Work Site due to recontamination, the Contractor shall conduct a Residuals Contingency Re-dredging Post-Construction Survey following re-dredging. The cost for Contractor's surveying of Residuals Contingency Re-dredging will not be cause for additional compensation to the Contractor.
 - .2 Results of these surveys will be compared to the monthly progress reports provided by the Contractor.
 - .3 The Contractor and the Departmental Representative shall follow the same procedures regarding acceptance of the work as described above for Dredging and Capping Construction Surveys.

- .5 Site-Wide Post-Construction Survey:
 - .1 Following removal of the TRB and sheet pile wall, and all other in-water activities, the Contractor shall conduct a Post-Construction Survey over the entire EGD Work Site.
 - .2 This Post-Construction Survey will represent the final Record Drawing regarding sea bed elevations throughout the EGD Work Site.
 - .3 The Contractor and the Departmental Representative shall follow the same procedures regarding acceptance of the work as described above for Dredging and Capping Post-Construction Surveys.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section covers methods and procedures for demolishing and disposal off-site, or salvaging, storing, recycling and/or re-use in the work the wharf safety ladders, high mast light with CCTV camera system, and other jetty attachments and (mechanical / electrical / civil) utilities at the work site designated to be removed, relocated, re-used or re-installed, in whole or in part, or to be handed over to Departmental Representative for unspecified future uses, as described on the Drawings and as found in the field.
- .2 This Section also covers dismantling, extraction and off-site disposal of the South Jetty fender log system (including chains, steel bolting materials, miscellaneous steel materials and attachments).
- .3 This Section also covers jetty attachments and (mechanical/electrical/civil) utilities to be salvaged during the course of the work, as described on the Drawings, and then handed over to Departmental Representative for unspecified future uses.
- .4 This Section also covers the temporary disconnection, removal, storage and subsequent reinstatement (to existing condition) of the impressed current cathodic protection (ICCP) system on the seabed under the existing steel-piled South Jetty deck structure, including inspection and testing of the ICCP system before disconnection and after reinstatement, all as described on the Drawings. The ICCP system protects the existing steel-piled concrete deck South Jetty structure and adjacent anchored bulkhead wall from corrosion.
- .5 For requirements pertaining to localized demolition and/or surface preparation of existing concrete structures in readiness for new concrete work, refer to relevant Sections of the Specification and to the Drawings.
- .6 Dismantling, extraction and off-site disposal of existing timber fender piles and corner dolphin piles at the South Jetty is covered under Section 02 41 16.01 (Structure Demolition).
- .7 Storage and re-installation of existing timber fender piles and corner dolphin piles where required in the work is covered under Section 31 62 19 (Timber Piling).
- .8 Timber jetty and concrete structure demolition is covered under Section 02 41 16.01 (Structure Demolition).

1.2 Related Sections

- .1 Section 01 33 00 (Submittal Procedures)
- .2 Section 01 35 13.43 (Special Procedures for Contaminated Sites)
- .3 Section 01 35 33 (Health and Safety Requirements)

- .4 Section 01 35 43 (Environmental Procedures and Sustainability)
- .5 Section 01 74 19 (Waste Management and Disposal)
- .6 Section 02 41 13.14 (Asphalt Paving Removal)
- .7 Section 02 41 16.01 (Structure Demolition)
- .8 Section 02 41 16.02 (Structure Relocation)
- .9 Section 02 55 10 (Dust Control)
- .10 Section 05 50 00 (Metal Fabrications)
- .11 Section 22 15 00 (Compressed Air Systems)
- .12 Section 22 33 18 (Drainage Waste Piping – Plastic)
- .13 Section 26 05 00 (Common Work Results for Electrical)
- .14 Section 26 05 36 (Cable Trays for Electrical Systems)
- .15 Section 31 23 10 (Excavating, Trenching and Backfilling)
- .16 Section 31 62 19 (Timber Piling)
- .17 Section 33 11 16 (Water Utility Distribution Piping)

1.3 Measurement and Payment Procedures

- .1 Selective site demolition items (wharf safety ladders, high mast light with CCTV camera system, and other designated jetty attachments and mechanical / electrical / civil utilities, but excluding the floating fender log system), to be demolished and disposed off-site, or handed over to Departmental Representative for unspecified future uses, or salvaged, stored and re-used in the work as shown on the Drawings, will not be measured individually. Payment for selective site demolition items (wharf safety ladders, high mast light with CCTV camera system, and other designated jetty attachments and mechanical / electrical / civil utilities, but excluding the floating fender log system and excluding the ICCP system), will be made at the Lump Sum price tendered for SELECTIVE SITE DEMOLITION: GENERAL. Payment shall be full compensation for all work in connection with the aforementioned selective site demolition items (excluding the floating fender log system and excluding the ICCP system), as described in this Section and on the Drawings.
- .2 Temporary disconnection, removal, storage and subsequent reinstatement (to existing condition) of the impressed current cathodic protection (ICCP) system on the seabed under the existing steel-piled South Jetty deck structure, including inspection and testing of the ICCP system before disconnection and after reinstatement, will not be measured individually. Payment for temporary disconnection, removal, cleaning, storage and subsequent reinstatement of the ICCP system, and related inspection and testing, will be made at the Lump Sum price tendered for SELECTIVE SITE DEMOLITION: ICCP SYSTEM.

- .3 The dismantling, extraction and off-site disposal of the South Jetty floating fender log system (including chains, steel bolting materials, miscellaneous steel materials and attachments), as shown on the Drawings, will not be measured individually. Payment for dismantling, extraction and off-site disposal of the South Jetty floating fender log system (including chains, steel bolting materials, miscellaneous steel materials and attachments) will be made at the Lump Sum price tendered for SELECTIVE SITE DEMOLITION: SOUTH JETTY FENDER LOGS. Payment shall be full compensation for all work in connection with dismantling, extraction and off-site disposal of the South Jetty floating fender log system (including chains, steel bolting materials, miscellaneous steel materials and attachments) as described in this Section and on the Drawings.
- .4 Dismantling, extraction and off-site disposal of existing timber fender piles and corner dolphin piles at the South Jetty will be measured to Section 02 41 16.01 (Structure Demolition), and payment shall include all costs in connection with such work as specified in that Section.
- .5 Storage and re-use of existing timber fender piles and corner dolphin piles in the work, where indicated on the Drawings, will be measured to Section 31 62 19 (Timber Piling), and payment shall include all costs in connection with such work as specified in that Section.
- .6 Storage, modification and re-use of wharf safety ladders in the work will be measured to Section 05 50 00 (Metal Fabrications), and payment shall include all costs in connection with such work as specified in that Section.
- .7 Demolition of structures will be measured to Section 02 41 16.01 (Structure Demolition), and payment shall include all costs in connection with demolition of structures as specified in that Section.
- .8 Removal of existing asphalt paving will be measured to Section 02 41 13.14 (Asphalt Paving Removal), and payment shall include all costs in connection with asphalt paving removal as specified in that Section.

1.4 References

- .1 CAN/CSA-S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.
- .2 Occupational Health and Safety Regulations, WorkSafeBC.
- .3 National Building Code of Canada (NBCC), Part 8 - Safety Measures at Construction and Demolition Sites.

1.5 Definitions – Not Used

1.6 Submittals

- .1 At least twenty-eight (28) days prior to commencing selective site demolition work, and in accordance with Section 01 33 00 (Submittal Procedures), submit as

part of the Construction Work Plan for review by Departmental Representative the proposed method, sequencing of work and product data for demolition, dismantling, disassembly and off-site disposal of the items designated for selective site demolition. Include proposed cleaning procedure for catwalk utilities.

- .2 Within the Construction Work Plan, provide specific information (including end-use) for any materials that are to be recycled and/or re-used by others, in lieu of off-site disposal, for Departmental Representative review and acceptance.
- .3 At least twenty-eight (28) days prior to start of selective site demolition work, submit detailed Waste Reduction Work Plan in accordance with Section 01 74 19 (Waste Management and Disposal) and indicate:
 - .1 Descriptions of types and anticipated quantities of materials to be salvaged, re-used, recycled and land-filled.
 - .2 Names and addresses of haulers, waste facilities and waste receiving organizations.

1.7 Site Conditions

- .1 The Contractor shall inspect the work site to thoroughly familiarize itself with site conditions before starting selective site demolition work.
- .2 Refer to the EGD Asbestos Management Plan (included in an Appendix to the Specifications) for known locations where asbestos may be encountered. Should material resembling spray or trowel-applied asbestos or other designated substance listed as hazardous be encountered, stop work, take preventative measures, and notify the Departmental Representative immediately. Do not proceed until written instructions have been received from the Departmental Representative.
- .3 Notify the Departmental Representative before disrupting Esquimalt Graving Dock access or services.
- .4 The existing fire water main, compressed air system, sanitary sewer system and electrical / fibre optic cabling located on cable trays in the under-deck catwalk (all designated to be removed during timber jetty demolition works), are in serviceable but contaminated condition. Contamination is primarily faeces from wildlife. Contractor is to be aware of this condition and take all necessary precautions and care during the work. All contaminated portions of services and cable trays removed from the under-deck catwalk are to be cleaned to remove the aforementioned contamination before re-use in the work (where stipulated) or disposal off-site. Decontamination / cleaning shall only occur in designated areas with appropriate containment and all wastewater shall be contained and disposed of at an authorized Wastewater Treatment and Disposal Facility.

2. PART 2 – PRODUCTS – NOT USED

3. PART 3 – EXECUTION

3.1 Preparation and Protection

- .1 Within fourteen (14) days of Contract award, inspect site with Departmental Representative to verify extent and location of items designated for removal, disposal, recycling, salvage and items to remain or to be re-used in the work.
- .2 Protect existing items designated to remain and items designated for salvage or re-use. In event of damage to such items, immediately replace or make repairs to approval of Departmental Representative.
- .3 Cut existing surfaces as required to accommodate new work.
- .4 Remove items so shown or specified.
- .5 Make cuts with clean, true, smooth edges. Make patches inconspicuous in final assembly.
- .6 Patch and make good surfaces cut, damaged or disturbed, to Departmental Representative's approval. Match existing material, colour, finish and texture.
- .7 Making good is defined as matching construction and finishing materials and the adjacent surfaces such that there is no visible difference between existing and new surfaces when viewed from 1.5 metres in ambient light, and includes painting the whole surface to the next change in plane.
- .8 Protect in accordance with Section 31 23 10 (Excavating, Trenching and Backfilling).
- .9 Locate and protect electrical and mechanical services. Preserve active services traversing site in operating condition. Notify and obtain approval of Departmental Representative before starting demolition.
- .10 Disconnect and cap designated sewer drains, water lines and electrical duct banks. Remove standpipes, manholes and vaults as shown on the Drawings, and securely plug to form watertight seal. Seal end of underground ducts to prevent water ingress into duct bank system.
- .11 Schedule demolition and temporary capping of utilities, mechanical and electrical services to minimize disruption for EGD operations.
- .12 Ensure site demolition work is performed in accordance with Laws and Regulations.
- .13 Perform site demolition work in accordance with the Occupational Health and Safety Regulations of WorkSafeBC.
- .14 Manage hazardous materials in accordance with Laws and Regulations.

- .15 Prevent debris, dust, and any sediment laden waters from entering any drainage system, water course or marine environment in line with EGD Environmental Best Management Practices (EBMPs), specifically EBMP #17 and EBMP #18.
- .16 Ensure that selective demolition work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.
- .17 Do not dispose of waste or volatile materials including but not limited to, mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers.
- .18 Ensure proper disposal procedures are maintained throughout the project.
- .19 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers or onto adjacent properties.
- .20 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with Laws and Regulations.
- .21 Do not disturb or damage items designated to remain in place.
- .22 Demolish and dispose off-site any reinforced or unreinforced concrete designated for removal in accordance with Section 02 41 16.01 (Structure Demolition).
- .23 Excavate at least 300 mm below pipe invert, when removing pipes under existing or future pavement area.
- .24 Backfill in areas as indicated and in accordance with Section 31 23 10 (Excavating, Trenching and Backfilling).
- .25 During all in-water and above-water demolition and pile extraction work, Environmental Protection shall comply with the requirements of Section 01 35 43 (Environmental Procedures and Sustainability) and the EMP.
- .26 Employ structural demolition methods that minimize or eliminate deposition of cementitious material, concrete debris or concrete dust into the marine environment.
- .27 Do not allow buoyant items that have been demolished or detached from their original position (i.e., floating debris) to float beyond the work site. Do not allow such floating debris to cause any hindrance or obstacle to marine traffic and EGD dry dock operations. Identify and collect such floating debris, and dispose in accordance with the Specification.

3.2 Removal, Storage and Re-Use (General)

- .1 Remove and store materials designated to be salvaged or re-used, in manner to prevent damage, at Contractor's storage location. Advise Departmental Representative in writing of designated storage location.
- .2 Where items identified for selective site demolition and re-use have been in contact with contaminated seabed material, those items shall be decontaminated before being re-used in the work.

- .3 Store and protect in accordance with requirements for maximum preservation of material.
- .4 Handle salvaged materials as new materials.
- .5 Separate waste materials for re-use and recycling.
- .6 Label stored materials, indicating material type and quantity. All parts and components of mechanical and electrical equipment specified for salvage to be clearly labeled prior to removal to facilitate re-assembly. All components and parts should be packaged and labelled in a manner which prevents damage or loss.
- .7 Label the location of storage areas for salvaged material and provide barriers and security devices. Designate appropriate security resources and other measures to prevent vandalism, damage and theft.
- .8 Locate stored materials convenient for re-use in new construction to eliminate double handling wherever possible.
- .9 Where salvaged materials are to be re-used in the work, re-use such materials in accordance with the Section of the specification relevant to the item in question.
- .10 Remove the CCTV camera system from the high mast light (system includes CCTV camera, transformer, and antenna) before dismantling the high mast light pole. Hand over the CCTV camera system as a single package to the Departmental Representative for storage while the high mast light is out of service. Re-install the CCTV camera system on the high mast light immediately after light pole re-installation.
- .11 Stockpile materials designated for off-site disposal in location(s) which facilitate removal from site and examination by potential end markets, and which does not impede disassembly, processing, or hauling procedures.
- .12 Dismantle items containing materials for salvage and stockpile salvaged materials at Contractor's storage location.
- .13 Handle and dispose of hazardous materials in accordance with Laws and Regulations.
- .14 Remove stockpiled material, as directed by Departmental Representative, when it interferes with construction activities.
- .15 Once terminated, the Contractor shall megger / electrically test all cables that are to remain in place, to verify that no damage has been incurred during demolition / disconnection work, and that the cables remain in the same usable condition as found at start of the work.

3.3 Removal, Storage and Reinstatement (ICCP System)

- .1 Temporarily remove, store and subsequently reinstate (to existing condition) the impressed current cathodic protection (ICCP) system on the seabed under the existing steel-piled South Jetty deck structure, as described on the Drawings.

- .2 Where components of the ICCP system have been in contact with contaminated seabed material, those components shall be decontaminated before being re-used in the work.
- .3 In order to protect the existing steel-piled concrete deck South Jetty structure and adjacent anchored bulkhead wall from corrosion, schedule the temporary removal and subsequent reinstatement of the relevant portions of the ICCP system to minimize the length of time that any portion of the ICCP system is out of service during the work.
- .4 Do not remove portions of the ICCP system that are not directly affected by the work (i.e., maintain ICCP system at maximum feasible level of effectiveness throughout construction).
- .5 Monitor and maintain the portion of the ICCP system that remains intact and operational during each phase of the work. Coordinate with Departmental Representative to determine if any temporary adjustment to the electrical supply is required to ensure normal operational performance of the partially intact ICCP system (to pre-existing performance level) during each phase of the work.
- .6 Inspect and test the ICCP system before disconnection and after reinstatement, to confirm normal operational performance (to pre-existing performance level) throughout the work and at completion of the work.
- .7 If, in the opinion of the Departmental Representative, the reduction in effectiveness of the active ICCP system during the work results in an unexpected increase in corrosion of the protected steel elements, then the Departmental Representative, at its sole discretion, may require the Contractor to install an alternate temporary ICCP system on an expedited basis, at additional cost to the Contract.

3.4 Removal from Site and Disposal

- .1 Except where salvage and re-use in the work is specified, Contractor becomes the owner of, and is responsible for, any soil, sediment, debris, waste, timber jetty components designated for demolition, or other material (including material that the Contractor identifies for recycling and/or re-use in lieu of off-site disposal) once it is removed, dredged, or excavated to be loaded onto a vehicle, barge, or other vessel for transport to a Contractor Off-Site Offload Facility, Disposal Facility, Treatment Facility, Hazardous Waste Management Facility, or other recycling/re-use facility.
- .2 Transport all structure Demolition Debris off-site from the EGD Facility only by use of waterborne transport. Do not use trucks to transport Demolition Debris from the EGD Facility.
- .3 Remove materials that cannot be salvaged for re-use or recycling, and dispose of in accordance with the Laws and Regulations at licensed facilities.
- .4 Dismantle items containing materials for salvage and stockpile salvaged materials at Contractor's storage location.

- .5 Handle and dispose of hazardous materials in accordance with Laws and Regulations.
- .6 Remove asphalt pavement in accordance with Section 02 41 13.14 (Asphalt Paving Removal).
- .7 Transport material designated for alternate disposal by accepted haulers to receiving organizations listed in Waste Reduction Work Plan and in accordance with Laws and Regulations. Do not deviate from haulers and receiving organizations listed in Waste Reduction Work Plan without prior written authorization from Departmental Representative.
- .8 Dispose of materials not designated for alternate disposal in accordance with Laws and Regulations. Disposal facilities must be listed in Waste Reduction Work Plan. Do not deviate from disposal facilities listed in Waste Reduction Work Plan without prior written authorization from Departmental Representative.

3.5 Cleaning and Restoration

- .1 Keep site clean and organized throughout demolition procedure.
- .2 Repair damage to adjacent structures and utilities caused by selective site demolition work, as directed by Departmental Representative.
- .3 Remove debris, trim surfaces and leave work site clean, upon completion of work.
- .4 Use cleaning solutions and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife or marine environment.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section covers the breakup and removal of existing asphalt deck overlay pavement on the west timber jetty and south timber jetty (including east approach structure), as shown on the Drawings.
- .2 This Section also covers the breakup and removal of existing asphalt pavement where required for termination, modification or installation of buried utilities, as shown on the Drawings.

1.2 Related Sections

- .1 Section 01 74 19 (Waste Management and Disposal)
- .2 Section 02 41 13 (Selective Site Demolition)
- .3 Section 02 41 16.01 (Structure Demolition)
- .4 Section 02 55 10 (Dust Control)

1.3 Measurement and Payment Procedures

- .1 Removal of existing asphalt pavement will be measured for payment by the tonne of asphalt material actually removed, to the limits shown on the Drawings or directed by the Departmental Representative, regardless of depth or thickness removed or number of operations required. Quantities will be computed to the nearest whole tonne. Removed asphalt will be measured for payment by weighing on accurately calibrated weigh scales furnished by and at the expense of the Contractor. The weigh scales shall be capable of printing a weight ticket including time, date, truck number, and weight. Weight tickets furnished by a public weigh-master will be acceptable. An accurately recorded tare weight of hauling equipment with operator shall be provided on each weight ticket.
- .2 Notwithstanding the stipulated method of measurement for removal of asphalt pavement, the Contractor shall perform Quality Control checks (and the Departmental Representative may, at its sole discretion, elect to perform parallel Quality Assurance checks) on the tonnage of asphalt pavement material as it leaves the EGD Waterlot on waterborne transport, by calculating weights in tonnes based upon barge freeboard measurements. The Contractor shall provide the Departmental Representative with marine surveyor-certified barge tonnage / displacement tables and shall jointly measure with the Departmental Representative the freeboard of the unloaded / loaded barge at all four corners of the deck. The barge shall not depart the site until all measurements are complete and agreed to by both parties. Freeboard measurement for calculation of tonnage will be the average of the four corner measurements. The resulting tonnage of asphalt pavement removed will only be used by the Contractor as a Quality

Control check on general progress of the asphalt pavement removal work, and by the Departmental Representative as a Quality Assurance check, not for payment purposes.

- .3 Payment for removal of existing asphalt pavement shall be at the unit prices tendered for ASPHALT PAVING REMOVAL: WEST TIMBER JETTY, ASPHALT PAVING REMOVAL: SOUTH TIMBER JETTY, and ASPHALT PAVING REMOVAL: MISCELLANEOUS FOR BURIED UTILITIES, respectively. Payment shall include all costs in connection with breakup, sorting, removing, hauling, stockpiling, and disposal of existing asphalt pavement to the limits shown on the Drawings.

1.4 Waste Management and Disposal

- .1 Separate waste materials for re-use and/or recycling in accordance with Section 01 74 19 (Waste Management and Disposal).
- .2 Divert unused asphalt materials from landfill to asphalt recycling facility or other authorized facility in accordance with the Laws and Regulations and as accepted by the Departmental Representative.

1.5 Definitions – Not Used

1.6 Submittals – Not Used

2. PART 2 – PRODUCTS – NOT USED

3. PART 3 – EXECUTION

3.1 Preparation

- .1 Prior to beginning removal operation, inspect and verify with Departmental Representative areas, depths and lines of asphalt pavement to be removed.
- .2 Square up adjacent surfaces to remain in place by saw cutting or other method approved by Departmental Representative.

3.2 Protection

- .1 Protect existing pavement not designated for removal, and light units and structures from damage. In event of damage, immediately replace or make repairs to approval of Departmental Representative at no additional cost.

3.3 Removal

- .1 Remove existing asphalt pavement to lines and grades as shown on the Drawings, except as otherwise established by Departmental Representative in the field.

- .2 Use equipment and methods of removal and hauling which do not damage or disturb underlying pavement or granular materials that are to remain in place.
- .3 Prevent contamination with base course aggregates, soil, or other materials when removing asphalt pavement for subsequent incorporation into hot mix asphalt concrete paving.
- .4 Provide for suppression of dust generated by removal process in accordance with Section 02 55 10 (Dust Control).

3.4 Stockpiling of Material

- .1 Dispose of removed asphalt pavement by stockpiling in locations designated by Departmental Representative.
- .2 Removed asphalt pavement which is to be recycled in hot mix asphalt concrete under this Contract may be stockpiled at designated asphalt plant site.

3.5 Sweeping

- .1 Sweep remaining asphalt pavement surfaces clean of debris resulting from removal operations using rotary power brooms and hand brooms as required.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section covers the demolition of existing timber jetty structures, mass concrete and reinforced concrete structures, and the disposal of debris arising from such demolition. Dismantling, extraction, and off-site disposal of steel bolting materials, miscellaneous steel materials, and attachments associated with the timber/concrete jetty structures to be demolished are also covered in this Section.
 - .1 Existing timber jetty structures and timber piled foundations to be demolished include: West Timber Jetty (including west timber-piled concrete crane pad), South Timber Jetty (including south timber-piled concrete crane pad), and East Approach Timber Structure, all as shown on the Drawings and as found in the field.
 - .2 Existing timber pilings to be demolished: miscellaneous timber piling remnants of previous wharf structures (that were removed circa 1985) within the under-pier areas of the EGD Work Site.
 - .3 Existing concrete structures to be demolished, or partially demolished, include: west/south timber-piled concrete crane pads, and a portion of the jetty deck slab at the high mast light foundation, as shown on the Drawings and as found in the field.
- .2 Re-use of salvaged timber components by modification and reinstallation for new usages as indicated on the Drawings (e.g., as fender piles, navigation marker piles or timber bull rail) is a Project requirement.
- .3 This Section also covers pre-construction condition inspections of adjacent structures to be performed by Contractor in advance of the start of any structure demolition work. Pre-construction condition inspections are to be performed for:
 - .1 the steel-piled deck structure (including pipe piles);
 - .2 the anchored sheet pile bulkhead wall (at north edge of steel-piled deck);
 - .3 the concrete faced timber crib (north of west portion of steel-piled deck);
 - .4 the small concrete L-wall (at east end of steel-piled deck);
 - .5 the steel sheet pile perimeter wall and its attachment to the timber jetty.
- .4 This Section also covers the dismantling, extraction and off-site disposal of existing timber fender piles and corner dolphin piles at the South Jetty, as shown on the Drawings and as found in the field. Dismantling, extraction, and off-site disposal of steel bolting materials, miscellaneous steel materials, and attachments at existing fender piles and corner dolphin piles are also covered in this Section.
- .5 This Section also covers the demolition, removal and off-site disposal of existing timber cutoff piles and collapsed steel sheet pile wall (both believed to date from

around 1925-1940) located underneath the steel-piled concrete deck structure, as shown on the Drawings and as found in the field. It is anticipated that these items will be removed during the under-pier dredging work; refer also to Section 35 20 23 (Dredging, Barge Dewatering and In-Water Transportation).

- .6 This Section also covers the demolition, removal and off-site disposal of existing timber support beams, timber chocks, timber step-over footboards, existing steel waler beams, deck connection brackets, and associated steel bolting and connection materials (all at the South Jetty sheet pile perimeter wall), as shown on the Drawings and as found in the field.
- .7 Storage, adaptation and re-use of salvaged steel waler beams for use as Temporary Support Walers for re-driven sheet pile wall at the Timber Crib, are covered under Section 05 50 00 (Metal Fabrications).
- .8 Re-driving of the sheet pile perimeter wall, and extraction and disposal (at completion of under-pier sediment remediation works) of the sheet pile perimeter wall, are covered under Section 31 62 17 (Steel Sheet Piling).
- .9 Storage and re-use of existing timber fender piles and corner dolphin piles in the work is covered under Section 31 62 19 (Timber Piling).
- .10 Dismantling, extraction, and off-site disposal of the existing fender log system (including chains, steel bolting materials, miscellaneous steel materials, and attachments) are covered under Section 02 41 13 (Selective Site Demolition).
- .11 Demolition and disposal (or handing over to the Departmental Representative for unspecified future uses, or salvage, storage and re-use) of jetty attachments and utilities is covered under Section 02 41 13 (Selective Site Demolition).
- .12 Demolition and disposal of asphalt pavement is covered under Section 02 41 13.14 (Asphalt Paving Removal).
- .13 Temporary removal and subsequent reinstatement (at new location) of the tug boat wharf is covered under Section 02 41 16.02 (Structure Relocation).
- .14 Dredging of marine sediments is covered under Section 35 20 23 (Dredging, Barge Dewatering, and In-Water Transportation).

1.2 Related Sections

- .1 Section 01 33 00 (Submittal Procedures)
- .2 Section 01 35 13.43 (Special Procedures for Contaminated Sites)
- .3 Section 01 35 33 (Health and Safety Requirements)
- .4 Section 01 35 43 (Environmental Procedures and Sustainability)
- .5 Section 01 74 19 (Waste Management and Disposal)
- .6 Section 02 41 13 (Selective Site Demolition)
- .7 Section 02 41 13.14 (Asphalt Paving Removal)

- .8 Section 02 41 16.02 (Structure Relocation)
- .9 Section 02 55 10 (Dust Control)
- .10 Section 05 50 00 (Metal Fabrications)
- .11 Section 31 62 17 (Steel Sheet Piling)
- .12 Section 31 62 19 (Timber Piling)
- .13 Section 35 20 23 (Dredging, Barge Dewatering, and In-Water Transportation)
- .14 Section 35 20 23.01 (Offloading, Upland Transportation and Disposal)

1.3 Measurement and Payment Procedures

- .1 Pre-construction condition inspections of adjacent structures (to be performed by the Contractor prior to the start of any structure demolition work), will not be measured individually. Pre-construction condition inspections of adjacent structures will be paid for at the Lump Sum price tendered for PRE-CONSTRUCTION CONDITION INSPECTIONS OF ADJACENT STRUCTURES. Payment shall be full compensation for all structural condition inspections, including reporting, as specified herein.
- .2 Dismantling, extraction, cleaning, and off-site disposal (except where re-use is specified) of timber fender piles and corner dolphin piles at the South Jetty, regardless of the method of extraction, will not be measured individually. Dismantling, extraction, cleaning, and off-site disposal (except where re-use is specified) of timber fender piles and corner dolphin piles at the South Jetty will be paid for at the Lump Sum prices tendered for STRUCTURE DEMOLITION: SOUTH JETTY FENDER PILES and STRUCTURE DEMOLITION: SOUTH JETTY CORNER DOLPHIN PILES, respectively. Payment shall be full compensation for dismantling, controlled extraction, and cleaning of timber piles from driven condition in seabed, transportation and disposal off-site to an accepted disposal facility (except where re-use is specified), including any environmental fees / levies and all work incidental thereto, of existing timber fender piles and corner dolphin piles, as specified and as shown on the Drawings.
- .3 Demolition, removal, and off-site disposal (except where re-use is specified) of existing timber support beams and timber chocks at the South Jetty will not be measured individually. Demolition, removal, and off-site disposal (except where re-use is specified) of existing timber support beams and timber chocks at the South Jetty will be paid for at the Lump Sum price tendered for STRUCTURE DEMOLITION: TIMBER PILE SUPPORT BEAMS AND CHOCKS (at Sheet Pile Wall). Payment shall be full compensation for demolition, removal, transportation, and disposal off-site to an accepted disposal facility (except where re-use is specified), including any environmental fees / levies and all work incidental thereto, of existing timber support beams and chocks (including timber step-over footboards), as specified and as shown on the Drawings.

- .4 Demolition, removal (except where temporary re-use is specified), and off-site disposal of existing steel waler beams and deck connections at the South Jetty will not be measured individually. Demolition, removal (except where temporary re-use is specified), and off-site disposal of existing steel waler beams and deck connections at the South Jetty will be paid for at the Lump Sum price tendered for **STRUCTURE DEMOLITION: STEEL WALER BEAMS** (at Sheet Pile Wall). Payment shall be full compensation for demolition, removal (except where temporary re-use is specified), transportation, and disposal off-site to an accepted disposal facility, including any environmental fees / levies and all work incidental thereto, of existing steel waler beams and deck connections, as specified and as shown on the Drawings. Deck connection brackets and bolts will not be paid for separately, but shall be included in the price for structure demolition of steel waler beams.
- .5 Demolition and disposal off-site, or salvaging, storage, and re-use in the work (or handing over to the Departmental Representative for unspecified future uses) of the wharf safety ladders, other jetty attachments, and utilities not covered by this Section or other Sections will be measured to Section 02 41 13 (Selective Site Demolition), and payment shall include all costs in connection with such work as specified in that Section.
- .6 Demolition of existing timber jetty structures, timber piled foundations, and miscellaneous timber pilings will be measured for payment by the tonne of timber demolished, to the limits shown on the Drawings or directed by the Departmental Representative. Quantities will be computed to the nearest whole tonne. Demolished timber elements (decking, beams, bracings, piles, etc., as found in the field) will be measured for payment by weighing on accurately calibrated weigh scales furnished by and at the expense of the Contractor. The weigh scales shall be capable of printing a weight ticket including time, date, truck number, and weight. Weight tickets furnished by a public weigh-master will be acceptable. An accurately recorded tare weight of hauling equipment with operator shall be provided on each weight ticket.
- .7 Notwithstanding the stipulated method of measurement for structure Demolition Debris, the Contractor shall perform Quality Control checks (and the Departmental Representative may, at its sole discretion, elect to perform parallel Quality Assurance checks) on the tonnage of structure Demolition Debris as it leaves the EGD Waterlot on waterborne transport, by calculating weights in tonnes based upon barge freeboard measurements. The Contractor shall provide the Departmental Representative with marine surveyor-certified barge tonnage / displacement tables and shall jointly measure with the Departmental Representative the freeboard of the unloaded / loaded barge at all four corners of the deck. The barge shall not depart the site until all measurements are complete and agreed to by both parties. Freeboard measurement for calculation of tonnage will be the average of the four corner measurements. The resulting tonnage of Demolition Debris will only be used by the Contractor as a Quality Control check on general progress of the Structure Demolition work, and by the Departmental Representative as a Quality Assurance check, not for payment purposes.

- .8 Demolition of existing timber jetty structures, timber piled foundations, and miscellaneous timber pilings, as described in this Section, and regardless of the method of demolition or the method of off-site disposal, will be paid for at the unit prices tendered for STRUCTURE DEMOLITION: WEST TIMBER JETTY and STRUCTURE DEMOLITION: SOUTH TIMBER JETTY, respectively. Payment shall include for all costs in connection with demolition, controlled extraction, and cleaning of timber piles from driven condition in seabed, and controlled breakup, sorting, transport, and disposal of the timber structures, as specified and as shown on the Drawings.
- .9 The line item for demolition of timber jetties in the Unit Price Table indicates, for convenience only, the in-place timber density that has been used to calculate the estimated tonnage from the neat line volume of timber structures.
- .10 Demolition, controlled extraction, cleaning, and off-site disposal of existing timber cutoff piles and collapsed steel sheet pile wall (located underneath the steel-piled concrete deck structure), as shown on the Drawings and as found in the field, will not be measured individually. Demolition, controlled extraction, cleaning, and off-site disposal of these timber cutoff piles and the collapsed sheet pile wall will be paid for at the Lump Sum price tendered for STRUCTURE DEMOLITION: TIMBER CUTOFF PILES AND COLLAPSED SHEET PILE WALL. Payment shall be full compensation for demolition, controlled extraction, cleaning, transportation, and disposal off-site of these items to an accepted disposal facility, including any environmental fees / levies and all work incidental thereto.
- .11 No separate measurement or payment will be made for incidental materials (such as bolts, steel brackets, connectors, etc) that are recovered during structure demolition.
- .12 Measurement for demolition of existing unreinforced and reinforced concrete structures will be calculated in cubic metres of concrete demolished, computed from field surveys of existing concrete surface (before demolition) and final concrete/substrate surface (after demolition), to demolition lines shown on the Drawings or as directed by the Departmental Representative.
- .13 Demolition of existing unreinforced and reinforced concrete structures, as described in this Section, and regardless of the method of demolition, will be paid for at the unit price tendered for STRUCTURE DEMOLITION: WEST JETTY CONCRETE CRANE PAD and STRUCTURE DEMOLITION: SOUTH JETTY CONCRETE CRANE PAD, respectively. Payment shall include all costs in connection with demolition, controlled breakup, sorting, transport, and disposal of the concrete structures, as specified and as shown on the Drawings.
- .14 Demolition, dismantling, extraction, sorting, transport, and off-site disposal of the steel bolting materials, reinforcing bars, screws, nails, tie-rods, through-bolts, threaded rod, anchor bolts, and other miscellaneous materials within and attached to the existing timber or concrete structures to be demolished will not be paid for

separately, but shall be included in the relevant prices of the work covered by this Section.

1.4 References

- .1 Canadian Standards Association (CSA):
 - .1 CAN/CSA S350-M1980 (R2003), Code of Practice for Safety in Demolition of Structures.
 - .2 CAN/CSA-A23.1, Concrete Materials and Methods of Concrete Construction.
- .2 National Building Code of Canada (NBCC), Part 8 - Safety Measures at Construction and Demolition Sites.
- .3 WorkSafeBC, Occupational Health & Safety Regulations.

1.5 Definitions – Not Used

1.6 Submittals

- .1 At least twenty-eight (28) days prior to commencing structure demolition work, and in accordance with Section 01 33 00 (Submittal Procedures), submit as part of the Construction Work Plan for review by the Departmental Representative, design, drawings, and supporting data prepared by qualified professional engineer registered or licensed in the Province of British Columbia showing the proposed method, sequencing of work, and product data for demolition, partial demolition, dismantling, extraction, disassembly, and off-site disposal of the designated timber, steel, and concrete structures. Include proposed cleaning procedure for under-deck catwalk, timber piles, timber cutoff piles, and collapsed sheet pile wall extracted from seabed.
- .2 Within the Construction Work Plan, provide specific information (including end-use) for any materials that are to be recycled and/or re-used by others, in lieu of off-site disposal, for Departmental Representative review and acceptance.
- .3 If the proposed method to extract existing driven timber piles and sheet piles from the seabed does not utilize a vibratory piling hammer (with timber pile clamp), then submit an alternative equivalent method for review by the Departmental Representative.
- .4 At least twenty-eight (28) days prior to start of structure demolition work, submit a detailed Waste Reduction Work Plan in accordance with Section 01 74 19 (Waste Management and Disposal) and indicate the following:
 - .1 Descriptions of types and anticipated quantities of materials to be salvaged, re-used, recycled, and land-filled.
 - .2 Names and addresses of haulers, waste facilities, and authorized waste receiving organizations.

- .5 At least seven (7) days prior to start of structure demolition work, submit for review by the Departmental Representative the pre-construction condition inspection report covering the following existing structures adjacent to the work:
 - .1 the steel-piled deck structure (including pipe piles);
 - .2 the anchored sheet pile bulkhead wall (at north edge of steel-piled deck);
 - .3 the concrete faced timber crib (north of west portion of steel-piled deck);
 - .4 the small concrete L-wall (at east end of steel-piled deck);
 - .5 the steel sheet pile perimeter wall and its attachment to the timber jetty.
 - .6 The pre-construction condition inspections shall be performed by, and the report shall be sealed by, a qualified professional engineer registered or licensed in the Province of British Columbia. The inspections and report shall include visual observations of the condition of the main structural components (e.g., pipe piles, sheet piles, beams, slabs, and walls) and their coating systems, representative photographs, and tables identifying areas of significant deterioration or physical damage. Once accepted by the Departmental Representative as an accurate representation of existing condition, this pre-construction condition inspection report will be used as a baseline reference in the event that any damage to existing adjacent structures within the EGD Work Site occurs during the work.
- .6 At least seven (7) days prior to start of structure demolition work, submit for review by the Departmental Representative proof of accurate calibration and certification of weigh scale facilities that will be used for measurement and payment of structure Demolition Debris.
- .7 The Contractor shall submit to the Departmental Representative copies of all manifests, weight tickets, and other documentation to demonstrate and track the final disposition of the structure Demolition Debris at a Disposal Facility(ies). The documentation shall track the Demolition Debris from the point of leaving the EGD Work Site to final disposal.

1.7 Site Conditions

- .1 Review environmental site information and the Environmental Management Plan (EMP) and take precautions to protect the environment.
- .2 For geotechnical investigation reports and other background data, refer to the Data Reports listed in the Specification Index. Review all Data Reports for information regarding composition and condition of structures to be demolished, and geotechnical conditions.
- .3 The Contractor shall inspect the work site to thoroughly familiarize itself with site conditions before starting structure demolition work.
- .4 Refer to the EGD Asbestos Management Plan and South Jetty Visual Assessment for Asbestos (included in an Appendix to the Specification) for known locations

where asbestos may be encountered. Should material resembling spray or trowel-applied asbestos or other designated substance listed as hazardous be encountered, stop work, take preventative measures, and notify the Departmental Representative immediately. Do not proceed until written instructions have been received from the Departmental Representative.

- .5 Notify the Departmental Representative before disrupting Esquimalt Graving Dock access or services.
- .6 The existing under-deck catwalk (designated to be removed during timber jetty demolition works), is in serviceable but contaminated condition. Contamination is primarily faeces from wildlife. The Contractor is to be aware of this condition and take all necessary precautions and care during the work. All contaminated portions of the under-deck catwalk are to be cleaned to remove the aforementioned contamination before disposal off-site. Decontamination / cleaning shall only occur in designated areas with appropriate containment, and all wastewater shall be contained and disposed of at an authorized Wastewater Treatment and Disposal Facility.

2. PART 2 – PRODUCTS

2.1 Equipment

- .1 Leave equipment and machinery running only while in use, except where extreme temperatures prohibit shutting down.
- .2 Demonstrate that tools and machinery are being used in manner that allows for salvage of materials in best condition possible.

3. PART 3 – EXECUTION

3.1 Preparation and Protection

- .1 Do work in accordance with Section 01 35 33 (Health and Safety Requirements).
- .2 Perform (and report on) pre-construction condition inspections of existing adjacent structures in advance of any structural demolition work, as described in Clause 1.6.4 of this Section.
- .3 Protection:
 - .1 Support affected structures and prevent movement, settlement, or damage to adjacent structures, utilities, and portions of structures to remain in place. Provide bracing, shoring, and underpinning as required.
 - .2 If safety of structure being disassembled or demolished (or adjacent structures and services) appears to be endangered, take preventative measures, cease operations, and immediately notify the Departmental Representative.

- .3 Prevent debris from blocking surface drainage, mechanical, and electrical systems.
- .4 Keep noise, dust, and inconvenience to occupants to a minimum and in accordance with Section 02 55 10 (Dust Control).
- .5 Protect dry dock cranes, caisson gates, electrical systems, services, and equipment.
- .6 Install and maintain temporary structural safety barricades and work site procedures throughout the demolition work, in accordance with WorkSafeBC requirements.
- .7 Provide temporary dust screens, covers, railings, supports, and other protection as required.
- .4 Locate and protect utility lines. Do not disrupt active or energized utilities designated to remain undisturbed.
- .5 Disconnect electrical, fibre optic, telephone, and communication service lines entering areas designated for demolition as shown on the Drawings.
- .6 Post warning signs on electrical lines and equipment that must remain energized to serve other dock equipment and services during period of demolition.
- .7 Disconnect, cap, and re-route designated mechanical services, as shown on the Drawings.
- .8 During all in-water and above-water demolition and pile extraction work, Environmental Protection shall comply with the requirements of Section 01 35 43 (Environmental Procedures and Sustainability) and the EMP/Water Quality Monitoring Plan (WQMP).
- .9 Protect existing structures (including steel pipe piles) from accidental damage during dredging operations, as stipulated in Section 35 20 23 (Dredging, Barge Dewatering, and In-Water Transportation).
- .10 Employ structural demolition methods that minimize or eliminate deposition of cementitious material, concrete debris, or concrete dust into the marine environment.
- .11 Do not allow buoyant items that have been demolished or detached from their original position (i.e., floating debris) to float beyond the EGD Work Site. Do not allow such floating debris to cause any hindrance or obstacle to marine traffic and EGD dry dock operations. Identify and collect such floating debris, and dispose in accordance with the Specifications.
- .12 Provide temporary fender protection along the waterside (exposed face) of the existing timber crib and steel-piled concrete deck structures to protect those structures from abrasion or impact damage caused by the Contractor's floating construction equipment, tugboats, or by other construction activities. The temporary fender protection shall comprise timber or rubber fender units, or combination thereof, to the Departmental Representative's satisfaction, and shall

remain in place until re-installation of the timber fender piles has been completed in that area of the work.

3.2 Demolition and Salvage

- .1 Demolish and remove existing timber, steel, and concrete structures; portions of existing structures; attachments; and utilities as shown on the Drawings, to permit new construction.
- .2 Except where an equivalent alternative method has been submitted and accepted by the Departmental Representative, use vibratory piling hammer (with timber pile clamp or sheet pile clamp) to extract existing driven timber piles and sheet piles from the seabed.
- .3 Extract, dismantle, and store existing timber piles ready for off-site disposal, as shown on the Drawings.
- .4 Use all practicable means to extract timber piles intact. Extract timber piles carefully, to maximize the number and length of intact piles that are removed from the site, and to minimize pile breakage and/or debris on the seabed caused by the pile extraction process.
- .5 Where existing timber piles for extraction are located underneath concrete deck structures, and all practicable means to extract those timber piles intact have been used, then the Departmental Representative will accept controlled cutoff of those timber piles with extraction and removal of the cut off portion. All pile remnants left in place are to be documented and location shown on the Record Drawings.
- .6 In the event that pile breakage occurs during extraction of timber piles from the seabed, make all reasonable efforts to extract the broken portion of the pile(s). In the event that extraction of broken portion is impractical (e.g., remnant is below mud-line), then report such occurrence to the Departmental Representative in writing, and await direction from the Departmental Representative.
- .7 Demolish portions of existing timber structures only as shown on the Drawings.
- .8 Prevent debris, dust, and any sediment-laden waters from entering any drainage system, water course, or marine environment in line with EGD Environmental Best Management Practices (EBMPs), specifically EBMPs No. 17 and 18.
- .9 Verify that selective demolition work does not adversely affect adjacent watercourses, groundwater, and wildlife, or contribute to excess air and noise pollution.
- .10 Do not dispose of waste or volatile materials, including but not limited to, mineral spirits, oil, petroleum-based lubricants, or toxic cleaning solutions into watercourses, storm sewers, or sanitary sewers.
- .11 During timber demolition work, recover and dispose of steel bolting materials, screws, nails, tie-rods, through-bolts, threaded rod, anchor bolts, and other miscellaneous materials within the affected timber structures.

- .12 Sort materials into appropriate piles for re-use and/or recycling.
- .13 Blasting or other explosive methods shall not be used to assist in demolition of structures.
- .14 Refer to the Drawings and Specifications for attachments and utilities to be disposed, or salvaged for re-use or for handing over to the Departmental Representative. Remove attachments and utilities to be salvaged, store as directed by the Departmental Representative, and re-install under appropriate Section of the Specifications where re-use is indicated.
- .15 During concrete demolition work, recover and dispose of miscellaneous reinforcing bars, formwork ties, tie-rods, through-bolts, threaded rod, anchor bolts, and miscellaneous materials within the existing concrete structures.

3.3 Disassembly and Demolition Procedures

- .1 Except where salvage and re-use in the work is specified, the Contractor becomes the owner of, and is responsible for, any soil, sediment, debris, waste, timber jetty components designated for demolition, or other material (including material that the Contractor identifies for recycling and/or re-use in lieu of off-site disposal) once it is removed, dredged, or excavated to be loaded onto a vehicle, barge, or other vessel for transport to a Contractor Off-Site Offload Facility, Disposal Facility, Treatment Facility, Hazardous Waste Management Facility, or other recycling/re-use facility.
- .2 Throughout course of disassembly and demolition, pay close attention to connections and material assemblies. Employ workmanship procedures that minimize damage to materials and equipment.
- .3 Verify that workers and subcontractors are trained to carry out work in accordance with appropriate demolition techniques.
- .4 A project supervisor with previous demolition experience must be present on site throughout demolition work.
- .5 Carry out demolition in accordance with CAN/CSA S350 and other applicable safety standards and Laws and Regulations.
- .6 Workers must utilize adequate fall protection as required by WorkSafeBC.
- .7 Verify that the sequence of disassembly and demolition is such that structural integrity is maintained and that collapse of the structure is prevented. Verify that all workers are aware of critical supports, both existing and temporary.
- .8 Remove and store materials to be salvaged, in manner to prevent damage.
- .9 Store and protect in accordance with requirements for maximum preservation of material.
- .10 Handle salvaged materials as new materials.
- .11 Source separate for recycling materials that cannot be salvaged for re-use including wood, metal, concrete, and asphalt.

- .12 Where existing materials are to be re-used in the work, use special care in removal, handling, storage, and re-installation to ensure proper function in completed work.
- .13 Trim faces and edges of partially demolished structural elements to tolerances shown on the Drawings.

3.4 Processing

- .1 Designate location for processing of materials that eliminates double handling (except where specified otherwise) and provides adequate space to maintain efficient material flow.
- .2 De-nail, strip, and separate materials to ensure best possible condition of salvaged materials.
- .3 Keep processing area clean and free of excess debris.
- .4 Supply separate, marked disposal bins for categories of waste material.
- .5 Separate demolition waste materials for re-use and/or recycling, in accordance with Section 01 74 19 (Waste Management and Disposal).
- .6 Separate processed materials into organized piles for stockpiling. Provide a collection area for materials processed and designated for alternate disposal. Pile miscellaneous materials on pallets to facilitate off-site transport.

3.5 Cleaning of Extracted Timber Piles

- .1 After extraction of timber piles, clean off all sediment and other objects that are attached to the surface of the piles.
 - .1 Handle, store, and transport the extracted timber piles in the same manner as contaminated sediment prior to cleaning the timber piles.
 - .2 Prevent the removed sediment or other removed objects from entering the marine environment outside of the TRBCA, and comply with water quality criteria of the EMP/WQMP during extraction, transport, and cleaning of the extracted timber piles.
 - .3 All sediment and other objects that were cleaned off the surface of the timber piles shall be managed for disposal in accordance with Section 35 20 23 (Dredging, Barge Dewatering, and In-Water Transportation) and Section 35 20 23.01 (Offloading, Upland Transportation and Disposal).
 - .4 Prevent removed sediment or other removed objects from re-contaminating areas where Required Dredging or Engineered Capping is in process or has been completed.

3.6 Stockpiling

- .1 Label stockpiles, indicating material type and quantity.
- .2 Designate appropriate security resources/measures to prevent vandalism, damage, and theft.
- .3 For salvaged attachments and utilities that are to be re-used in the work, locate stockpiled materials convenient for use in new construction. Eliminate double-handling wherever possible.
- .4 Stockpile materials that are designated for alternate disposal in a location that facilitates removal from site and examination by potential end markets, and that does not impede disassembly, processing, or hauling procedures.
- .5 Stockpile materials shall be contained and filtered to eliminate particle transfer into the marine environment.

3.7 Removal from Site and Disposal

- .1 Remove from the EGD Work Site all Demolition Debris that is not required or specified for re-use in the work.
- .2 Except where re-use of timber materials in the work is required or specified, transport all structure Demolition Debris off site from the EGD Facility only by waterborne transport. Do not use trucks to transport Demolition Debris from the EGD Facility.
- .3 Dispose of removed materials, including creosoted or treated timber components, to appropriate authorized disposal, recycling, or re-use facilities in Canada except where specified otherwise, in accordance with Laws and Regulations.
- .4 Transport material designated for disposal by approved haulers to receiving organizations listed in the Waste Reduction Work Plan and in accordance with Laws and Regulations. Do not deviate from haulers and receiving organizations listed in the Waste Reduction Work Plan without prior written authorization from the Departmental Representative.

3.8 Cleaning and Restoration

- .1 Keep site clean and organized throughout demolition procedure.
- .2 Upon completion of project, remove debris, trim surfaces, and leave work site clean.
- .3 Use cleaning solutions and procedures that are not harmful to health, are not injurious to plants, and do not endanger wildlife or that marine environment.
- .4 Repair damage to adjacent structures and utilities caused by disassembly or demolition of structures in the work, as directed by the Departmental Representative.

- .5 Upon completion of the project, reinstate adjacent jetty apron pavement areas affected by the work to the condition that existed prior to beginning work, and match the condition of adjacent, undisturbed areas.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section covers disconnection, any temporary relocation for the Contractor's own purpose, storage, and reinstallation of the timber tug boat wharf, including the wharf locator piles and access gangway (to a new location as described on the Drawings), to facilitate marine dredging works as shown on the Drawings and as described in the Specifications. The work also includes disconnection and subsequent reconnection of affected utilities at the tug boat wharf.
- .2 Extraction and disposal of timber fender piles and corner dolphin piles at the South Jetty are covered under Section 02 41 16.01 (Structure Demolition).
- .3 Storage and subsequent re-installation of existing timber fender piles and corner dolphin piles designated for re-use in the work are covered under Section 31 62 19 (Timber Piling).
- .4 Construction execution aspects for extraction and subsequent reinstallation of steel pipe piles at the tug boat wharf is covered under Section 31 61 13 (Pile Foundations General Requirements).
- .5 Demolition, salvage, and disposal off-site of miscellaneous items designated to be disposed off-site are covered under Section 02 41 13 (Selective Site Demolition).

1.2 Related Sections

- .1 Section 01 11 55 (General Instructions)
- .2 Section 01 33 00 (Submittal Procedures)
- .3 Section 01 35 13.43 (Special Procedures for Contaminated Sites)
- .4 Section 01 35 33 (Health and Safety Requirements)
- .5 Section 01 35 43 (Environmental Procedures and Sustainability)
- .6 Section 01 74 11 (Cleaning)
- .7 Section 01 74 19 (Waste Management and Disposal)
- .8 Section 02 41 13 (Selective Site Demolition)
- .9 Section 02 41 16.01 (Structure Demolition)
- .10 Section 02 55 10 (Dust Control)
- .11 Section 31 61 13 (Pile Foundations General Requirements)
- .12 Section 31 62 19 (Timber Piling)

1.3 Measurement and Payment Procedures

- .1 Disconnection, any temporary relocation for the Contractor's own purpose, storage, and reinstallation of the timber tug boat wharf including the wharf locator piles and access gangway will not be measured individually. Disconnection, any temporary relocation for the Contractor's own purpose, storage, and reinstallation of the timber tug boat wharf including the wharf locator piles and access gangway as specified and as shown on the Drawings will be paid for at the Lump Sum prices tendered for STRUCTURE RELOCATION, for each discrete relocation activity as listed below:
 - .1 STRUCTURE RELOCATION: DISCONNECT AND STORE TUG BOAT WHARF (includes any temporary relocation for the Contractor's own purpose).
 - .2 STRUCTURE RELOCATION: REINSTALL TUG BOAT WHARF.

Payment shall be full compensation for disconnection of affected structures, disconnection and subsequent reconnection of affected utilities on floating marine structures, any temporary relocation for the Contractor's own purpose, storage, and reinstallation of the affected structures, all as specified and as shown on the Drawings.

- .2 Payment under Clause 1.3.1 shall also cover the protection and safeguarding of the existing tug boat wharf from environmental effects (wind and wave attack) throughout the period during which the tug boat wharf is removed from its existing position, as described in this Section of the Specifications.

1.4 Definitions

- .1 Refer to Section 01 11 55 (General Instructions) for all definitions related to the Contract.

1.5 Submittals

- .1 As part of the detailed Construction Work Plan, and in accordance with Section 01 33 00 (Submittal Procedures), the Contractor shall prepare a section that describes the method and procedures for structure relocation. Structure relocation activities shall not begin until: 1) the Construction Work Plan has been reviewed and accepted by the Departmental Representative; and 2) other notifications and review have been completed as necessitated by the permits or other requirements of the Contract. At a minimum, the method and procedures for relocation of designated structures shall contain the following information:
 - .1 Order and sequence in which the structure relocation work is to be performed, including a description of equipment to be used and methods of operation.
 - .2 Identify timing and sequencing of structure relocation activities at the South Jetty (that will meet the marine access requirements of the EGD

- Facility), as they relate to other major elements of the work, and integration with the overall construction schedule.
- .3 Identify any temporary relocation of the tug boat wharf for the Contractor's own purpose, with full description of temporary location and function.
 - .4 Proposed method of protection and safeguarding of the existing tug boat wharf from environmental effects (wind and wave attack) throughout the period starting when the tug boat wharf is removed from its existing position and continuing until it is reinstalled in its new location as described on the Drawings.
 - .5 Methods, procedures, and equipment to be utilized for structure relocation work.
 - .6 Methods and procedures for providing environmental protection throughout the structure relocation work.
- .2 The Contractor shall allow a minimum of five (5) working days for the Departmental Representative to review the Construction Work Plan, prior to start of structure relocation activities.

1.6 References

- .1 CAN/CSA-S350-M1980 (R2003), Code of Practice for Safety in Demolition of Structures.
- .2 Occupational Health and Safety Regulations, WorkSafeBC.
- .3 National Building Code of Canada (NBCC), Part 8 - Safety Measures at Construction and Demolition Sites.

1.7 EGD Work Site Conditions

- .1 Inspect the EGD Work Site thoroughly and verify EGD Work Site conditions before starting structure relocation work.
- .2 Review environmental site information and the Environmental Management Plan (EMP) and take precautions to protect environment.
- .3 For geotechnical investigation reports, dive inspection reports and other background data, refer to the Data Reports listed in the Specification Index. Review all Data Reports and Reference Drawings for information regarding composition and condition of structures to be relocated, and geotechnical conditions.
- .4 Should material resembling spray or trowel-applied asbestos or other designated substance listed as hazardous be encountered, stop work, take preventative measures, and notify the Departmental Representative immediately. Do not proceed until written instructions have been received from the Departmental Representative.

2. PART 2 – PRODUCTS – NOT USED

3. PART 3 – EXECUTION

3.1 Preparation and Protection

- .1 Notify the Departmental Representative a minimum of five (5) working days before start of structure relocation activities. No structure relocation work shall commence until the Departmental Representative has reviewed and accepted the Contractor's Construction Work Plan. Schedule work in conformance with the sequencing requirements of the Specifications.
- .2 Inspect the site with the Departmental Representative to verify the extent and location of structures designated for relocation.
- .3 Leave equipment and machinery running only while in use, except where extreme temperatures prohibit shutting down.
- .4 Demonstrate that tools and machinery are being used in a manner that minimizes potential damage to structures that are to be relocated.
- .5 Support affected structures and prevent movement, settlement, or damage to adjacent structures, utilities, and portions of structures to remain in place. Provide bracing, shoring, and underpinning as required.
- .6 If the safety of a structure being relocated (or adjacent structures and services) appears to be endangered, take preventative measures, cease operations, and immediately notify the Departmental Representative.
- .7 Prevent Demolition Debris from blocking surface drainage, mechanical, and electrical systems.
- .8 Keep noise, dust, and inconvenience to EGD occupants and users to a minimum, and in accordance with Section 01 35 13.43 (Special Procedures for Contaminated Sites), Section 01 35 43 (Environmental Procedures and Sustainability), and Section 02 55 10 (Dust Control).
- .9 Protect dry dock cranes, caisson gates, electrical systems, services, and equipment.
- .10 Install and maintain temporary structural safety barricades and EGD Work Site procedures throughout the structure relocation work, in accordance with WorkSafeBC requirements.
- .11 Provide temporary dust screens, covers, railings, supports, and other protection as required.
- .12 Locate and protect utility lines. Do not disrupt active or energized utilities designated to remain undisturbed.
- .13 The Contractor shall be responsible for coordination, through the Departmental Representative, with the appropriate parties regarding identification of active utility lines prior to the start of structure relocation work. Unless stipulated

- otherwise on the Drawings, the Contractor shall be responsible for disconnection and reconnection of all active utility lines as necessary for the work. Do not damage any active or disconnected utility line during the work.
- .14 Post warning signs on electrical lines and equipment that must remain energized to serve other dock equipment and services during period of structure relocation.
 - .15 Protect and safeguard the existing tug boat wharf from environmental effects (wind and wave attack) throughout the period starting when the tug boat wharf is removed from its existing position and continuing until it is reinstalled in its new location as described on the Drawings.
 - .16 During all in-water dismantling work, Environmental Protection shall comply with the requirements of Section 01 35 43 (Environmental Procedures and Sustainability), Section 01 35 13.43 (Special Procedures for Contaminated Sites), the EMP, and the Environmental Protection Plan (EPP).
 - .17 Do not allow buoyant items that have been disconnected or detached from their original position (i.e., floating Demolition Debris) to float beyond the EGD Work Site. Do not allow floating Demolition Debris to cause any hindrance or obstacle to marine traffic and EGD dry dock operations. Identify and collect floating Demolition Debris on a daily basis, and dispose in accordance with the Specification.

3.2 Structure Disconnection, Relocation, Temporary Use and Storage

- .1 Disconnect and relocate the tug boat wharf (including the access gangway and locator piles), as described on the Drawings, all in accordance with the methods and procedures described in the Construction Work Plan.
- .2 Prior to disconnecting structures identified for relocation, survey the affected structures and prepare a dimensioned scale drawing for each structure to show location, general arrangement with key dimensions, locator pile type / diameter / length / seabed embedment / positions, safety ladders, lights, utilities, and miscellaneous attachments. Identify and mark all existing connection details and utility hook-up details. Submit the aforementioned drawing to the Departmental Representative for review and as the record of pre-existing conditions. Do not disconnect structures for relocation until the aforementioned drawing has been submitted to and accepted as complete by the Departmental Representative.
- .3 Relocate all structures identified for relocation and attachments including locator piles, floats, marine fenders, safety ladders, lights, utilities, and miscellaneous attachments in a manner to prevent damage, at the locations designated by the Departmental Representative and as shown on the Drawings.
- .4 Store and protect all relocated or stored structures and components so as to ensure their preservation and their structural integrity.
- .5 If, after removal from its initial position, the Contractor uses the tug boat wharf for its own purpose (before subsequent relocation to the required final position), the Contractor is responsible for protecting the tug boat wharf and all components

from damage arising from such temporary use. The Contractor is responsible for any damage that occurs to the tug boat wharf and all components arising from such temporary use.

- .6 Any temporary relocation of the tug boat wharf for the Contractor's own purpose, shall be solely within the EGD Work Site.
- .7 Do not disturb or damage items designated to remain in place.

3.3 Structure Reinstallation and Sequencing of Work

- .1 Reinstall structures to the designated location as shown on the Drawings, and to pre-existing operational condition.
- .2 Reinstall the South Jetty tug boat wharf, sequence as follows:
 - .1 Temporarily secure the timber tug boat wharf in its designated location.
 - .2 Reinstall the steel locator piles per existing details, and as shown on the Drawings, all in accordance with Section 31 61 13 (Pile Foundations General Requirements).
 - .3 Reinstall and reconnect the gangway.
 - .4 Reinstall electrical service (connect to re-routed electrical service).
- .3 The Contractor shall reinstall all relocated structures so that they maintain their original use and function (albeit in new location).
- .4 The Contractor shall be responsible for any damage that occurs to the structures designated for relocation throughout the disconnection, relocation, storage, and reinstallation work.
- .5 The Contractor and the Departmental Representative shall jointly inspect all relocated structures following reinstallation and reconnection of utilities, to confirm adherence to the requirements of the Specification.

3.4 Cleaning and Restoration

- .1 Conduct EGD Work Site restoration activities in accordance with Section 01 74 11 (Cleaning).
- .2 Keep EGD Work Site clean and organized throughout structure relocation work.
- .3 Upon completion of the work, remove debris, and leave work EGD Work Site clean.
- .4 Repair damage to adjacent structures and utilities caused by disconnection, relocation or reinstallation of structures in the work, as directed by the Departmental Representative.

3.5 Acceptance of the Work

- .1 Notify the Departmental Representative following completion of the structure relocation work.
- .2 The Departmental Representative will inspect the work and provide acceptance, or require the Contractor to perform additional work in order to complete the structure relocation work as described in the Contract documents.
- .3 Do not demobilize from the project site prior to Departmental Representative acceptance of the work.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section specifies requirements for dust control for the duration of the project.

1.2 Related Sections

- .1 Section 02 41 13 (Selective Site Demolition)
- .2 Section 02 41 13.14 (Asphalt Paving Removal)
- .3 Section 02 41 16.01 (Structure Demolition)
- .4 Section 31 23 10 (Excavating, Trenching and Backfilling)
- .5 Section 31 24 15 (General Fill)

1.3 Measurement and Payment Procedures

- .1 Supply and application of water for dust control is considered incidental to the work and will not be measured separately.
- .2 Supply, installation, relocation as necessary, and final removal of dust screens for dust control is considered incidental to the work and will not be measured separately.
- .3 No measurement or payment will be made under this Section.

1.4 References – Not Used

1.5 Definitions – Not Used

1.6 Submittals – Not Used

2. PART 2 – PRODUCTS

2.1 Materials

- .1 Water: to Departmental Representative's approval.
- .2 Dust Screens: to Departmental Representative's approval.

3. PART 3 – EXECUTION

3.1 Application

- .1 Ensure that dust arising from all Contractor operations, such as barge or truck transportation, material stockpiling and demolition work, is controlled by water application and use of dust screens.

- .2 Ensure that dust blown from the Work does not affect adjacent facilities.
- .3 Apply water as required for dust control, and when directed by Departmental Representative. Dust control methods shall be chosen such that a minimal amount of water required.
- .4 Apply water with distributors equipped with spray system to ensure uniform application and with means of shut off.
- .5 Runoff from water used for dust control shall not enter the storm drains or run directly or indirectly into the marine environment.
- .6 Provide temporary dust tight screens or partitions to localize dust generating activities, and for protection of workers, finished areas of work, and public.
- .7 Maintain, relocate as necessary, and remove dust screens at completion of those portions of the work that may generate airborne dust.
- .8 Secure and cover material in open trucks hauling excavated material, and re-use the covers.
- .9 If Contractor's dust and particulate control is not sufficient for controlling dusts and particulates into atmosphere, stop work. Discuss, with Departmental Representative, procedures to resolve the problem. Make necessary changes to operations prior to resuming excavation, handling, processing, or other work that may cause release of dusts or particulates.
- .10 Take extra precautions, when necessary, to ensure that dust control measures are adequate during hot and dry weather, if there are strong winds, or if sediment is stockpiled overnight.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section covers formwork for all concrete components of the work.

1.2 Related Sections

- .1 Section 03 20 00 (Concrete Reinforcing)
- .2 Section 03 30 00 (Cast-in-Place Concrete)
- .3 Section 03 39 00 (In-Situ Concrete Structures)

1.3 Measurement and Payment Procedures

- .1 No measurement or payment will be made under this Section. All work performed to satisfy the requirements of this Section shall be paid under sections for which concrete formwork, falsework, and accessories are required.

1.4 References

- .1 ANSI/ACI-347, Concrete Formwork, Recommended Practice for.
- .2 ASTM A760/A760M-01a, Standard Specification for Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains.
- .3 CAN/CSA G401-01, Corrugated Steel Pipe Products.
- .4 CAN/CSA-A23.1-M, Concrete Materials and Methods of Concrete Construction.
- .5 CAN3-O86-M, Engineering Design in Wood (Working Stress Design).
- .6 CAN3-O86.1-M, Engineering Design in Wood (Limit States Design).
- .7 CAN3-O86.1S1, Supplement No. 1 to CAN3-O86.1-M Engineering Design in Wood (Limit States Design).
- .8 CAN3-O86 S1, Supplement No. 1 to CAN3-O86-M, Engineering Design in Wood (Working Stress Design).
- .9 CSA O121-M, Douglas Fir Plywood.
- .10 CSA-S269.1-1975 (R2003), Falsework for Construction Purposes.
- .11 CSA-S269.2-M87 (R2003), Access Scaffolding for Construction Purposes.
- .12 CSA-S269.3-M92 (R2003), Concrete Formwork.
- .13 CSA O151-M, Canadian Softwood Plywood.

1.5 Definitions - Not Used

1.6 Submittals - Not Used

2. PART 2 – PRODUCTS

2.1 Materials

- .1 Formwork lumber: plywood and wood formwork materials to CAN3-O86.1, CAN3-O86.1S1.
- .2 Falsework materials: to CSA S269.1.
- .3 Form ties: removable or snap-off metal ties, fixed or adjustable length, free of tie devices leaving holes larger than 25 mm dia in concrete surface. The portion which remains embedded in the concrete shall have a minimum cover of 50 mm after patching.
- .4 Form release agent: chemically active release agents containing compounds that react with free lime present in concrete to provide water insoluble soaps, preventing concrete from sticking to forms.
- .5 Form stripping agent: colourless mineral oil, free of kerosene, with viscosity between 70 and 110 s Saybolt Universal 15 to 24 mm²/S at 40° C, flashpoint minimum 150° C, open cup.

3. PART 2 – EXECUTION

3.1 Erection

- .1 Verify lines, levels and plumb walls before proceeding with formwork and ensure dimensions agree with drawings.
- .2 Obtain Departmental Representative's approval for use of earth forms.
- .3 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.
- .4 Construct falsework in accordance with CSA S269.1.
- .5 Construct forms to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CAN/CSA-A23.1.
- .6 Obtain Departmental Representative's permission before framing openings not indicated in concrete joists, beams, or columns.
- .7 Align form joints and make watertight. Keep form joints to minimum.
- .8 Use 25 mm chamfer strips on external corners of beams, joints, and columns, except where indicated otherwise on the Drawings.
- .9 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.
- .10 Line forms for the following surfaces:
 - .1 All faces of precast concrete elements that will not receive subsequent cast-in-place concrete;

- .2 Internal faces of utilidor and access openings;
- .3 Exposed faces of jetty deck slab and bull rail;
- .4 Exposed faces of closure pours; and,
- .5 Exposed faces of retaining walls.
- .11 Do not stagger joints of form lining material. Align joints to obtain uniform pattern.
- .12 Clean formwork in accordance with CAN/CSA-A23.1, before placing concrete.
- .13 Re-use of formwork and falsework is subject to requirements of CAN/CSA-A23.1.
- .14 Slip-forming methods shall not be used.
- .15 Formwork and falsework shall be designed and fabricated in accordance with WorkSafeBC regulations.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section covers the provision and installation of reinforcement for all concrete components of the work.

1.2 Related Sections

- .1 Section 01 33 00 (Submittal Procedures)
- .2 Section 03 30 00 (Cast-in-Place Concrete)
- .3 Section 03 39 00 (In-Situ Concrete Structures)

1.3 Measurement and Payment Procedures

- .1 No measurement or payment will be made under this Section. Include reinforcement costs in items of concrete work in Section 03 39 00 (In-Situ Concrete Structures), as relevant to the item of concrete work.
- .2 Payment for reinforcing steel (paid under the relevant concrete items per Clause 1.3.1) shall include for all costs in connection with detailing, fabricating, supplying, and installing reinforcing steel, including supporting materials, spacers, ties, inserts for dowels, and additional splices not shown on the Contract Drawings.

1.4 References

- .1 Canadian Standards Association (CSA):
 - .1 CAN/CSA-A23.1, Concrete Materials and Methods of Concrete Construction.
 - .2 CAN/CSA-S6-06, Canadian Highway Bridge Design Code.
 - .3 CSA-G30.3, Cold Drawn Steel Tie Wire for Concrete Reinforcement.
 - .4 CSA-G30.5, Welded Steel Wire Fabric for Concrete Reinforcement.
 - .5 CSA-G30.14, Deformed Steel Wire for Concrete Reinforcement.
 - .6 CSA-G30.15, Welded Deformed Steel Wire Fabric for Concrete Reinforcement.
 - .7 CAN/CSA-G30.18, Billet-Steel Bars for Concrete Reinforcement.
 - .8 CAN/CSA-G40.21, Structural Quality Steels.
 - .9 CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .10 CSA W186, Welding of Reinforcing Bars in Reinforced Concrete Construction.

- .2 Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.
- .3 American National Standards Institute/American Concrete Institute: ANSI/ACI 315, Details and Detailing of Concrete Reinforcement.

1.5 Definitions – Not Used

1.6 Submittals

- .1 Submit shop drawings, including placement of reinforcement, in accordance with Section 01 33 00 (Submittal Procedures).
- .2 Shop drawings shall consist of bar bending details, bar schedules and placing drawings. Bar schedules shall detail each type of bar and provide a total weight, computed from the theoretical mass specified in CAN/CSA-G30.18.
- .3 Indicate on shop drawings, bar bending details, lists, quantities of reinforcement, sizes, spacings, type of reinforcement (uncoated), locations of reinforcement and splices, and mechanical splices if approved by Departmental Representative, with identifying code marks to permit correct placement without reference to structural drawings. Prepare reinforcement drawings in accordance with the Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.
- .4 Detail lap lengths and bar development lengths to CAN/CSA-S6-06 (Canadian Highway Bridge Design Code), unless indicated otherwise.

2. PART 2 – PRODUCTS

2.1 Materials

- .1 Substitution of bar sizes, spacing, and splice locations may be made only if permitted in writing by Departmental Representative.
- .2 Provide materials free of loose rust, mill scale, or oil coating that may reduce concrete bond.
- .3 Reinforcing steel: uncoated billet steel (also termed “black bar”), grade 400, deformed bars to CAN/CSA-G30.18, unless indicated otherwise.
- .4 Weldable reinforcing steel: uncoated weldable low alloy steel deformed bars to CAN/CSA-G30.18.
- .5 Plain round bars: to CAN/CSA-G40.21.
- .6 Tie wires to tie uncoated reinforcing steel: cold-drawn annealed steel wire ties, 16-gauge minimum black annealed wire, to CSA-G30.3.
- .7 Deformed steel wire for concrete reinforcement: to CSA-G30.14.
- .8 Welded steel wire fabric: to CSA-G30.5. Provide in flat sheets only.
- .9 Welded deformed steel wire fabric: to CSA-G30.15. Provide in flat sheets only.

- .10 Chairs, bolsters, bar supports, spacers: acceptable non-metallic material in accordance with CAN/CSA-A23.1. Concrete chairs shall not be used to support stainless steel reinforcing bars.
- .11 Mechanical couplers for reinforcing bars: subject to approval of Departmental Representative.

2.2 Detailing and Fabrication

- .1 Fabricate reinforcing steel in accordance with CAN/CSA-A23.1, ANSI/ACI 315, and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.
- .2 Reinforcement splices shall be located as detailed on the reviewed placing drawings. Obtain Departmental Representative's approval for locations of reinforcement splices other than those shown on reviewed placing drawings.
- .3 Provide lap splice lengths, standard hooks and bar development lengths to CAN/CSA-S6-06 (Canadian Highway Bridge Design Code), unless indicated otherwise. All reinforcing bar embedments shall be treated as tension embedments, and all lap splices shall be treated as Class B tension lap splices to CAN/CSA-S6-06, unless indicated otherwise. The smaller bar shall govern the splice length, except for angled splices.
- .4 Mechanical couplers for reinforcing bars may be used subject to approval of Departmental Representative, and shall develop not less than 120 % of the minimum yield strength of the bar.
- .5 Welding of reinforcement is not permitted without written approval of Departmental Representative. If welding is approved by Departmental Representative, weld reinforcement in accordance with CSA-W186.
- .6 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

2.3 Source Quality Control

- .1 All steel incorporated in the work shall be identified by heat number.
- .2 Provide Departmental Representative with certified copy of mill test report for each lot of reinforcing steel, showing physical and chemical analysis, prior to fabrication.
- .3 Upon request, inform Departmental Representative of proposed source of material to be supplied.

3. PART 3 – EXECUTION

3.1 Field Bending

- .1 Do not field bend reinforcement except where indicated or authorized in writing by Departmental Representative. When field bending is authorized, bend without heat, applying a slow and steady pressure.
- .2 Replace bars which develop cracks or splits, or exhibit excessive surface contamination.

3.2 Field Welding

- .1 Do not field weld reinforcement except where indicated or authorized in writing by Departmental Representative. When field welding is authorized by Departmental Representative, weld reinforcement in accordance with CSA-W186.

3.3 Handling and Storage

- .1 Reinforcing steel shall be handled and stored at all times so that damage, surface contamination, and loss of identification tags are avoided.

3.4 Placing Reinforcement

- .1 Place reinforcing steel as indicated on reviewed placing drawings and in accordance with CAN/CSA-A23.1.
- .2 Use plain round bars, where indicated on the Drawings, as slip dowels in concrete. Paint portion of dowel intended to move within hardened concrete with one coat of asphalt paint. When paint is dry, apply an even film of mineral lubricating grease. Align bars for intended movement within hardened concrete.
- .3 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing steel and placement.
- .4 Ensure cover to reinforcement is maintained during concrete pour.
- .5 Deviation from placement, such as for construction access, to be noted and submitted to Departmental Representative for review not less than fourteen (14) days prior to construction.

3.5 Field Touch-Up and Remediation

- .1 Where reinforcing bars project temporarily from concrete structures already cast, protect the exposed bar portions from corrosion until subsequent concrete is placed.
- .2 Prior to placing concrete, clean off loose rust, mill scale or oil coating which may reduce concrete bond.
- .3 Prior to placing concrete, clean off salt deposits from surface of reinforcing bars.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section covers the supply of concrete for all components of the work.

1.2 Related Sections

- .1 Section 01 33 00 (Submittal Procedures)
- .2 Section 03 10 00 (Concrete Forming and Accessories)
- .3 Section 03 20 00 (Concrete Reinforcing)
- .4 Section 03 39 00 (In-Situ Concrete Structures)
- .5 Section 04 05 12 (Grout)
- .6 Section 05 50 00 (Metal Fabrications)
- .7 Section 09 97 19 (Painting Exterior Metal Surfaces)
- .8 Section 33 11 16 (Water Utility Distribution Piping)

1.3 Measurement and Payment Procedures

- .1 No measurement or payment will be made under this Section. Concrete shall be measured and paid for as specified in the relevant Sections.
- .2 The cost of quality control shall be deemed to be incidental to the work and no separate payment will be made.
- .3 The cost of Departmental Representative's quality assurance testing will be borne by Departmental Representative.
- .4 No separate measurement or payment will be made for reinforcing steel. Refer to Section 03 20 00 (Concrete Reinforcing) and Section 03 39 00 (In-Situ Concrete Structures).
- .5 Movement joints and construction joints will not be measured separately, but considered incidental to the work. All costs in connection with joints shall be included in the unit prices tendered for concrete covered by the relevant Sections.
- .6 Miscellaneous steelwork items embedded in concrete shall be measured to Section 05 50 00 (Metal Fabrications), and payment will include all costs in connection with supplying and installing miscellaneous steelwork items.

1.4 References

- .1 American Concrete Institute, hereinafter referred to as ACI:
ACI 305R Hot Weather Concreting
ACI 306R Cold Weather Concreting

- .2 American Society for Testing and Materials, hereinafter referred to as ASTM:
- | | |
|----------------------|---|
| ASTM C157/C157M-04 | Standard Test Method for Length Change of Hardened Hydraulic-Cement, Mortar, and Concrete |
| ASTM C171 | Sheet Materials for Curing Concrete |
| ASTM C309 | Liquid Membrane-Forming Compounds for Curing Concrete |
| ASTM C260-01 | Standard Specification for Air-Entraining Admixtures for Concrete |
| ASTM C494/C494M-05 | Standard Specification for Chemical Admixtures for Concrete |
| ASTM C1017/C1017M-03 | Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete |
| ASTM C1202-05 | Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration |
| ASTM D994 | Specification for Pre-Formed Expansion Joint Filler for Concrete (Bituminous Type) |
- .3 Canadian Standards Association, hereinafter referred to as CSA:
- | | |
|----------------|--|
| CAN /CSA-A3001 | Portland Cement |
| CAN/CSA-A23.1 | Concrete Materials and Methods of Concrete Construction (refer to ASTM C260 and C494 for Admixtures) |
| CAN /CSA-A23.2 | Methods of Test for Concrete |
| CAN/CSA-A3001 | Supplementary Cementing Materials |
| CAN/CSA-A3001 | Blended Hydraulic Cement |
- .4 Canadian General Standards Board, hereinafter referred to as CGSB:
- | | |
|-----------------|---|
| CAN/CGSB-19.24M | Sealing Compound, Multi-Component, Chemical Curing |
| CAN/CGSB-37.2M | Emulsified Asphalt, Mineral-Colloid Type, Unfilled, for Damp-proofing and Waterproofing |

1.5 Definitions

- .1 Design Service Life: The time during which the structure performs its design function without unforeseen maintenance or repair.

1.6 Concrete Service Life

- .1 Notwithstanding any Design Service Life requirements specified elsewhere, the concrete incorporated in the work shall be designed for durability, for the specified exposure class, in conformance with the applicable clauses in CAN/CSA-A23.1-09 (R2014) section 4.1, and for a Design Service Life of seventy-five (75) years.

1.7 Submittals

- .1 At least twenty-eight (28) days before the start of each type of concrete work submit, to Departmental Representative for review, the following items in accordance with Section 01 33 00 (Submittal Procedures):
 - .1 Source of concrete.
 - .2 Source of cementitious material(s).
 - .3 Source of aggregate(s), including test report dated within one (1) year demonstrating that aggregates meet the requirements of CAN/CSA-A23.1, including assessment of alkali-aggregate reactivity.
 - .4 Departmental Representative, at its discretion, may require samples of the proposed aggregate(s) to be supplied by Contractor, at Contractor's cost, for independent testing purposes.
 - .5 Proposed admixtures and method of application.
 - .6 Mix design for each type of concrete, indicating material content of each component per cubic metre (m³).
 - .7 Evidence that the proposed mix design for each type of concrete will achieve the specified Design Service Life. This shall include rapid chloride permeability (ASTM C1202) and twenty-eight (28)-day drying shrinkage (ASTM C157).
 - .8 Quality Control Plan, including proposed methods for early identification of trends in concrete properties and for taking corrective actions.
 - .9 Certification that proposed concrete materials and mix design conform to CAN/CSA-A23.1 and the requirements of this Section. Certification of aggregates shall include assessment of alkali aggregate reactivity in accordance with CAN/CSA-A23.1-09 (R2014), Clause 4.2.3.5.1.
 - .10 Certification that proposed concrete production plant, including delivery equipment, conforms to CAN/CSA-A23.1 and the requirements of this Section.
 - .11 Details of proposed protective systems and procedures for placing and curing concrete, including situations when the ambient temperature is less than 5° Celsius (C), or greater than 25° C.
 - .12 Details of proposed patching, repair and finishing procedures.

- .2 Submittals required by Clause 3.6 of this Section shall be provided to Departmental Representative at least twenty-four (24) hours prior to the start of concrete placement, except that the check lists specified in Clause 3.6.4 shall be provided at least four (4) hours prior to the start of concrete placement.

1.8 Mix Design Trials

- .1 At least twenty-eight (28) days before the start of each type of concrete work, carry out a full-scale trial of the proposed mix design, except where allowed otherwise by Clause 1.8.4 of this Section. A full-scale trial shall consist of a minimum of five (5) m³ of concrete batched at the plant designated as the source of that type of concrete.
- .2 Contractor shall arrange for sampling and testing of trial concrete. Failure to achieve the specified requirements or changes in source of materials or batching plant may require further mix design trials at Departmental Representative's discretion, and at Contractor's own cost.
- .3 The cost of each trial, including all sampling and testing of trial concrete, shall be borne by Contractor.
- .4 For each type of concrete, a full-scale trial is not required if (instead) Contractor submits to Departmental Representative acceptable evidence of adequate performance of concrete from previous comparable mix designs with the required concrete properties. Evidence of adequate long-term performance is also required, in order to ensure compliance with the Design Service Life.

2. PART 2 – PRODUCTS

2.1 Materials

- .1 Portland cement: Type MS cement (previously referred to as Type 20 cement) to CAN/CSA-A3001. Type GU cement (previously referred to as Type 10 cement) may be used if tri-calcium aluminate content is between 4.0 percent and 7.5 percent.
- .2 Supplementary Cementing Materials: Type F Fly Ash or Type CI Fly Ash or Type SF Silica Fume, to CAN/CSA-A3001.
- .3 Water: to CAN/CSA-A23.1.
- .4 Aggregates: to CAN/CSA-A23.1, normal density.
- .5 Air entraining admixture: to CAN/CSA-A23.1 (which refers to ASTM C260).
- .6 Chemical admixtures: to CAN/CSA-A23.1 (which refers to ASTM C494). Use of accelerating or set retarding admixtures during cold and hot weather placing to be subject to Departmental Representative's approval. Calcium chloride shall not be used. Chemical admixtures in all concrete shall be free of chloride ions.
- .7 Superplasticizing admixtures: to CAN/CSA-A23.1 (which refers to ASTM C494 and ASTM C1017).

- .8 Curing compound: to CAN/CSA-A23.1 white, or to ASTM C309, Type 1-1-chlorinated rubber Type 1-D with fugitive dye.
- .9 Joint filler shall be asphalt-impregnated fibreboard to ASTM D994.
- .10 Adhesive shall be a pressure sensitive adhesive compatible with the joint filler.
- .11 Back-up rod shall be an extruded, closed-cell, circular polyethylene foam back-up material for use with cold applied sealants.
- .12 Sealant primer shall be a single component, resin based primer specifically formulated for use with the joint sealant. Acceptable Product is as follows:
 - .1 Sika Primer TPR-415.
- .13 Joint sealant shall be gun grade, two component, polysulphide sealant, grey or bronze in colour. Acceptable Products are as follows:
 - .1 For horizontal applications, use Sika Duoflex S.L. conforming to CAN/CGSB-19.24, Type 1, Class B.
 - .2 For vertical and overhead applications, use Sika Duoflex N.S. conforming to CAN/CGSB-19.24, Type 2, Class A.
- .14 Epoxy adhesive for drilled rebar shall be an injectable mortar designed for use with precast concrete. Acceptable Product is as follows:
 - .1 Hilti HIT-HY 150
- .15 Bond breaker shall be asphaltic emulsion conforming to CAN/CGSB-37.2.

2.2 Concrete Mixes

- .1 Concrete mixes shall be proportioned to provide a workable mix suitable for the complexity of that class of work, without segregation or bleeding.
- .2 Proportion normal density concrete in accordance with CAN/CSA-A23.1 Alternative 1, for the specified exposure class, to give the properties stipulated in Table 03 30 00-1 of this Section for each concrete type.
- .3 Slump shall be measured at time and point of discharge. Slump indicated is without superplasticizer. Concrete shall be placed at the lowest possible slump compatible with conditions of placement. Subject to approval by Departmental Representative, slump may be increased above the indicated maximum by the addition of an approved superplasticizer. The superplasticizing admixture, if used, shall not adversely influence the performance of the air-entraining admixture.

Table 03 30 00-1

Concrete Properties

Concrete Type	Exposure Class	Compressive Strength at 28 Days (MPa)	⁽¹⁾ Nominal Aggregate Size, max. (mm)	Slump, max. (mm)	Air Content (%)	Water / Cementing Materials Ratio, max. (by weight)	Chloride Ion Penetrability Requirements and Age of Test
A	C-1	45	20	50 ± 20	5 - 8	0.35	< 1000 Coulombs within 56 days
B	C-3	30	20	75 ± 20	4 - 7	0.50	-

Note (1): See definition in CSA A23.1-09.

- .4 Concrete mix types shall be used as follows:
 - .1 **Type A:** Jetty Deck Slab.
 - .2 **Type B:** Bedding, cradles, encasement, supports, manhole bases, thrust blocks, and concrete infill for vehicle protection bollards.
- .5 The quantity of cementitious materials shall be kept to the minimum necessary to achieve the compressive strength, permeability and water/cementing materials ratio specified in Table 03 30 00-1 of this Section.
- .6 Special requirements for concrete Type A (jetty deck slab):
 - .1 The mix for concrete Type A shall be proportioned to minimize drying shrinkage. Measures shall include appropriate aggregate gradation and proportioning, and appropriate use of admixtures to reduce the water content of the mix.
 - .2 The mix shall contain maximum twenty (20) percent fly ash and maximum five (5) percent silica fume, by mass of total cementitious materials. When ambient temperature at time of placement will drop below 10 °C, use maximum ten (10) percent fly ash.
 - .3 Maximum concrete temperature at time of placement shall be 20 °C.
- .7 All concrete specified for exposure class C-1 shall meet chloride ion permeability requirements listed in Table 03 30 00-1 of this Section.
- .8 For grout, refer to Section 04 05 12 (Grout).

3. PART 3 – EXECUTION

3.1 General

- .1 All concrete work shall be in accordance with CAN/CSA-A23.1.
- .2 No work shall commence until approval in writing is given by Departmental Representative for concrete materials and mix design.

- .3 Upon acceptance by Departmental Representative of a concrete mix design, including ingredients and sources of materials, changes, or modifications in any manner will not be permitted without the prior approval of Departmental Representative.

3.2 Miscellaneous Embedded Steelwork

- .1 Contractor shall build into the concrete structures various inserts and ducts, to details shown on the Drawings.
- .2 All reinforcing bar dowels and anchor bolts shall be placed before the concrete is poured, unless indicated otherwise.
- .3 Contractor shall not damage metal fabrications in storing, handling, erecting and during concrete placement.
- .4 Adequate provision shall be made to keep metal fabrications plumb and in true alignment during erection and throughout concrete placement. Metal fabrications to be embedded in concrete, or grouted, shall be accurately set and held firmly in position while concrete or grout is being placed and cured. Templates shall be used to ensure correct placement.
- .5 Any embedded fabrications that are incorrectly placed or that move during embedment to an extent that will affect their proper operation shall be removed and replaced correctly or shall be corrected by other means, subject to Departmental Representative's approval.
- .6 All damage to coatings shall be restored by Contractor in accordance with Section 09 97 19 (Painting Exterior Metal Surfaces) to provide an unbroken coating film equal to the original coating.

3.3 Movement Joints

- .1 Movement joints (i.e., for expansion or contraction) shall be provided at locations shown on the Drawings.
- .2 The formed surface of the joint shall be cleaned of all accretions of concrete or foreign materials.
- .3 The joint filler material shall cover the entire surface of the joint and fit around all openings and reinforcement. Exposed edges of the filler material shall be set back from the outer face as shown on the Drawings. Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Departmental Representative. The filler shall be secured to the concrete surface by stapling, the specified adhesive or other positive fastening. When more than one piece is required for a joint, fasten abutting ends and hold securely to shape. All joints in the filler shall be so tight that mortar from fresh concrete cannot seep through to the opposite surface.
- .4 The diameter of the back-up rod shall be from twenty-five (25) to fifty (50) percent larger than the width of the joint into which it is to be inserted. The back-

up rod shall be positioned to maintain the distance, as shown on the Drawings, of the rod from the outer face of the concrete.

- .5 Before application of the sealant, the sides of the joints shall be cleaned of curing compound, or other contaminants, by wire brushing. The joint shall then be blown free of all dirt and dust by oil-free compressed air. The depth to the back-up rod from outer face of concrete shall be checked and if it is more than \pm three (3) millimetres (mm) in error, it shall be corrected. The joint surface shall then be primed, after which the sealant shall be applied and the exposed outer face lightly tooled to a smooth, neat surface. The aspect ratio of the joint sealant shall be 1:1.

3.4 Construction Joints

- .1 Construction joints shall be provided only at locations shown on the Drawings, unless approved otherwise by Departmental Representative.
- .2 The hardened surface of horizontal and vertical construction joints shall be roughened by mechanical means to full amplitude of 5 mm to CAN/CSA-A23.1-09 (R2014) clause 7.2.2, to expose clean and sound aggregate, prior to casting the subsequent part of the structure. Roughen concrete surface by suitable methods authorized by Departmental Representative.
- .3 The next layer of concrete above a horizontal construction joint shall be of the quality specified, but shall be proportioned with an excess of mortar, have a depth of approximately 150 mm, and be well-vibrated to achieve maximum bond, all as required by CAN/CSA-A23.1-09 (R2014), clause 7.2.2.
- .4 Reinforcing steel shall be continuous through construction joints.
- .5 Where shown on the drawings, form a recess in the exposed edge(s) of construction joints and seal with back-up rod and sealant as for a movement joint.

3.5 Concrete Supply

- .1 Not less than two batch mixers shall be available at the batch plant site at all times during which concrete is being placed.
- .2 The batch plant shall have an assured source of supply of cement at a temperature not exceeding 40° C.
- .3 All concrete production and delivery equipment shall be capable of delivering successive batches of concrete at intervals not exceeding twenty (20) minutes. The rate of delivery shall not be greater than will allow for proper placement and consolidation of the concrete.
- .4 The elapsed time from batching of concrete (measured from the time the cement is added to the aggregate) to commencement of discharge at the site shall not exceed ninety (90) minutes. The use of retarder requires the prior approval of Departmental Representative.
- .5 Stationary and truck mixers with blades worn more than ten (10) percent from original blade design profile will not be allowed. Accumulations of hardened

mortar or concrete shall be completely removed or the equipment will not be allowed.

- .6 All mixers and agitating equipment used in production of concrete will be subject to testing of batch uniformity for concrete by Departmental Representative.

3.6 Placing Concrete

- .1 Obtain Departmental Representative's approval before placing concrete. Provide twenty-four (24) hours' notice prior to placing of concrete.
- .2 Prior to placing of concrete, obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing.
- .3 Contractor is responsible for taking all measures necessary to prevent an accidental release (concrete spill) to the marine environment, and measures outlined or monitoring required by the EMP or WQMP. In the event of accidental release, the Contractor is responsible for providing an appropriate spill response to limit potential deleterious substances from entering the marine environment and to meet water quality criteria as detailed in the WQMP.
- .4 Prior to placing of concrete, review all applicable drawings for formwork blockouts, sleeves, reinforcement, embedded items (including electrical and mechanical), and submit to Departmental Representative a check list covering these items. The check list shall be signed off by each trade involved in that pour.
- .5 All concrete placing methods shall be in accordance with CAN/CSA-A23.1. Concrete shall not be deposited by free fall into the forms when the drop exceeds 1.5 m. A drop pipe or other approved method shall be employed in such circumstances.
- .6 Pumping of concrete is permitted, subject to Departmental Representative's approval of equipment and mix design. If pump placement is used, the mix designs may be modified, subject to Departmental Representative's approval, to provide the desired properties at the point of discharge.
- .7 When placing fresh concrete adjacent to hardened concrete restrained by continuous reinforcement, special consideration shall be given to the concrete curing, placing temperature, control of heat of hydration of the mix components, or use of insulation to guard against thermal and/or shrinkage cracking.
- .8 Except where proprietary self-consolidating concrete products have been approved by Departmental Representative for use in the work, all concrete shall be consolidated by internal vibration using an adequate number of immersion vibrators with the correct frequency. One spare vibrator for each three (3) operating ones shall be on hand during all concrete placement operations.
- .9 Ensure reinforcement and inserts are not disturbed during concrete placement for all concrete work.
- .10 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature, and test samples taken.

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

3.7 Curing of Concrete

- .1 Concrete shall be protected and cured in accordance with the requirements of CAN/CSA-A23.1-09 (R2014), section 7.4. Curing type shall meet the requirements of CAN/CSA-A23.1-09 (R2014), Tables 2 and 20, for the applicable exposure class, except as noted.
- .2 Notwithstanding the requirements of CAN/CSA-A23.1-09 (R2014), Tables 2 and 20, curing Type 3 (extended) shall be used for:
 - .1 Type A concrete (jetty deck slab).

3.8 Cold and Hot Weather Protection

- .1 All concrete work in cold or hot weather shall be executed strictly in accordance with CAN/CSA-A23.1 and ACI 305R or ACI 306R recommendations, as applicable. Curing and protection of the fresh concrete shall conform to CAN/CSA-A23.1.

3.9 Tolerances

- .1 The dimensional tolerances for concrete work shall be as given in CAN/CSA-A23.1-09 (R2014) clause 6.4, unless noted otherwise.

3.10 Finishing

- .1 Finishing and treatment of concrete slab surfaces shall be in accordance with CAN/CSA-A23.1-09 (R2014) clause 7.5 and Table 22 for Class A finish, unless noted otherwise.
- .2 All exposed horizontal surfaces that are not intended to receive any additional concrete shall have a float finish as specified and shall conform accurately, within specified tolerance limits, to grades and elevations shown on the Drawings. Finished surfaces shall be free from open texturing, voids, bug holes, plucked aggregate, and local projections. Further trowel, broom or special finishes shall be performed as specified and where shown or required.
- .3 Provide broom finish for the concrete wearing surface of the Jetty Deck Slab. The broom finish shall be aligned with the slope (if any) of the finished concrete surface to facilitate water runoff. Broom finish shall mean a fine, but slip-resistant, striated surface produced by brushing the newly troweled surface with a soft bristled broom. Brooming shall be performed when the concrete has been previously float finished and troweled and is sufficiently hard to retain the texture.

3.11 Joint Fillers

- .1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Departmental Representative. When more than one piece is required for a joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.
- .2 Locate and form movement joints as indicated. Install joint filler.

3.12 Repairs and Surface Patching

- .1 Immediately after removal of formwork, concrete surfaces shall be inspected for defects. Repairable defects shall be repaired as soon as practicable with patching mortar as described herein. If proper and effective repair of a defect is not feasible, or the repair work carried out is not successful, the elements affected shall be identified to Departmental Representative and shall be removed and replaced at Contractor's own cost.
- .2 Immediately after removal of formwork, all bolts, ties, nails or other metal not required for further construction purposes, shall be removed or cut back to a depth of at least fifty (50) mm from the surface of the concrete. The cut out areas and cavities shall be repaired as soon as practicable with patching mortar as described herein.
- .3 Surface irregularities, such as bulges, fins, lips or plugs shall be removed by chipping or grinding, and if necessary, shall be repaired as soon as practicable with patching mortar as described herein. Grinding, when used, shall not proceed until the concrete has sufficiently hardened to prevent dislodgement of coarse aggregate particles.
- .4 Materials used to repair or patch surface defects shall be made of similar constituents and of approximately the same proportions as used for the concrete being patched, except that adjustments to the aggregate size and sand content may be made if required to provide similar finish to adjacent surfaces as determined by trial repair or patch. The quantity of mixing water shall be no more than necessary to facilitate handling and placing.
- .5 Proprietary bagged patching materials may be used, subject to approval by Departmental Representative.
- .6 The patching mortar shall colour-match the colour of the surrounding concrete.
- .7 The patching mortar shall be mixed in advance and allowed to stand with frequent manipulation with a trowel, without addition of water, until it has reached the stiffest consistency that will permit placing.
- .8 Bonding grout shall be prepared using a mix of one part cement to one part fine sand passing a No. 30 mesh sieve, mixed to the consistency of thick cream and then well brushed into the surfaces to be repaired or patched.

- .9 A pre-approved latex type bonding agent may be added to the repair or patching material. Quantity and use of admixture shall be accordance with the manufacturer's specifications.

3.13 Protection

- .1 Take every precaution to prevent damage, abrasions and staining of surfaces and edges of concrete during the work. Provide plywood or insulation protection and polyethylene wrappings or other means as required to concrete elements that may be damaged by subsequent construction activities. Remove protective coverings at completion of construction.
- .2 Barricades shall be erected to prevent traffic on newly finished surfaces.

3.14 Quality

- .1 Quality control for concrete production and delivery shall be the responsibility of the Contractor.
- .2 A Quality Control Plan approved by Departmental Representative shall be implemented throughout concrete production in accordance with the requirements of CAN/CSA-A23.1. In addition, as part of the Contractor's Quality Control Plan, the following shall be undertaken:
 - .1 Obtain and retain one (1) sample of each lot of cement.
 - .2 Obtain and retain mill certificate for each lot of cement.
 - .3 Obtain and retain sieve analysis of all aggregates at least once each week.
 - .4 Maintain a record of each batch of concrete showing measured quantities of constituents.
 - .5 Each delivery shall be accompanied by a delivery slip that clearly identifies the concrete by mix number and class. Obtain and retain each delivery slip, for subsequent handover to Departmental Representative's site representative.
 - .6 Undertake sampling and testing of concrete materials and concrete products in accordance with CAN/CSA-A23.1.
 - .7 Maintain a record of concrete test results. During construction, analyze results at least weekly for early identification of trends in concrete properties and for pre-emptive corrective action as required. Advise Departmental Representative of corrective actions taken.
 - .8 Deliver to Departmental Representative weekly comprehensive Quality Control Reports.
- .3 Departmental Representative may retain, at its sole discretion, a testing firm to undertake confirmatory testing, as and when Departmental Representative deems necessary. This quality assurance activity shall not relieve the Contractor of its responsibility for quality control measures outlined above.

- .4 At Departmental Representative's sole discretion, Departmental Representative's testing firm may perform Quality Assurance as follows:
 - .1 Advise Departmental Representative on the suitability of aggregates, cementitious materials, admixtures and mix design for the various Types of concrete.
 - .2 Evaluate the Contractor's mix designs at the trials on the basis of the Contractor's samples and tests. If trials are not required, evaluate mix designs on evidence presented for approval.
 - .3 Perform sampling and testing at point of concrete deposit as required by Departmental Representative for quality assurance purposes.
 - .4 Provide overall review of Contractor's Quality Control Plan and perform checks during the progress of the work.
 - .5 Provide specialist advice on concrete technology.
- .5 Inspection or testing by Departmental Representative and/or its testing firm will not augment or replace Contractor Quality Control, or relieve Contractor of its contractual responsibility for quality work.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section describes construction of miscellaneous reinforced and unreinforced concrete structures.
- .2 Construction of concrete thrust blocks for water mains is covered in Section 33 11 16 (Water Utility Distribution Piping).

1.2 Related Sections

- .1 Section 01 33 00 (Submittal Procedures)
- .2 Section 03 10 00 (Concrete Forming and Accessories)
- .3 Section 03 20 00 (Concrete Reinforcing)
- .4 Section 03 30 00 (Cast-in-Place Concrete)
- .5 Section 04 05 12 (Grout)
- .6 Section 05 50 00 (Metal Fabrications)
- .7 Section 09 97 19 (Painting Exterior Metal Surfaces)
- .8 Section 31 23 10 (Excavating, Trenching and Backfilling)
- .9 Section 31 24 15 (General Fill)
- .10 Section 32 11 19 (Granular Sub-Base)
- .11 Section 32 11 23 (Aggregate Base Courses)
- .12 Section 33 11 16 (Water Utility Distribution Piping)

1.3 Measurement and Payment Procedures

- .1 Concrete covered by this Section will be measured in cubic metres incorporated into the work, determined by the details and dimensions shown on the Drawings. Blockouts, ducts, embedded pipe or other items (except reinforcing steel) creating voids where the volume is greater than 0.10 cubic metres (m³) shall be deducted from the measurement.
- .2 Concrete covered by this Section will be paid for at the relevant unit prices tendered, as listed below. Payment for concrete shall include for all costs in connection with the concrete, as specified and as shown on the Drawings, including all costs in connection with reinforcing steel.
 - .1 IN-SITU CONCRETE: JETTY DECK SLAB.
- .3 Ducts embedded in concrete structures will not be measured separately, but considered incidental to the work. All costs in connection with ducts embedded in concrete structures shall be included in the unit prices tendered for concrete.

- .4 Concrete for thrust blocks for firewater mains, and concrete infill for vehicle protection bollards, will not be measured separately, but considered incidental to the work. All costs in connection with thrust blocks for firewater mains, and concrete infill for vehicle protection bollards, shall be included in the unit prices tendered for concrete.
- .5 Expansion joints, movement joints, contraction joints and construction joints will not be measured separately, but considered incidental to the work. All costs in connection with the construction of joints, including concrete anchorages at movement joints, shall be included in the unit prices tendered for concrete.
- .6 Miscellaneous metal fabrications will be measured to Section 05 50 00 (Metal Fabrications), and payment shall include all costs in connection with supplying and installing miscellaneous metal fabrications.
- .7 Excavation for concrete structures will be measured to Section 31 23 10 (Excavating, Trenching and Backfilling) and payment shall include all costs in connection with excavation.

1.4 References

- .1 ASTM A307, Specification for Carbon Steel Externally Threaded Standard Fasteners.
- .2 CAN/CSA-A23.1, Concrete Materials and Methods of Concrete Construction.

1.5 Definitions - Not Used

1.6 Submittals

- .1 Submit shop drawings for Departmental Representative's review, in accordance with Section 01 33 00 (Submittal Procedures). Indicate the following items:
 - .1 Concrete Reinforcing, as stipulated by Section 03 20 00.
 - .2 Metal Fabrications, as stipulated by Section 05 50 00.
- .2 Submit the concrete pour sequence, placing procedures, formwork, insulation and checklists for all in-situ concrete structures, for Departmental Representative's review, in accordance with Section 01 33 00 (Submittal Procedures).

1.7 Operating Environment

- .1 Management of environmental effects on construction of in-situ concrete structures shall be the sole responsibility of the Contractor.
- .2 The design ambient temperature range is from -6° C minimum to 24° C maximum.

2. PART 2 – PRODUCTS

2.1 Materials

- .1 Compacted backfill materials under concrete structures: to Section 31 24 15 (General Fill), Section 32 11 19 (Granular Sub-Base) or Section 32 11 23 (Aggregate Base Courses), as appropriate to the material described on the Drawings.
- .2 Concrete mixes and materials: to Section 03 30 00 (Cast-in-Place Concrete).
- .3 Reinforcing steel: to Section 03 20 00 (Concrete Reinforcing).
- .4 Joint filler, adhesive, back-up rod, sealant primer, joint sealant and bond breaker: to Section 03 30 00 (Cast-in-Place Concrete).
- .5 Miscellaneous metalwork: to Section 05 50 00 (Metal Fabrications).

3. PART 3 – EXECUTION

3.1 General

- .1 The sequencing of concrete pours shall make provision to minimize the effects of concrete shrinkage on the finished structure.
- .2 Install crack control joints and construction joints at locations shown on the Drawings, except as otherwise approved by Departmental Representative.
- .3 Concrete mix design, initial concrete temperature, placing procedures, formwork and insulation shall be employed to ensure that the maximum temperature differential over the cross-section of any reinforced concrete element, does not exceed 22° C. This provision does not apply to mass concrete.
- .4 Contractor is responsible for taking all measures necessary to prevent an accidental release (concrete spill) to the marine environment, and measures outlined or monitoring required by the EMP or WQMP. In the event of accidental release, the Contractor is responsible for providing an appropriate spill response to limit potential Deleterious Substances from entering the marine environment and to meet water quality criteria as detailed in the WQMP.

3.2 Concrete Structures Founded on Compacted Fill

- .1 Remove unsuitable material at founding level to extent and depth as directed by Departmental Representative.
- .2 Prepare foundations and construct miscellaneous concrete items only after completion and acceptance of sub-grade preparation and compaction.

3.3 Miscellaneous Embedded Steelwork

- .1 Build into the concrete structures the miscellaneous metal fabrications to details shown on the Drawings.

3.4 Galvanizing and Painting

- .1 Coat all miscellaneous steel as defined by Section 09 97 19 (Painting Exterior Metal Surfaces).

3.5 Erection of Metal Fabrications

- .1 Do not damage metal fabrications in storing, handling and erecting.
- .2 Adequate provision shall be made to keep the metal fabrications plumb and in true alignment during erection.
- .3 Miscellaneous metal fabrications to be embedded in concrete, or grouted, shall be accurately set and held firmly in position while concrete or grout is being placed and cured. Any embedded fabrications that are incorrectly placed or that move during embedment to an extent that will affect their proper operation shall be removed and replaced correctly or shall be corrected by other approved means.
- .4 All damage to painting shall be restored by touch-up painting by Contractor to provide an unbroken paint film equal to the original coating, as specified in Section 09 97 19 (Painting Exterior Metal Surfaces).

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section describes the requirements for grout for the following application, as described on the Drawings:
 - .1 Type 1 Grout: As a bearing pad for the reinstalled high mast light and other miscellaneous metal fabrications.

1.2 Related Sections

- .1 Section 01 33 00 (Submittal Procedures)
- .2 Section 03 10 00 (Concrete Forming and Accessories)
- .3 Section 03 30 00 (Cast-in-Place Concrete)
- .4 Section 03 39 00 (In-Situ Concrete Structures)

1.3 Measurement and Payment Procedures

- .1 No measurement or payment will be made under this Section. All work performed to satisfy the requirements of this Section shall be paid under the relevant Sections for which grout or grouting is required.

1.4 References

- .1 CAN/CSA-A23.1-M, Concrete Materials and Methods of Concrete Construction.
- .2 CAN/CSA-A23.2-M, Methods of Test for Concrete.
- .3 Additional material and testing standards listed in CAN/CSA-A23.1-09 (2014) section 2.

1.5 Definitions – Not Used

1.6 Submittals

- .1 For each type of grout proposed for use in the work, at least twenty-eight (28) days prior to commencing work, submit the following in accordance with Section 01 33 00 (Submittal Procedures) to Departmental Representative for review:
 - .1 Manufacturer's product data sheets and printed instructions;
 - .2 Proposed admixtures;
 - .3 Proposed Quality Control Plan;
 - .4 List of all equipment to be used for grouting;
 - .5 Calibration certificates for all gauges to be used for grouting; and,

- .6 Certification that each type of grout will comply with the Specification.
- .2 Submit grouting records, to Departmental Representative for review, in timely fashion during the work.

2. PART 2 – PRODUCTS

2.1 Materials

- .1 Grout shall be non-metallic and shrinkage compensating cementitious “flowable” polypropylene fiber grout, and shall be proportioned and mixed to give the properties in Table 04 05 12-1, unless noted otherwise.
- .2 Superplasticizing admixtures: CAN/CSA-A23.1, and refer to ASTM C260 and ASTM C494 for admixtures.
- .3 Use of accelerating or set retarding admixtures to be subject to Departmental Representative’s review.
- .4 Synthetic fiber reinforcement for Type 1 grout mixture shall meet the requirements below, unless noted otherwise:
 - .1 Material: Fibrillated polypropylene.
 - .2 Conformance: ASTM C1116.
 - .3 Specific Gravity: 0.91.
 - .4 Alkali Resistance: Alkali proof.
 - .5 Storage: Store in clean, dry area in accordance with manufacturer’s instructions.

Table 04 05 12-1

**Properties for Type 1 Grout
 (Structural Connections)**

Grout Property	Test Method	Limit
<u>Plastic:</u>		
Bleeding:	CAN/CSA-A23.2-1B	< 0.5 %
Expansion:	CAN/CSA-A23.2-1B	Range = 0.5 % to 3.0 %
Height Change:	ASTM C877	> 0.3 %
Workability:		
a) If no coarse aggregate is used;	CAN/CSA-A23.2-1B (flow)	± 5 sec. deviation from value in trial.
b) If 10 mm coarse aggregate is added.	CAN/CSA-A23.2-5C (slump) CAN/CSA-A23.2-4C	± 20 mm deviation from value in trial.
Air Entrainment:		0.0 % to 3.0 % (after adding superplasticizer)
<u>Hardened:</u>		
Compressive Strength:	CAN/CSA-A23.2.1B	
a) 3 day		> 30 MPa
b) 28 day		> 60 MPa
Porosity, 28 days Boiled Absorption:	CAN/CSA-A23.2.1B for casting cube; and ASTM C642 for test procedure.	< 12 %
Expansion, at 56 days:	ASTM C1090, but using curing in ASTM C1107.	> 0.00 %
<u>Aggregates:</u>		
Fine Aggregate:	CSA/A23.1-09	Gradation limits do not apply.
Coarse Aggregate:	CSA/A23.1-09	The Contractor may add up to 50 % by volume of coarse aggregate (10 mm maximum size)

2.2 Grouting Equipment

- .1 All plant and equipment for mixing and placing grout, including head-box, any circulating hoses and fittings, shall be of a type and size and mechanical condition suitable for doing the work in an efficient and effective manner.

- .2 Demonstrate to the satisfaction of Departmental Representative the ability of the grout mixing and pumping equipment to produce the specified grout mix in a pre-construction field trial.
- .3 Grout mixer parameters:
 - .1 Provide a high speed, high shear (colloidal) mixer of sufficient capacity to provide a continuous supply of uniformly mixed, stable suspension grout. Paddle or shear vane mixers may be used, subject to Departmental Representative's review;
 - .2 Provide a head-box to ensure continuous grout flow; and,
 - .3 Mixing unit to be equipped with an accurate water metering unit for controlling the amount of mixing water used in the grout.
- .4 Maintain all grouting equipment in a fully serviceable condition, capable of continuous and efficient performance during any grouting operation.

3. PART 3 – EXECUTION

3.1 Mixing and Placing Grout

- .1 Mix grout to a flowable consistency and in accordance with good practice.
- .2 Place grout continuously from one side (or from bottom to top in vertical spaces) to ensure that all air is expelled as the grout front advances. Ensure that grout attains 100 % contact with the contact area shown on the Drawings.
- .3 Cure grout by moist cure with burlap for minimum twenty-four (24) hours.
- .4 Protect grout from freezing until it has attained compressive strength 20 MPa.
- .5 If grout will be subject to freezing within fourteen (14) days of placement, the grout shall contain entrained air in conformance with CAN/CSA-A23.1-09 (2014) clause 6.8.4.3.
- .6 Contractor is responsible for taking all measures necessary to prevent an accidental release (grout spill) to the marine environment, and measures outlined or monitoring required by the EMP or WQMP. In the event of accidental release, the Contractor is responsible for providing an appropriate spill response to limit potential Deleterious Substances from entering the marine environment and to meet water quality criteria as detailed in the WQMP.

3.2 Testing of Grout

- .1 Testing of grout properties shall be to CAN/CSA A23.2.1B.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section covers the fabrication and installation of miscellaneous steel fabrications.
- .2 This Section also covers the storage, adaptation and re-use of salvaged steel waler beams, to form the temporary support walers for the re-driven sheet pile wall at the timber crib. For salvage of structural steel waler beams to be adapted and re-used in the work refer to Section 02 41 16.01 (Structure Demolition).
- .3 This Section also covers the storage, modification, and re-use of salvaged wharf safety ladders in the work. For salvage of wharf safety ladders to be modified and re-used in the work refer to Section 02 41 13 (Selective Site Demolition).
- .4 Bolting material and other fabricated metal items not described elsewhere shall also be fabricated in accordance with this Section.
- .5 For sheet piling supply, installation, re-driving, and extraction work, refer to Section 31 62 17 (Steel Sheet Piling).
- .6 For grounding requirements for metalwork items, refer to Section 26 05 27 (Grounding).
- .7 For cable trays, pipe supports and other electrical supports, refer to the Section relevant for each item.

1.2 Related Sections

- .1 Section 01 33 00 (Submittal Procedures)
- .2 Section 02 41 13 (Selective Site Demolition)
- .3 Section 02 41 16.01 (Structure Demolition)
- .4 Section 03 30 00 (Cast-in-Place Concrete)
- .5 Section 03 39 00 (In-Situ Concrete Structures)
- .6 Section 09 97 19 (Painting Exterior Metal Surfaces)
- .7 Section 26 05 27 (Grounding)
- .8 Section 31 62 17 (Steel Sheet Piling)

1.3 Measurement and Payment Procedures

- .1 Storage, adaptation and re-use of salvaged steel waler beams, to form the temporary support walers at the timber crib, will not be measured individually. Storage, adaptation, and re-use of salvaged steel waler beams, to form the temporary support walers at the timber crib, will be paid for at the Lump Sum price tendered for METAL FABRICATIONS: TEMPORARY SUPPORT

- WALERS AT TIMBER CRIB. Payment shall be full compensation for storage, adaptation and re-use of salvaged steel waler beams, to form the temporary support walers at the timber crib, including all connections and details as described on the Drawings.
- .2 Storage, modification, and re-use of salvaged wharf safety ladders will not be measured individually. Storage, modification, and re-use of salvaged wharf safety ladders will be paid for at the Lump Sum price tendered for METAL FABRICATIONS: WHARF SAFETY LADDERS. Payment shall be full compensation for storage, modification, and re-use of salvaged wharf safety ladders, including all connections and details as described on the Drawings.
 - .3 Miscellaneous metal items described on the Drawings (but not otherwise identified in this Section), will not be measured individually. Miscellaneous steel fabrications, regardless of steel grade or type, and will be paid for at the Lump Sum price tendered for METAL FABRICATIONS: MISCELLANEOUS. Payment shall be full compensation for supply and installation of these metal fabrications.
 - .4 Anchor bolts, brackets, bearing pads and other miscellaneous steel items will not be measured separately, but considered incidental to the work of this Section. All costs in connection with anchor bolts, brackets, bearing pads and other miscellaneous steel items shall be included in the price tendered for the associated items of work.

1.4 References

- .1 Canadian Standards Association (CSA):
 - .1 CAN/CSA G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CAN/CSA-W47.1, Certification of Companies for Fusion Welding of Steel.
 - .3 CAN/CSA-W48, Filler Metals and Allied Materials for Metal Arc Welding (Developed in cooperation with the Canadian Welding Bureau).
 - .4 CAN/CSA-W59, Welded Steel Construction.
 - .5 CAN/CSA-W178.1, Certification of Welding Inspection Organizations.
 - .6 CAN/CSA-W178.2, Certification of Welding Inspectors.
 - .7 CAN/CSA-S16.1, Limit States Design of Steel Structures.
- .2 American Society for Testing and Materials (ASTM):
 - .1 ASTM A27/27M, Specification for Steel Castings, Carbon, for General Applications.
 - .2 ASTM A53/A53M, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

- .3 ASTM A108, Low Carbon Steel.
- .4 ASTM A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .5 ASTM A153/A153M, Standard Specification for Zinc Coating (Hot-dip) on Iron and Steel Hardware.
- .6 ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
- .7 ASTM A325M, Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Minimum Tensile Strength (Metric).
- .3 Other standards:
 - .1 CGSB I-GP-40M, Standard for: Primer, Structural Steel, Oil Alkyd Type.

1.5 Definitions – Not Used

1.6 Submittals

- .1 Submit shop drawings, in accordance with Section 01 33 00 (Submittal Procedures), to Departmental Representative a minimum of twenty-eight (28) days prior to commencing fabrication (this also applies to adaption and re-use of salvaged steelwork items).
- .2 Indicate materials, core thicknesses, finishes, connections, joints, methods of anchorage, number of anchors, supports, reinforcement, details and accessories.
- .3 Review of shop drawings by Departmental Representative will not relieve Contractor of responsibilities for the accuracy of the detail dimensions, general fit-up of parts to be assembled, adequacy of connection details, nor errors or defects contained in the shop drawings.

1.7 Quality Control Submittals

- .1 If requested, submit to Departmental Representative certified copies of mill reports, analyses, and tests covering chemical and physical properties of materials used in the work.

2. PART 2 – PRODUCTS

2.1 Materials

- .1 Steel sections and plates: to CAN/CSA-G40.21, Grade 350W (or Grade 300W for plates / sections not commonly available in Grade 350W, subject to Departmental Representative's review and approval).
- .2 Steel pipe (except where indicated otherwise): to ASTM A53/A53M, galvanized finish.

- .3 Steel pipe for vehicle protection bollards: to ASTM A53/A53M, painted as specified in Section 09 97 19 (Painting Exterior Metal Surfaces).
- .4 For sheet pile materials, refer to Section 31 62 17 (Steel Sheet Piling).
- .5 Welding materials: to CSA W59.
- .6 Bolts and anchor bolts: to ASTM A325 and A307, respectively, except where noted otherwise.
- .7 Concrete anchors: to ASTM A193 grade B7 (unless noted otherwise).
- .8 Concrete anchors at high mast light: to ASTM A354 grade BD.
- .9 Galvanizing: hot dipped galvanizing with zinc coating 610 g/m² to ASTM A123/A123M or ASTM A153/A153M as appropriate.
- .10 Shop coat primer: to CGSB I-GP-40M.

3. PART 3 – EXECUTION

3.1 Fabrication

- .1 Fabrication, connection design and detailing of all structural steelwork shall conform to CAN/CSA-S16.1 (Limit States Design of Steel Structures).
- .2 Welding of structural steelwork shall conform to CAN/CSA-W59 (Welded Steel Construction) and shall be performed by certified welders. Fabrication shops shall be approved by the Canadian Welding Bureau to CAN/CSA-W47.1.
- .3 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
- .4 Use welded connections for exterior metalwork unless indicated otherwise, or approved otherwise by Departmental Representative.
- .5 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush. Seal exterior steel fabrications to provide corrosion protection in accordance with CAN/CSA-S16.1.
- .6 Where possible, fit and shop assemble work, ready for erection.
- .7 All Nelson Stud anchor welding to be made in accordance with recommendations of the Nelson Stud Welding Co., Lorain, Ohio.

3.2 Corrosion Protection

- .1 Unless otherwise noted in Section 09 97 19 (Painting Exterior Metal Surfaces), all steel fabrications covered by this Section shall be hot-dip galvanized after fabrication.
- .2 For steel fabrications specifically noted in Section 09 97 19 (Painting Exterior Metal Surfaces), surfaces shall be painted in accordance with that Section.

- .3 No corrosion protection is required for steel fabrications that are to be modified in the work (e.g., re-driven sheet pile wall), or items that are to be supplied for temporary applications (e.g., steel waler and associated connections to support the re-driven sheet pile wall at the timber crib).

3.3 Quality Assurance Inspection

- .1 Departmental Representative, at its sole discretion, may inspect the steel prior to galvanizing for the degree of cleanliness to check for compliance with ASTM A123/A123M or ASTM A153/A153M as appropriate. In the event that Departmental Representative elects to inspect the steel prior to galvanizing, no galvanizing shall be allowed until Departmental Representative has accepted the surface preparation.
- .2 Departmental Representative, at its sole discretion, may measure the dry film thickness (DFT) of the galvanizing on the steel fabrications to check for compliance with these specifications

3.4 Erection

- .1 Erection of all structural steelwork shall conform to CAN/CSA-S16.1 (Limit States Design of Steel Structures).
- .2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.
- .3 Provide suitable means of anchorage acceptable to Departmental Representative such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.
- .4 Hand items over for casting into concrete to appropriate trades together with setting templates.
- .5 Touch-up field welds, bolts and burnt or scratched surfaces after completion of erection as follows:
 - .1 Galvanized surfaces with zinc rich primer.
 - .2 Coated surfaces in accordance with Section 09 97 19 (Painting Exterior Metal Surfaces).
- .6 Refer to Section 26 05 27 (Grounding) for grounding requirements for metalwork items.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section covers the field preservative treatment of re-used timber components.

1.2 Related Sections

- .1 Section 01 33 00 (Submittal Procedures)
- .2 Section 31 62 19 (Timber Piling)
- .3 Section 35 20 23.01 (Offloading, Upland Transportation and Disposal)

1.3 Measurement and Payment Procedures

- .1 Wood treatment will not be measured separately, but considered incidental to the work. All costs in connection with wood treatment, including quality control inspection and testing, shall be included in the unit prices tendered for the associated items of work.

1.4 References

- .1 Canadian Standards Association (CSA):
 - .1 CAN/CSA-O80 Series-08, Standard for Wood Preservation.
- .2 Canadian Institute of Treated Wood and Western Wood Preservers Institute (CITW): “Best Management Practices for the use of Treated Wood in Aquatic Environments.”
- .3 Canadian Wood Preservation Certification Authority (CWPCA).

1.5 Definitions – Not Used

1.6 Submittals – Not Used

2. PART 2 – PRODUCTS

2.1 Materials for Field Treatment

- .1 Copper naphthenate: To CAN/CSA-O80 Series.
- .2 Creosote: To CAN/CSA-O80 Series.

3. PART 3 – EXECUTION

3.1 Application: Field Treatment

- .1 Comply with CAN/CSA-O80 Series requirements.
- .2 Surfaces of re-used timber components that are exposed by cutting, trimming, or boring, cracks, and holes shall be treated promptly with three (3) separate coats of copper naphthenate (2% minimum copper). Allow enough time between coats for full absorption. Alternatively, creosote field-treatment of creosoted timber piles in accordance with CAN/CSA-O80 Series will be allowed.
- .3 Take all reasonable precautions to minimize the amount of field preservative treatment from escaping into the marine environment.

3.2 Waste Management and Disposal

- .1 Separate waste materials for re-use and/or recycling.
- .2 Place materials defined as hazardous or toxic in designated containers.
- .3 Dispose of creosoted or preservative-treated timber components, end pieces, wood scraps, and sawdust in accordance with Laws and Regulations. Creosoted or preservative-treated wood must not be disposed of with other materials destined for recycling or re-use.
- .4 Dispose of unused wood preservative at authorized hazardous material collections site that is permitted to accept such materials.
- .5 Do not dispose of unused preservative material into sewer system, streams, or lakes, onto ground, or in other locations where they will pose health or environmental hazards.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section covers the modification and re-use of salvaged timber components in the work. Re-use of salvaged timber components for new usages as indicated on the Drawings (e.g., as timber chocks and bull rail) is a Project requirement. It is not anticipated that any new timber components will be required for the work.
- .2 For re-use of timber fender piles (to protect concrete structures) and corner dolphin piles (as navigation markers), refer to Section 31 62 19 (Timber Piling).

1.2 Related Sections

- .1 Section 01 33 00 (Submittal Procedures)
- .2 Section 01 74 19 (Waste Management and Disposal)
- .3 Section 02 55 10 (Dust Control)
- .4 Section 05 50 00 (Metal Fabrications)
- .5 Section 06 05 73 (Wood Treatment)
- .6 Section 31 62 19 (Timber Piling)

1.3 Measurement and Payment Procedures

- .1 Timber components will not be measured individually. Payment for work in this Section will be made at the relevant Lump Sum price tendered for TIMBER CHOCKS (re-used material) or TIMBER BULL RAIL (re-used material). Payment shall be full compensation for all work in connection with modification and re-use of timber components (other than timber piles) as described in this Section and on the Drawings.
- .2 Metal fabrications (including through-bolts, straps and anchors) will be measured to Section 05 50 00 (Metal Fabrications), and payment shall include all costs in connection with metal fabrications as specified in that Section.
- .3 Re-use of timber piles will be measured to Section 31 62 19 (Timber Piling), and payment shall include all costs in connection with timber piles as specified in that Section.
- .4 Preservative treatment is considered as incidental to supply and installation of new timber components.

1.4 References

- .1 Canadian Standards Association (CSA):
 - .1 CAN/CSA B111-1974(R2003), Wire Nails, Spikes and Staples.

- .2 CAN/CSA G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .3 CAN/CSA-O86, Engineering Design in Wood.
- .4 CAN/CSA-O80 Series-08, Standard for Wood Preservation.
- .5 CAN/CSA-O121, Douglas Fir Plywood.
- .6 CAN/CSA-O141, Softwood Lumber.
- .2 American Society for Testing and Materials (ASTM):
 - .1 ASTM A 307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - .2 ASTM A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - .3 ASTM A153/A153M, Standard Specification for Zinc Coating (Hot-dip) on Iron and Steel Hardware.
- .3 National Lumber Grades Authority (NLGA):
 - .1 Standard Grading Rules for Canadian Lumber.
- .4 Canadian Institute of Treated Wood and Western Wood Preservers Institute (CITW), Best Management Practices for the Use of Treated Wood in Aquatic Environments.
- .5 Canadian Wood Council (CWC), Wood Design Manual (2005).

1.5 Definitions – Not Used

1.6 Submittals – Not Used

1.7 Quality Control

- .1 Timber shall be identified by grade stamp of a firm certified by Canadian Lumber Standards Accreditation Board.
- .2 Plywood shall be identified by grade mark in accordance with CSA standards.
- .3 Departmental Representative may inspect materials and products at its discretion at all stages of their manufacture, transportation and installation. Satisfactory inspection at any stage does not preclude future rejection. Acceptance will not be made until the materials and products are satisfactorily installed in the completed structure to the project specifications.

1.8 Waste Management and Disposal

- .1 Separate and recycle waste materials in accordance with Section 01 74 19 (Waste Management and Disposal), the Waste Reduction Work Plan, and the Materials Source Separation Program to the maximum extent economically possible.

- .2 Separate wood waste in accordance with the Waste Reduction Work Plan and place in designated areas.
- .3 Separate metal, plastic, wood and corrugated cardboard-packaging in accordance with the Waste Reduction Work Plan and place in designated areas for recycling.
- .4 Do not burn scrap at the project site.
- .5 Fold up metal banding, flatten, and place in designated area for recycling.

2. PART 2 – PRODUCTS

2.1 Framing and Structural Materials

- .1 Timber: (not required for this project)
 - .1 Coastal Douglas Fir No.1 structural grade or better.
 - .2 In accordance with CAN/CSA-O86 and CAN/CSA-O141.
 - .3 Timber to bear a grading stamp of a firm certified by Canadian Lumber Standards Administration Branch, and be in accordance with NLGA Standard Grading Rules for Canadian Lumber.
 - .4 Departmental Representative may inspect materials and products at its discretion at all stages of their manufacture, transportation and assembly. Satisfactory inspection at any stage does not preclude future rejection if the materials or products are subsequently found to lack uniformity or fail to conform to the requirements specified. Acceptance will not be made until the materials or products are satisfactorily installed in the completed structure as specified.
 - .5 Timber to be seasoned with a maximum moisture content of 20%.
 - .6 Timbers to be rough sizes unless noted otherwise.
 - .7 Timbers shall not contain centre cores.
- .2 Plywood: (not required for this project)
 - .1 DFP (Douglas Fir Plywood) Exterior Grade.
 - .2 In accordance with CAN/CSA-O121.
- .3 Plank decking: (not required for this project)
 - .1 Coastal Douglas Fir No.1 76 x 305 mm.
 - .2 In accordance with CAN/CSA-O86 and CAN/CSA-O141.
 - .3 In accordance with NLGA Standard Grading Rules for Canadian Lumber.
 - .4 Decking to be wane free.
 - .5 Timber to be seasoned with a maximum moisture content of 20%.

- .6 Decking lengths: 1.8 m to 6.0 m or longer with a minimum of 90% of planks exceeding 3.0 m. For spans shorter than 3.0 m, use decking of same length as span.

2.2 Accessories

- .1 Nails, spikes and staples: to CAN/CSA-B111. Nails shall be Ardox nails.
- .2 Bolts: 19 mm diameter unless indicated otherwise, complete with nuts and washers.
- .3 Drift Pins: to ASTM A307 or CAN/CSA G40.20/G40.21.
- .4 Proprietary fasteners: lag bolts, screws and other fasteners, recommended for purpose by manufacturer.

2.3 Fastener Finishes

- .1 Hot Dip Galvanizing: to ASTM A153/A153M.

2.4 Wood Preservative

- .1 Wood Treatment: to Section 06 05 73 (Wood Treatment) and to Wood Preservation Canada Best Management Practices for the Use of Treated Wood in Aquatic and Other Sensitive Environments.

3. PART 3 – EXECUTION

3.1 Preparation

- .1 Timbers to be treated shall be cut to final length prior to treatment. Wherever possible, bolt holes and drift pin holes shall be drilled prior to treatment. Treat with wood preservative in accordance with Section 06 05 73 (Wood Treatment).
- .2 Store and protect wood products.
- .3 Timbers shall be handled and installed carefully to avoid damage. Use fibre slings during transportation. Timbers shall not be unloaded by dumping them from a truck or trailer. Peavies, cant hooks, pile hooks or other pointed tools shall not be used for handling treated timbers.

3.2 Selection of Timber Components for Re-use in the Work

- .1 Timber components chosen by Contractor for re-use in the work are to be pre-selected by Contractor as generally suitable for intended use (e.g., as fender chocks or as bull rail). Upon notification of readiness by Contractor, with minimum notification time of twenty-four (24) hours, Departmental Representative will inspect the pre-selected timber components and either accept the timber as being generally suitable for intended use, or require Contractor to replace any unsuitable timber with spare timber available from the jetty

demolition work. Departmental Representative's decision as to acceptability of timber components for re-use in the work is final.

3.3 Installation

- .1 Comply with requirements of the CWC Wood Design Manual supplemented by the following requirements:
 - .1 Install members true to line, levels and elevations, square and plumb.
 - .2 Construct continuous members from pieces of longest practical length.
 - .3 No treated timbers shall be cut on site except as accepted by Departmental Representative.

3.4 Erection

- .1 Frame, anchor, fasten, tie, and brace members to provide necessary strength and rigidity.
- .2 Counterbore bolts where necessary to provide clearance for other work. Fill counterbore holes with mastic after bolts have been tightened.
- .3 Plate washers are required under the heads and nuts of all timber members. Washer sizes to be as indicated on the Drawings.
- .4 Bolts to be tightened from the nut end only and tightened to the full human effort with a spud wrench or with an impact wrench.
- .5 Holes for drift bolts and pins shall be 0.8 to 1.5 mm smaller than the diameter of the drift bolt or pin.
- .6 Holes for bolts shall be same diameter as the bolt, to provide a driving fit.
- .7 Unused holes in pressure treated timber to be plugged with full length pressure treated creosoted dowels and covered with mastic.
- .8 Counterbores shall be filled with mastic after the bolts have been installed and tightened.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section covers the supply of all labour, materials, and equipment required to clean and coat miscellaneous steel items specifically identified within this Section.

1.2 Related Sections

- .1 Section 01 33 00 (Submittal Procedures)
- .2 Section 03 39 00 (In-Situ Concrete Structures)
- .3 Section 05 50 00 (Metal Fabrications)

1.3 Measurement and Payment Procedures

- .1 No measurement or payment will be made under this Section. All work performed to satisfy the requirements of this Section shall be paid under the relevant Sections for which application of coatings to metal items and field touch up is required.

1.4 References

- .1 SSPC-PS COM, Commentary on Painting and Coatings Systems.
- .2 SSPC-SP COM, Surface Preparation Commentary for Steel and Concrete Structures
- .3 SSPC-PA 1, Shop, Field and Maintenance Painting of Steel.
- .4 SSPC-SP 1, Solvent Cleaning.
- .5 SSPC-SP 3, Power Tool Cleaning.
- .6 SSPC-SP 10, Near White Blast Cleaning.
- .7 SSPC-VIS1, Pictorial Surface Preparation Standards for Painting Steel Surfaces.
- .8 SSPC-AB 1, Mineral and Slag Abrasives
- .9 SSPC-AB 2, Cleanliness of Recycled Ferrous Metallic Abrasives
- .10 SSPC-AB 3, Ferrous Metallic Abrasives
- .11 SSPC-Guide 15, Field Methods for Retrieval and Analysis of Soluble Salts on Steel and Other Non-porous Substrates

1.5 Definitions – Not Used

1.6 Submittals

- .1 Coating product literature including case histories, references and colour availability shall be submitted in accordance with Section 01 33 00 (Submittal Procedures) for Departmental Representative's approval, no less than twenty-eight (28) days prior to application.

1.7 Operating Environment

- .1 The work covered by this Section is located above, within and below the intertidal and splash zones.
- .2 The design ambient temperature is from -5°C minimum to 23°C maximum.

2. PART 2 – PRODUCTS

2.1 Materials

- .1 Abrasive blasting materials shall conform to SSPC-SP COM, SSPC-SP 10 and SSPC-AB 1 or SSPC-AB 2 and 3.
- .2 The abrasive size shall be selected to achieve a profile height that satisfies the requirements of the manufacturer for the specified protective coating system.
- .3 Coatings shall be a high solids, surface tolerant, abrasion resistant, low temperature cure two-component epoxy paint system which may be applied to a high film thickness, designed for immersion in saltwater with a proven history of use in marine environments under saltwater immersion conditions.
- .4 Solvents and other cleaners that are used to remove oil, grease, and other soluble contaminants such as salts shall be as recommended by the coating manufacturer and shall conform to SSPC-SP 1.

3. PART 3 – EXECUTION

3.1 Surface Preparation of Steel Fabrications

- .1 All work shall be performed in accordance with SSPC-SP COM.
- .2 Any areas that are contaminated with oil and grease shall be solvent cleaned prior to abrasive blast cleaning, as per SSPC-SP1.
- .3 All steel surfaces to be painted, whether fabrication or casting, shall be abrasive blast cleaned to SSPC-SP 10 and the appearance shall approximate the visual standard SP 10 of SSPC-VIS1.
- .4 The surface profile shall be as specified by the coating manufacturer.

- .5 All traces of abrasive materials shall be removed from the surface by blowing clean, dry compressed air onto the surface.
- .6 The compressed air shall have water/oil traps on the line to prevent contamination of the steel by oil or water.
- .7 Contractor is responsible for taking all measures necessary to prevent an accidental release (paint spill or overspray) to the marine environment, and measures outlined or monitoring required by the EMP or WQMP. In the event of accidental release, the Contractor is responsible for providing an appropriate spill response to limit potential Deleterious Substances from entering the marine environment and to meet water quality criteria as detailed in the WQMP.

3.2 Application of Coating on Steel Fabrications

- .1 All paint coating application shall be done in accordance with the coating manufacturers' recommendations and in conformance with SSPC-PA 1.
- .2 The paint coating shall be applied to the recommended thickness of the coating manufacturer to provide a fifteen (15)-year life expectancy in salt water immersion when five (5) percent to ten (10) percent coating breakdown occurs and active rusting of the steel substrate is present as determined by SSPC-Vis 2 Grade 4. The minimum total thickness of the coating system shall be 400 microns (16 mils).
- .3 All steel must be clean and dry prior to paint coating application. Any cleaned steel not coated within eight (8) hours shall be blast cleaned again.
- .4 All paint coating material shall be delivered to the project site in the original factory-sealed containers bearing the coating manufacturer's labels identifying the product number, batch number, name, colour, instructions for use and WHMIS requirements. Material Safety Data Sheets shall accompany the material and remain on site at all times.
- .5 The shelf life of all paint coating materials, as recommended by the coating manufacturer of each specific product, shall not be exceeded.
- .6 All paint coating materials shall be stored in an area which shall protect the materials from weather and temperature extremes as per the coating manufacturer's recommendations.
- .7 No paint coating application work shall be performed under unfavourable weather conditions unless a suitable heated enclosure is provided which shields the steel from precipitation and provides suitable application temperatures as recommended by the coating manufacturer.
- .8 No paint coatings shall be applied if the conditions for relative humidity, ambient temperature and steel temperature do not satisfy the coating manufacturer's requirements.
- .9 All products shall be thoroughly mixed as per the coating manufacturer's recommended procedures.

- .10 Thinning shall not be allowed except as recommended by the coating manufacturer.
- .11 Monitor and record the wet and dry film thickness of the coatings during application to ensure the proper thickness is attained, as recommended by the coating manufacturer's recommendations for the required service life in salt water immersion.
- .12 Ensure the paint coating system is properly cured prior to handling, transporting or placing the coated items in service.
- .13 When two or more repair coats are to be applied to the steel at the project site and the coatings have been contaminated with oil, grease or soluble salts, wash each repair coat with a suitable cleaner, thoroughly rinse it, dry the surface and then apply the subsequent coats by brush or roller as recommended by the coating manufacturer.
- .14 Containers of the coating material shall be kept sealed when not in use. A solvent float or other method, as recommended by the coating manufacturer, shall be used to re-seal partially full containers.

3.3 Miscellaneous Metal Items

- .1 Unless noted otherwise, all miscellaneous metals not directly referenced within this Section are to be hot dip galvanized in accordance with Section 05 50 00 (Metal Fabrications).
- .2 Vehicle protection bollards shall be cleaned and coated with the coating system specified in Clauses 3.1 and 3.2 of this Section.
- .3 Where metal fabrications that are to be painted are cast within concrete, the faces cast within the concrete are not to be coated with topcoat, but are to be painted with a primer coat of epoxy as recommended by the coating manufacturer.
- .4 Mask all threaded components.
- .5 Ensure all painted steel fabrications are handled by padded slings once they are coated.
- .6 The painted steel fabrications shall be stored and shipped on wooden dunnage padded with carpet at contact points.

3.4 Quality Assurance Inspection

- .1 Departmental Representative, at its sole discretion, may inspect the steel prior to paint application for the degree of cleanliness to check for compliance with SSPC-SP10. No coating work shall be allowed until Departmental Representative has approved the surface preparation.
- .2 Departmental Representative, at its sole discretion, may measure the dry film thickness (DFT) of the coatings on the painted items to check for compliance with these specifications.

3.5 Field Repairs

- .1 Weld areas and areas of coating damage shall be cleaned and re-coated as recommended by the coating manufacturer in general accordance with SSPC-PA 1.
- .2 The coating system on painted items shall be repaired for any damage caused by Contractor's forces prior to completion of the work.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section covers the modification of compressed air pipe system (surface run and buried), as shown on the Drawings. Surface run pipe includes pipework in the existing catwalk and pipework hung under the jetty deck.
- .2 Demolition, removal and salvage of existing compressed air pipe system is further covered under Section 02 41 13 (Selective Site Demolition).

1.2 Related Sections

- .1 Section 01 33 00 (Submittal Procedures)
- .2 Section 01 74 11 (Cleaning)
- .3 Section 01 78 30 (Closeout Submittals)
- .4 Section 01 91 13 (Commissioning Requirements)
- .5 Section 02 41 13 (Selective Site Demolition)

1.3 Measurement and Payment Procedures

- .1 Compressed air pipe work will not be measured individually. Compressed air pipe work will be paid for at the Lump Sum price tendered for MODIFICATIONS TO COMPRESSED AIR SYSTEM. Payment shall be full compensation for laying, jointing, installation, flushing, testing, supply and delivery of materials including pipe, fittings, valves, hangers, supports, and all work necessary or incidental thereto for which separate measurement is not provided elsewhere.

1.4 References

- .1 ASME Boiler and Pressure Vessel Code Section VIII, Division I, Rules for Construction of Pressure Vessels.
- .2 ASTM A53/A53M, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- .3 CSA B242, Groove- and Shoulder-Type Mechanical Pipe Couplings.

1.5 Definitions - Not Used

1.6 Shop Drawings

- .1 Submit shop drawings and product data in accordance with Section 01 33 00 (Submittal Procedures).

1.7 Material Certification

- .1 At least twenty-eight (28) days prior to commencing work, submit manufacturer's test data and certification that pipe materials meet the requirements of this Section. Include manufacturer's drawings, information and shop drawings where pertinent.

1.8 Site Conditions

- .1 The existing compressed air system located in the under-deck catwalk (all designated to be removed during timber jetty demolition works), is in serviceable but contaminated condition. Contamination is primarily faeces from wildlife. Contractor is to be aware of this condition and take all necessary precautions and care during the work. All contaminated portions of services removed from the under-deck catwalk are to be cleaned to remove the aforementioned contamination before disposal off-site. Decontamination / cleaning shall only occur in designated areas with appropriate containment and all wastewater shall be contained and disposed of at an authorized Wastewater Treatment and Disposal Facility.

1.9 Scheduling of Work

- .1 Schedule work to minimize interruptions to existing services.
- .2 The EGD compressed air system is to remain in service throughout construction, except as allowed for in this Section.
- .3 Isolation of the compressed air line serving the South Jetty shall be coordinated with Departmental Representative, and shall be performed in a manner to minimize impact on EGD operations. Out-of-service periods for the EGD compressed air system (excluding South Jetty components to be demolished under this Contract) shall be limited to six (6) hours duration and shall be scheduled to take place at night between 6:00 pm and 6:00 am, unless authorized in writing by Department Representative.
- .4 Notify Departmental Representative a minimum of fourteen (14) days prior to any planned interruption of service. Notify Departmental Representative immediately of any accidental interruption of compressed air system.

2. PART 2 – PRODUCTS

2.1 Pipe, Joints and Fittings

- .1 Steel piping: to ASTM A 53/A 53M, schedule 40 seamless galvanized.
- .2 Joints for steel pipe to be groove-type mechanical pipe couplings.
- .3 Fittings for steel pipe to be ductile iron conforming to ASTM A-536.

2.2 Valves

- .1 Re-use existing valves where possible.
- .2 New ball valves: Class 150, stainless steel body, three piece.

2.3 Hangars and Supports

- .1 Pipe hangers and supports as shown on the Drawings.
- .2 Permanent pipe hangers and supports: hot dipped galvanized after manufacture.
- .3 Pipe hanger and support to manufacturer's standard production components, parts and assemblies.

3. PART 3 – EXECUTION

3.1 Preparation

- .1 All existing utilities are shown according to available record drawings. The Contractor shall locate all existing utilities prior to construction, and shall notify the Departmental Representative of any conflicts a minimum of seventy-two (72) hours prior to construction. Any additional work required as a result of failing to pre-locate known or potential conflicts will be completed at the Contractor's expense.
- .2 Clean pipes, fittings, valves, and appurtenances of accumulated debris and water before installation. Carefully inspect materials for defects. Remove defective materials from site.

3.2 Pipe Installation

- .1 Install piping straight and true to bear evenly on hangers and supports.
- .2 Keep interior and ends of new piping and existing piping thoroughly cleaned of water and foreign matter.
- .3 Keep piping systems clean during installation by means of plugs or other approved methods. When work is not in progress, securely close open ends of piping to prevent entry of water and foreign matter.
- .4 Inspect piping before placing into position. Lay and join pipes to manufacturer's standard instructions and specifications except as noted otherwise herein.
- .5 Handle pipe by methods appropriate to the pipe material and use. Do not use chains or cables passed through pipe bore so that weight of pipe bears on pipe ends.
- .6 Do not exceed permissible deflection at joints as recommended by pipe manufacturer.

- .7 Cut pipes in an approved manner as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.
- .8 Align pipes carefully before jointing.
- .9 Install gaskets to manufacturer's recommendations. Support pipes with hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.
- .10 Avoid displacing gasket or contaminating with dirt or other foreign material. Gaskets so disturbed or contaminated shall be removed, cleaned, lubricated and replaced before jointing is attempted again.
- .11 Minimize deflection after joint has been made.
- .12 Do leakage test and have results approved by Departmental Representative before surrounding and covering joints and fittings with granular material. Backfill remainder of trench.

3.3 Hanger and Support Installation

- .1 Install hangers and supports to manufacturer's recommendations.
- .2 Install hanger so that rod is vertical under operating conditions.
- .3 Adjust hangers to equalize load.

3.4 Valve Installation

- .1 Install valves to manufacturer's recommendations at locations as indicated on the Drawings.

3.5 Leakage Testing

- .1 Provide labour, equipment and materials required to perform hydrostatic and leakage tests hereinafter described.
- .2 Notify Departmental Representative at least twenty-four (24) hours in advance of all proposed tests. Perform tests in presence of Departmental Representative.
- .3 Testing: Pressure test for one (1) hour minimum, to 1,100 kPa, with outlets closed and with compressor isolated from system, and record pressure drop over a one (1) hour period. The test shall be performed once before work commences, and once after work is complete to confirm that the work has not caused a detrimental effect on the system.
- .4 Test for local leakage by applying liquid leak detector to all new interfaces.

3.6 Cleaning

- .1 Cleaning: blow out piping to clean interior thoroughly of oil and foreign matter.

3.7 Operation and Maintenance Manuals

- .1 Provide operation and maintenance manuals, as stipulated in Section 01 78 30 (Closeout Submittals) for new valves or other equipment items installed in the work, if any.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section covers the modification of drainage waste pipe system for sanitary sewer (surface run and buried), as shown on the Drawings. Surface run pipe includes pipework in the existing catwalk and pipework hung under the jetty deck.
- .2 Demolition and removal of existing sanitary sewer is further covered under Section 02 41 13 (Selective Site Demolition).

1.2 Related Sections

- .1 Section 01 33 00 (Submittal Procedures)
- .2 Section 01 74 11 (Cleaning)
- .3 Section 01 78 30 (Closeout Submittals)
- .4 Section 01 91 13 (Commissioning Requirements)
- .5 Section 02 41 13 (Selective Site Demolition)

1.3 Measurement and Payment Procedures

- .1 Drainage waste piping will not be measured individually. Drainage waste piping will be paid for at the Lump Sum price tendered for MODIFICATIONS TO DRAINAGE WASTE PIPING. Payment shall be full compensation for laying, jointing, installation, flushing, testing, supply and delivery of materials including pipe, fittings, valves, hangers, supports, thrust blocks and all work necessary or incidental thereto for which separate measurement is not provided elsewhere.

1.4 References

- .1 ASTM International Inc.
 - .1 ASTM D 1784, Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly Vinyl Chloride (CPVC) Compounds.
 - .2 ASTM D 1785, Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
 - .3 ASTM D 2466, Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
 - .4 ASTM D 2564, Solvent Cements for Poly (Vinyl-Chloride) (PVC) Plastic Piping Systems.
- .2 American National Standards Institute (ANSI)
 - .1 ANSI/AWWA C601, Flushing and Disinfecting.

- .3 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-B137 Series-05, Thermoplastic Pressure Pipe Compendium.
- .4 Green Seal Environmental Standards (GSES)
 - .1 Standard GS-36, Commercial Adhesives.
- .5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .6 South Coast Air Quality Management District (SCAQMD), California State
 - .1 SCAQMD Rule 1168, Adhesive and Sealant Applications.

1.5 Definitions – Not Used

1.6 Shop Drawings

- .1 Submit shop drawings and product data in accordance with Section 01 33 00 (Submittal Procedures).

1.7 Material Certification

- .1 At least twenty-eight (28) days prior to commencing work, submit manufacturer's test data and certification that pipe materials meet the requirements of this Section. Include manufacturer's drawings, information and shop drawings where pertinent.

1.8 Site Conditions

- .1 The existing sanitary sewer system located in the under-deck catwalk (all designated to be removed during timber jetty demolition works), is in serviceable but contaminated condition. Contamination is primarily faeces from wildlife. Contractor is to be aware of this condition and take all necessary precautions and care during the work. All contaminated portions of services removed from the under-deck catwalk are to be cleaned to remove the aforementioned contamination before re-use in the work (where stipulated) or disposal off-site. Decontamination / cleaning shall only occur in designated areas with appropriate containment and all wastewater shall be contained and disposed of at an authorized Wastewater Treatment and Disposal Facility.

1.9 Scheduling of Work

- .1 Schedule work to minimize interruptions to existing services.
- .2 The EGD sanitary sewer system is to remain in service throughout construction, except as allowed in this Section.
- .3 Isolation of the sewer line serving the South Jetty shall be coordinated with Departmental Representative, and shall be performed in a manner to minimize

impact on EGD operations. Out-of-service periods for the EGD sanitary sewer system (excluding South Jetty components to be demolished under this Contract) shall be limited to six (6) hours duration and shall be scheduled to take place at night between 6:00 pm and 6:00 am, unless authorized in writing by Department Representative.

- .4 Notify Departmental Representative a minimum of fourteen (14) days prior to any planned interruption of service. Notify Departmental Representative immediately of any accidental interruption of sanitary sewer force main.

2. PART 2 – PRODUCTS

2.1 Pipe, Joints, and Fittings

- .1 For buried and above ground sanitary waste piping to:
 - .1 CAN/CSA B137
 - .2 ASTM D 1785
 - .3 ASTM D 2466
- .2 Joints: Solvent weld for PVC to ASTM D 2564

2.2 Hangers and Supports

- .1 Pipe hangers and supports as shown on the Drawings.
- .2 Permanent pipe hangers and supports: hot dipped galvanized after manufacture.
- .3 Pipe hangers and support to manufacturer's standard production components, parts and assemblies.

2.3 End Caps

- .1 End caps: as shown on the Drawings.
- .2 Caps to be flexible rubber end caps held in place with jubilee clip. Installation shall be capable of withstanding a pressure equivalent to a 3.0-metre (m) water column.

3. PART 3 – EXECUTION

3.1 Preparation

- .1 All existing utilities are shown according to available record drawings. The Contractor shall locate all existing utilities prior to construction, and shall notify the Departmental Representative of any conflicts a minimum of seventy-two (72) hours prior to construction. Any additional work required as a result of failing to pre-locate known or potential conflicts will be completed at the Contractor's expense.

- .2 Clean pipes, fittings, valves, and appurtenances of accumulated debris and water before installation. Carefully inspect materials for defects. Remove defective materials from site.

3.2 Pipe Installation

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.
- .2 Install in accordance with BC Plumbing Code and local authority having jurisdiction.
- .3 Align pipes carefully before jointing.
- .4 Complete each joint before laying next length of pipe.
- .5 Minimize deflection after joint has been made.
- .6 Cleanouts:
 - .1 Ensure accessible and that access doors are correctly located.
 - .2 Open, cover with linseed oil and re-seal.
 - .3 Verify cleanout rods can probe as far as the next cleanout, at least.
- .7 Test to ensure traps are fully and permanently primed.
- .8 Ensure fixtures are properly anchored, connected to system and effectively vented.
- .9 Affix applicable label (storm, sanitary, vent, pump discharge) c/w directional arrows every floor or 4.5 m (whichever is less).

3.3 Hanger Installation

- .1 Install hangers to manufacturer's recommendations.
- .2 Install hanger so that rod is vertical under operating conditions.
- .3 Adjust hangers to equalize load.

3.4 Testing

- .1 Pressure test end caps to a minimum pressure equivalent to a 3.0-m water column before backfilling. A ball test may be used.

3.5 Flushing

- .1 Flushing operations are to be witnessed by the Departmental Representative.
- .2 Flush water mains through available outlets with a sufficient flow to produce a velocity of 2 metres per second (m/s), within the pipe for ten (10) minutes, or until foreign materials have been removed and flushed water is clear.

- .3 Provide connections and pumps for flushing as required.
- .4 Open and close valves, hydrants, and service connections to ensure thorough flushing.

3.6 Operation and Maintenance Manuals

- .1 Provide operation and maintenance manuals, as stipulated in Section 01 78 30 (Closeout Submittals) for new valves or other equipment items installed in the work, if any required.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section describes the common work results applicable to electrical disciplines.
- .2 Demolition, removal and salvage (where specified) of existing electrical and communication services is covered under Section 02 41 13 (Selective Site Demolition).

1.2 Related Sections

- .1 Section 01 11 55 (General Instructions)
- .2 Section 01 33 00 (Submittal Procedures)
- .3 Section 01 35 33 (Health and Safety Requirements)
- .4 Section 01 51 00 (Temporary Facilities)
- .5 Section 01 61 10 (Product Requirements)
- .6 Section 01 74 19 (Waste Management and Disposal)
- .7 Section 01 78 30 (Closeout Submittals)
- .8 Section 01 91 13 (Commissioning Requirements)
- .9 Section 02 41 13 (Selective Site Demolition)
- .10 Section 26 05 21 (Low Voltage Wires and Cables)

1.3 Measurement and Payment Procedures

- .1 No measurement or payment will be made under this Section. All work performed to satisfy the requirements of this Section shall be paid under the relevant payment items in Section 26 05 21 (Low Voltage Wires and Cables).

1.4 References

- .1 Canadian Standards Association (CSA International)
 - .1 CSA C22.1, Canadian Electrical Code, Part 1 (Current Edition), Safety Standard for Electrical Installations.
 - .2 CSA C22.2 No. 65, Wire Connectors.
 - .3 CAN3-C235, Preferred Voltage Levels for AC Systems, 0 to 50,000 V.
- .2 Electrical and Electronic Manufacturer's Association of Canada (EEMAC)
 - .1 EEMAC 2Y-1, Light Gray Colour for Indoor Switch Gear.

- .3 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)
 - .1 IEEE SP1122, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.
- .4 National Building Code of Canada.
- .5 Telecommunications Industry Association/ Electronic Industries Alliance:
 - .1 TIA/EIA Standard 568C – Commercial building telecommunications wiring standard.

1.5 Definitions

- .1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.

1.6 Operating Requirements

- .1 Operating voltages: to CAN3-C235.
- .2 Motors, control and distribution devices and equipment are to operate satisfactorily at 60 Hz within normal operating limits established by CAN3-C235. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.
- .3 Language operating requirements: provide identification nameplates and labels for control items in English only.

1.7 Site Conditions

- .1 The existing electrical / fibre optic cabling located on cable trays in the under-deck catwalk (all designated to be removed during timber jetty demolition works), are in serviceable but contaminated condition. Contamination is primarily faeces from wildlife. Contractor is to be aware of this condition and take all necessary precautions and care during the work. All contaminated portions of services and cable trays removed from the under-deck catwalk are to be cleaned to remove the aforementioned contamination before re-use in the work (where stipulated) or disposal off-site. Decontamination / cleaning shall only occur in designated areas with appropriate containment and all wastewater shall be contained and disposed of at an authorized Wastewater Treatment and Disposal Facility.

1.8 Scheduling of Work

- .1 Schedule work to minimize interruptions to existing electrical services.
- .2 The EGD electrical services are to remain in service throughout construction, except as allowed in this Section.

- .3 Electrical services within the EGD Work Site are to be de-energized and locked-out throughout construction. Coordinate the de-energization and lock-out of electrical services with Departmental Representative.
- .4 Isolation of the electrical services serving the South Jetty shall be coordinated with Departmental Representative, and shall be performed in a manner to minimize impact on EGD operations. Out-of-service periods for the EGD electrical system (excluding South Jetty components to be demolished under this Contract) shall be limited to six (6) hours duration and shall be scheduled to take place at night between 6:00 pm and 6:00 am, unless authorized in writing by Department Representative.
- .5 Notify Departmental Representative a minimum of fourteen (14) days prior to any planned interruption of service. Notify Departmental Representative immediately of any accidental interruption of electrical system.
- .6 Remove existing electrical services as indicated. New electrical services to be installed and connected to existing electrical services. Coordinate commissioning and energization with Departmental Representative.

1.9 Submittals

- .1 At least twenty-eight (28) days prior to commencing work, provide submittals to Departmental Representative in accordance with Section 01 33 00 (Submittal Procedures).
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheets and include product characteristics, performance criteria, physical size, materials, finish and limitations.
 - .2 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures, maintenance instructions and manuals.
- .3 Shop drawings:
 - .1 Submit drawings stamped and signed by professional Engineer registered or licensed in the Province of BC.
 - .2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure coordinated installation.
 - .3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.
 - .4 Indicate on drawings clearances for operation, maintenance, and replacement of operating equipment devices.

- .5 Submit six (6) copies of drawings and product data to Departmental Representative.
- .6 If changes are required, notify Departmental Representative of these changes before they are made.
- .4 Record Drawings:
 - .1 Provide record (as-built) drawings in accordance with Section 01 78 30 (Closeout Submittals).
- .5 Quality Control:
 - .1 Provide CSA certified equipment and material with visible, legible labels.
 - .2 Where CSA certified equipment and material is not available, submit such equipment and material to Departmental Representative and authority having jurisdiction for approval before delivery to site.
 - .3 Submit test results of installed electrical systems and instrumentation.
 - .4 Permits and fees: in accordance with General Conditions of contract.
 - .5 Submit electrical permit and certificate of acceptance from authority having jurisdiction upon completion of Work to Departmental Representative.

1.10 Quality Assurance

- .1 Qualifications: electrical Work to be carried out by qualified, licensed electricians or apprentices in accordance with authorities having jurisdiction.
- .2 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 33 (Health and Safety Requirements).

1.11 Delivery, Storage and Handling

- .1 Material Delivery Schedule: provide Departmental Representative with schedule within fourteen (14) days after award of Contract.

1.12 Waste Management and Disposal

- .1 Collect and separate waste and packaging materials for reuse, recycling, and disposal in appropriate on-site bins in accordance with Section 01 74 19 (Waste Management and Disposal).
- .2 Divert unused wiring materials from landfill to metal recycling facility or other authorized facility in accordance with the Laws and Regulations and as accepted by Departmental Representative.

1.13 System Start-up

- .1 Instruct Departmental Representative and EGD operating personnel in operation, care and maintenance of systems, system equipment and components, all in accordance with Section 01 91 13 (Commissioning Requirements).

1.14 Operating Instructions

- .1 Provide operating instructions for each system and principal item of equipment, as specified in the technical sections, for use by operation and maintenance personnel.
- .2 Operating instructions to include following:
 - .1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
 - .2 Start-up, proper adjustment, operating, and shutdown procedures.
 - .3 Safety precautions.
 - .4 Procedures to be followed in event of equipment failure.
 - .5 Other items of instruction as recommended by manufacturer of each system or item of equipment.
- .3 Engrave operating instructions on approved laminated plastic.
- .4 Post instructions where directed.
- .5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.
- .6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.
- .7 Operating instructions to be in English language only.

2. PART 2 – PRODUCTS

2.1 Sustainable Requirements Environmental

- .1 Choose products and materials with recycled content or resource efficient characteristics whenever possible. Use least toxic sealants, adhesives, sealers and finishes necessary to comply with the requirements of the project.

2.2 Materials and Equipment

- .1 Provide material and equipment in accordance with Section 01 61 10 (Product Requirements).

- .2 Material and equipment to be CSA certified. Where CSA certified material and equipment are not available, obtain special approval from Departmental Representative and authority having jurisdiction before delivery to site and submit such approval as described in Clause 1.8 Submittals of this Section.
- .3 Material and equipment to be suitable for a damp marine environment.
- .4 Factory assemble control panels and component assemblies.

2.3 Warning Signs

- .1 Warning Signs: in accordance with requirements of authority having jurisdiction and as approved by Departmental Representative.

2.4 Wiring Terminations

- .1 Ensure lugs, terminals, screws used for termination of wiring are suitable for copper conductors.

2.5 Equipment Identification

- .1 Identify electrical equipment with nameplates and labels as follows:
 - .1 Nameplates: 3 mm thick plastic engraving sheet, matte white finish face, black core, lettering accurately aligned and engraved into core.
 - .2 Sizes per Table 26 05 00-1 as follows:

Table 26 05 00-1

Nameplate Sizes

Nameplate Size	Dimensions (mm)	No. Lines	Letter Height (mm)
Size 1	10 x 50	1	3
Size 2	12 x 70	1	5
Size 3	12 x 70	2	3
Size 4	20 x 90	1	8
Size 5	20 x 90	2	5
Size 6	25 x 100	1	12
Size 7	25 x 100	2	6

- .2 Labels: embossed plastic labels with six (6) mm high letters unless specified otherwise.
- .3 Wording on nameplates and labels to be approved by Departmental Representative prior to manufacture.

- .4 Allow for minimum of twenty-five (25) letters per nameplate and label.
- .5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
- .6 Disconnects, starters, contactors: indicate equipment being controlled and voltage.
- .7 Terminal cabinets and pull boxes: indicate system and voltage.
- .8 Transformers: indicate capacity, primary and secondary voltages.

2.6 Wiring Identification

- .1 Identify wiring with permanent indelible identifying markings, numbered coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.
- .2 Maintain phase sequence and colour coding throughout.
- .3 Colour coding: to CSA C22.1.
- .4 Use colour coded wires in communication cables, matched throughout system.

2.7 Conduit and Cable Identification

- .1 Conduit and cable identification tags to be stainless steel with embossed markings at each end of conduit or cable, where conduit or cable enters wall, ceiling, floor, pull pit, tunnel or building, also at each splice.
- .2 Complete cable schedule after installation including cable identification tags and submit to Departmental Representative on the as-built drawings in accordance with Section 01 78 30 (Closeout Submittals).

2.8 Finishes

- .1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.
- .2 Paint indoor switchgear and distribution enclosures light gray to EEMAC 2Y-1.

2.9 Seismic Restraints

- .1 Provide seismic restraints and anchors as indicated on the Drawings for electrical equipment, cabinets, light fixtures, cable trays, and cable supports.
- .2 Seismic restraints and anchors for electrical installations shall be reviewed and certified by a professional structural Engineer registered or licensed in the Province of BC.

3. PART 3 – EXECUTION

3.1 Preparation

- .1 All existing utilities are shown according to available record drawings. The Contractor shall locate all existing utilities prior to construction, and shall notify the Departmental Representative of any conflicts a minimum of seventy-two (72) hours prior to construction. Any additional work required as a result of failing to pre-locate known or potential conflicts will be completed at the Contractor's expense.

3.2 Installation

- .1 Carry out complete installation in accordance with CSA C22.1.
- .2 Construct underground systems in accordance with CSA C22.3 No.1.
- .3 Comply with TIA/EIA-569-C recommendations for separating unshielded copper control, voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
- .4 Obtain and pay for electrical permits and fees, at Contractor's own cost.
- .5 Review drawings from other disciplines for details related to the electrical installation scope of work including bonding of metallic parts. Coordinate electrical works with works of other disciplines such as structural, mechanical and civil disciplines including bonding of metallic parts.

3.3 Nameplates and Labels

- .1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.

3.4 Conduit and Cable Installation

- .1 Install conduit and sleeves prior to pouring of concrete.
 - .1 Sleeves through concrete: plastic, sized for free passage of conduit, and protruding minimum 50 mm.
- .2 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.
- .3 Install cables, conduits and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.
- .4 Arrange for holes through exterior walls and roof to be flashed and made weatherproof.

3.5 Mounting Heights

- .1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.
- .2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.
- .3 Install electrical equipment at following heights unless indicated otherwise.
 - .1 General receptacles: 300 mm.
 - .2 Local switches: 1,400 mm
 - .3 Electrical cabinets: as required by Code or as indicated.

3.6 Coordination of Protective Devices

- .1 Ensure circuit protective devices such as over-current trips, relays and fuses are installed to required values and settings.
- .2 Circuit breaker fault levels may be higher than standard ratings. Coordinate new circuit breaker fault levels with Departmental Representative using existing single line diagrams.

3.7 Field Quality Control

- .1 Load Balance:
 - .1 Measure phase current to panel boards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes.
- .2 Conduct the following tests in accordance with CSA C22.1-09, Canadian Electrical Code, Part 1:
 - .1 Power distribution system including phasing, voltage, grounding and load balancing.
 - .2 Circuits originating from branch distribution panels.
 - .3 Lighting and its control.
 - .4 Systems: fire alarm, communications, SCADA, fibre optic, and telephone.
 - .5 Insulation resistance testing:
 - .1 Megger 350-600 V circuits, feeders and equipment with a 1,000 V instrument.
 - .2 After installing cable but before splicing and/or terminating, perform insulation resistance test on each phase conductor.
 - .3 Check insulation resistance after each splice and/or termination.

- .4 Check each feeder for continuity, short circuits and grounds. Ensure resistance to ground of circuits is not less than 100 megohms for one (1) minute, corrected to 20°C, before energizing.
- .3 Carry out all stipulated electrical tests in presence of Departmental Representative, and upon completion of tests, submit load balance measurements and all electrical test results to Departmental Representative for review.
- .4 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

3.8 Cleaning

- .1 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.
- .2 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section covers supply and installation for low voltage (LV) wire connectors and box connectors.

1.2 Related Sections

- .1 Section 01 33 00 (Submittal Procedures)
- .2 Section 26 05 00 (Common Work Results for Electrical)
- .3 Section 26 05 21 (Low Voltage Wires and Cables)
- .4 Section 26 05 31 (Splitters, Junction Boxes, Pull Boxes and Cabinets)

1.3 Measurement and Payment Procedures

- .1 No measurement or payment will be made under this Section. All work performed to satisfy the requirements of this Section shall be paid under the relevant payment item in Section 26 05 21 (Low Voltage Wires and Cables).

1.4 References

- .1 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-C22.2 No.18, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware.
 - .2 CSA C22.2 No.65, Wire Connectors.
- .2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)
 - .1 EEMAC 1Y-2 Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).
- .3 National Electrical Manufacturers Association (NEMA).

1.5 Submittals

- .1 At least twenty-eight (28) days prior to commencing work, provide submittals to Departmental Representative in accordance with Section 01 33 00 (Submittal Procedures).
- .2 Product Data:

- .1 Submit manufacturer's printed product literature, specifications and datasheets and include product characteristics, performance criteria, physical size, materials, finish and limitations.
- .2 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures and maintenance instructions and manuals.

2. PART 2 - PRODUCTS

2.1 Materials

- .1 Pressure type wire connectors to: CSA C22.2 No.65, with current carrying parts of copper sized to fit copper conductors as required.
- .2 Fixture type splicing connectors to: CSA C22.2 No.65, with current carrying parts of copper sized to fit copper conductors 10 AWG or less.
- .3 Bushing stud connectors: to EEMAC 1Y-2 to consist of:
 - .1 Connector body and stud clamp for stranded copper conductors.
 - .2 Clamp for stranded copper conductors.
 - .3 Stud clamp bolts.
 - .4 Bolts for copper conductors.
 - .5 Sized for conductors as indicated.
- .4 Clamps or connectors for armoured cable, as required to: CAN/CSA-C22.2 No.18.

3. PART 3 – EXECUTION

3.1 Installation

- .1 Remove insulation carefully from ends of conductors and:
 - .1 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CSA C22.2 No.65.
 - .2 Install fixture type connectors and tighten. Replace insulating cap.
 - .3 Install bushing stud connectors in accordance with EEMAC 1Y-2.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section covers supply and installation of low voltage (LV) copper conductors rated from 0 to 1,000 Volts.

1.2 Related Sections

- .1 Section 01 33 00 (Submittal Procedures)
- .2 Section 26 05 00 (Common Work Results for Electrical)
- .3 Section 26 05 20 (Low Voltage Wire and Box Connectors)
- .4 Section 26 05 27 (Grounding)
- .5 Section 26 05 31 (Splitters, Junction Boxes, Pull Boxes and Cabinets)
- .6 Section 26 05 36 (Cable Trays for Electrical Systems)
- .7 Section 26 05 43.01 (Cables in Underground Ducts)

1.3 Measurement and Payment Procedures

- .1 Low voltage electrical system components will not be measured individually. Low voltage electrical system will be paid for under the Lump Sum price tendered for MODIFICATIONS TO LV ELECTRICAL SYSTEM. Payment shall be full compensation for supply, installation, connection and testing of low voltage electrical system complete with conductors, cables, connectors, terminations, outlet/conduit/junction/pull boxes, splitters, cabinets, conduit (including fastenings and fittings), cable trays, hangers, supports, lighting, emergency lighting, fire alarm system, electrical ducts, underground electrical service, disconnections and reconnections, and all work as described in the Drawings and as specified.
- .2 Grounding will be measured to Section 26 05 27 (Grounding), and payment shall include all costs in connection with supply and installation of a complete grounding system.

1.4 References

- .1 Canadian Standards Association (CSA International)
 - .1 CSA-C22.2 No. 38, Thermoset-Insulated Wires and Cables.
 - .2 CSA-C22.2 No. 131, Type Teck 90 Cable.
 - .3 CSA-C22.2 No. 239, Control and Instrumentation Cables.

1.5 Submittals

- .1 At least twenty-eight (28) days prior to commencing work, provide submittals to Departmental Representative in accordance with Section 01 33 00 (Submittal Procedures).
- .2 Product Data:
 - .1 Provide cable splice kit datasheets and installation instructions.
 - .2 Submit manufacturer's printed product literature, specifications and datasheets and include product characteristics, performance criteria, physical size, materials, finish and limitations.
 - .3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures and maintenance instructions and manuals.

2. PART 2 – PRODUCTS

2.1 General

- .1 Conductors and cables to match existing unless otherwise noted.

2.2 Cables and Reels

- .1 Provide new cables on reels or coils.
 - .1 Mark or tag each cable and outside of each reel or coil, to indicate cable length, voltage rating, conductor size, and manufacturer's lot number and reel number.
- .2 Each coil or reel of new cable to contain only one continuous cable without splices.

2.3 Teck 90 Cable

- .1 Cable: in accordance with Section 26 05 00 (Common Work Results for Electrical).
- .2 Conductors:
 - .1 Grounding conductor: copper.
 - .2 Circuit conductors: copper, size as indicated. Minimum size: 12 AWG. Stranded for 10 AWG and larger.
- .3 Insulation:
 - .1 Cross-linked polyethylene (XLPE).
 - .2 Rating: 600 V.

- .4 Inner jacket: polyvinyl chloride (PVC).
- .5 Armour: interlocked aluminum.
- .6 Overall covering: thermoplastic polyvinyl chloride.
- .7 Fastenings:
 - .1 One hole steel straps to secure surface cables 50 mm and smaller. Two hole steel straps for cables larger than 50 mm.
 - .2 Channel type supports for two or more cables at maximum of 600 mm centers.
 - .3 Threaded rods: 6 mm diameter to support suspended channels.
- .8 Connectors:
 - .1 Watertight approved for Teck 90 cable.
- .9 Splice kits:
 - .1 Watertight, inline, cold shrinkable, suitable for the cable and cable support method as indicated on the Drawings.
 - .2 No junction boxes shall be used to enclose the splice.

2.4 Building Wires

- .1 Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG.
- .2 Copper conductors: size as indicated, with 600 V insulation of cross-linked thermosetting polyethylene material rated RW90 XLPE for above-ground applications and RWU90 XLPE for underground duct applications, jacketed.

2.5 Control Cables

- .1 Type: low energy 300 V control cable, stranded annealed copper conductors sized as indicated:
 - .1 Insulation: TW 40 degrees C.
 - .2 Shielding: tape coated with paramagnetic material metallized tapes over each conductor pair.
 - .3 Overall covering: PVC jackets and interlocked armour of aluminum strip.
- .2 Type: 600 V stranded annealed copper conductors, sized as indicated:
 - .1 Insulation: cross-linked polyethylene type RW90 for above-ground applications and RWU90 for underground applications.
 - .2 Overall covering: thermoplastic jacket with sheath of aluminum interlocked armour and jacket over sheath of PVC.

3. PART 3 – EXECUTION

3.1 Field Quality Control

- .1 Perform tests in accordance with Section 26 05 00 (Common Work Results for Electrical).
- .2 Perform tests using method appropriate to site conditions and to approval of Departmental Representative and local authority having jurisdiction over installation.
- .3 Check insulation resistance of each phase conductor after each splice and/or termination.
- .4 Perform tests before energizing electrical system.

3.2 General Cable Installation

- .1 Install cable in ducts in accordance with Section 26 05 43.01 (Cables in Underground Ducts).
- .2 Lay cable in cable trays and strap in accordance with Section 26 05 36 (Cable Trays for Electrical Systems).
- .3 Terminate cables in accordance with Section 26 05 20 (Low Voltage Wire and Box Connectors).
- .4 Make terminations and splices only as indicated leaving 0.6 m of surplus cable in each direction.
 - .1 Make splices and terminations in accordance with manufacturer's instructions using approved splicing kits.
 - .2 All splices to be watertight and tested in accordance with Section 26 05 00 (Common Work Results for Electrical).
 - .3 Install, support, and stagger splices in locations as indicated on the Drawings.
- .5 Cable Colour Coding: to Section 26 05 00 (Common Work Results for Electrical).
- .6 Conductor length for parallel feeders to be identical.
- .7 Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.

3.3 Installation of Teck 90 Cable

- .1 Group cables wherever possible in cable trays and on channels.
- .2 Install exposed cable securely supported by straps.

3.4 Installation of Building Wires

- .1 Install wiring as follows:
 - .1 In underground ducts in accordance with Section 26 05 43.01 (Cables in Underground Ducts).

3.5 Installation of Control Cables

- .1 Install control cables in conduit and underground ducts.
- .2 Ground control cable shield.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section covers the supply, installation, connection and testing of grounding and bonding equipment to items that include, but are not limited to, re-installed high mast light and under-deck cable trays, as indicated on the Drawings.
- .2 Contractor to be aware that the existing steel-piled concrete deck South Jetty structure and adjacent anchored bulkhead wall are equipped with an Impressed Current Cathodic Protection (ICCP) system. Refer also to Section 02 41 13 (Selective Site Demolition) for ICCP removal, storage and reinstatement.

1.2 Related Sections

- .1 Section 01 33 00 (Submittal Procedures)
- .2 Section 02 41 13 (Selective Site Demolition)
- .3 Section 01 91 13 (Commissioning Requirements)
- .4 Section 26 05 00 (Common Work Results for Electrical)
- .5 Section 26 05 21 (Low Voltage Wires and Cables)

1.3 Measurement and Payment Procedures

- .1 Grounding components will not be measured individually. Grounding will be paid for at the Lump Sum price tendered for GROUNDING. Payment shall be full compensation for supply, installation, connection and testing of grounding conductors complete with extensions, grounding lugs and connectors, and all work as described in the Drawings.

1.4 References

- .1 CAN/CSA-C22.1, Canadian Electrical Code, Part 1, Current Edition, Safety Standards for Electrical Installations.
- .2 CAN/CSA-C22.2 No. 41-M, Grounding and Bonding Equipment.
- .3 CAN/CSA-C22.3 No. 2, General Grounding Requirements and Grounding Requirements for Electrical Supply Stations.
- .4 CAN/CSA-W47.1, Certification of Companies for Fusion Welding of Steel.
- .5 CAN/CSA-W48, Filler Metals and Allied Materials for Metal Arc Welding (Developed in cooperation with the Canadian Welding Bureau).
- .6 CAN/CSA-W59, Welded Steel Construction.

1.5 Submittals

- .1 At least twenty-eight (28) days prior to commencing work, provide submittals to Departmental Representative in accordance with Section 01 33 00 (Submittal Procedures).
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheets and include product characteristics, performance criteria, physical size, materials, finish and limitations.
 - .2 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures and maintenance instructions and manuals.

2. PART 2 – PRODUCTS

2.1 Ground Conductors and Connectors

- .1 2/0 AWG bare stranded soft annealed copper bonding conductors.
- .2 #2 AWG green PVC insulated stranded soft annealed copper bonding conductors.
- .3 Ground lugs: Acceptable Products: Burndy YAL-2TC or T&B 54112 or approved alternate.
- .4 Ground studs: Acceptable Products: Burndy GSTUD series or T&B TBGS series or approved alternate.
- .5 Ground conductor connectors: Acceptable Products: Burndy YGHC2-C2 or T&B CTP series or approved alternate.
- .6 Ground conductor splices: Acceptable Products: Burndy YGS or T&B 53512 or approved alternate.
- .7 Rebar ground clamps: Acceptable Products: Burndy GAR3902-BU or T&B 54760 or approved alternate.
- .8 Pipe ground clamps: Acceptable Products: Burndy GAR-TC/3902 or T&B 3905/3906-TB or approved alternate.
- .9 Flexible braided bare copper jumpers: Acceptable Products: Burndy Braid or T&B FB type or approved alternate.
- .10 Other grounding connector types and sizes as required and approved by Departmental Representative.

3. PART 3 – EXECUTION

3.1 General

- .1 All existing utilities are shown according to available record drawings. The Contractor shall locate all existing utilities prior to construction, and shall notify the Departmental Representative of any conflicts a minimum of seventy-two (72) hours prior to construction. Any additional work required as a result of failing to pre-locate known or potential conflicts will be completed at the Contractor's expense.
- .2 Contractor shall install a complete and continuous grounding system in accordance with CAN/CSA-C22.1, Canadian Electrical Code.
- .3 Grounding conductors shall be installed as indicated on the Drawings. Grounding conductors shall form one continuous loop out from the South Substation with permanent connections made between conductors and with conductor taps made where required to bond equipment and metallic parts.
- .4 Grounding of the High Mast #1 Light Standard shall be removed prior to removal of high mast, and inspected by Contractor and Departmental Representative for potential re-use in the work. Grounding shall be re-installed if existing is undamaged and is accepted by Departmental Representative as being in adequate condition for re-use. If existing grounding material is not accepted by Departmental Representative for re-use, provide new material as required.
- .5 All embedded grounding conductors underground and in concrete duct banks shall be bare stranded copper size 2/0 AWG.
- .6 All embedded grounding conductors shall be adequately held in position while concrete is poured.
- .7 Protect exposed grounding conductors from mechanical injury during and after construction.
- .8 Use mechanical connectors for grounding connections to equipment provided with lugs.
- .9 Sharp bends in the conductor shall be avoided.
- .10 Soldered joints are not permitted unless otherwise noted.

3.2 Testing

- .1 Contractor shall test the installed grounding network prior to project completion to confirm the grounding integrity of the Work, as follows:
 - .1 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of Departmental Representative and the local authority having jurisdiction over the installation.
 - .2 Perform tests at all accessible grounding locations.

- .3 Perform tests before energizing electrical system.
- .4 Disconnect ground fault indicator during tests and re-connect when tests are complete.
- .5 Provide test results to Departmental Representative prior to burying ground conductors.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section covers supply and installation for splitters, junction boxes, pull boxes and cabinets.

1.2 Related Sections

- .1 Section 01 33 00 (Submittal Procedures)
- .2 Section 26 05 00 (Common Work Results for Electrical)
- .3 Section 26 05 21 (Low Voltage Wires and Cables)
- .4 Section 26 05 27 (Grounding)

1.3 Measurement and Payment Procedures

- .1 No measurement or payment will be made under this Section. All work performed to satisfy the requirements of this Section shall be paid under the relevant payment item in Section 26 05 21 (Low Voltage Wires and Cables).

1.4 References

- .1 Canadian Standards Association (CSA International)
 - .1 CSA C22.1, Canadian Electrical Code, Part 1, Current Edition.
 - .2 CSA C22.2 No. 40, Cut-out, Junction, and Pull Boxes.
 - .3 CSA C22.2 No. 76, Splitters.

1.5 Submittals

- .1 At least twenty-eight (28) days prior to commencing work, provide submittals to Departmental Representative in accordance with Section 01 33 00 (Submittal Procedures).
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheets and include product characteristics, performance criteria, physical size, materials, finish and limitations.
 - .2 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures and maintenance instructions and manuals.

2. PART 2 – PRODUCTS

2.1 Splitters

- .1 Construction: welded stainless steel enclosure, welded corners and formed cover fixed in place with bolts.
- .2 Terminations: connection blocks to match required size and number of incoming and outgoing conductors as indicated.

2.2 Junction and Pull Boxes

- .1 Construction: welded galvanized steel enclosure for general use and PVC for lighting, SCADA, telephone and fire alarm circuits.
- .2 Covers Flush Mounted: 25 mm minimum extension all around.
- .3 Covers Surface Mounted: screw-on turned edge covers.

2.3 Cabinets

- .1 Construction: welded stainless steel hinged door, latch and catch.
- .2 Type E Empty: surface return flange mounting as indicated.
- .3 Type T Terminal: surface return flange mounting as indicated containing a stainless steel backboard.

3. PART 3 – EXECUTION

3.1 Splitter, Junction, Pull Boxes and Cabinets Installation

- .1 Install pull boxes in inconspicuous but accessible locations.
- .2 Mount splitters, junction boxes, and cabinets with top not higher than 2 m above finished floor except where indicated otherwise.
- .3 Install terminal block as indicated in Type T cabinets.
- .4 Only main junction and pull boxes are indicated. Install additional pull boxes as required by CSA C22.1.

3.2 Identification

- .1 Equipment Identification: to Section 26 05 00 (Common Work Results for Electrical).
- .2 Identification Labels: Size 2 indicating system name, voltage and phase or as indicated.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section covers supply and installation of cable trays and fittings, and re-use of existing cable trays and fittings where applicable.
- .2 Salvage and storage of existing cable trays and fittings are covered under Section 02 41 13 (Selective Site Demolition).

1.2 Related Sections

- .1 Section 01 33 00 (Submittal Procedures)
- .2 Section 02 41 13 (Selective Site Demolition)
- .3 Section 26 05 00 (Common Work Results for Electrical)
- .4 Section 26 05 21 (Low Voltage Wires and Cables)

1.3 Measurement and Payment Procedures

- .1 No measurement or payment will be made under this Section. All work performed to satisfy the requirements of this Section shall be paid under the relevant payment items in Section 02 41 13 (Selective Site Demolition) and in Section 26 05 21 (Low Voltage Wires and Cables).

1.4 References

- .1 Canadian Standards Association (CSA International)
 - .1 CAN/CSA C22.2 No. 126.2, Non-metallic Cable Tray Systems.
- .2 National Electrical Manufacturers Association (NEMA)
 - .1 NEMA FG 1, Fiberglass Cable Tray Systems.
 - .2 NEMA VE 2, Cable Tray Installation Guidelines.

1.5 Submittals

- .1 At least twenty-eight (28) days prior to commencing work, provide submittals to Departmental Representative in accordance with Section 01 33 00 (Submittal Procedures).

- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheets and include product characteristics, performance criteria, physical size, materials, finish and limitations.
 - .2 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures and maintenance instructions and manuals.
- .3 Shop Drawings: submit shop drawings showing materials, finish, dimensions, accessories, layout, and installation details.

1.6 Site Conditions

- .1 The existing cable trays in the under-deck catwalk (all designated to be removed during timber jetty demolition works), are in serviceable but contaminated condition. Contamination is primarily faeces from wildlife. Contractor is to be aware of this condition and take all necessary precautions and care during the work. All contaminated portions of cable trays removed from the under-deck catwalk are to be cleaned to remove the aforementioned contamination before re-use in the work (where stipulated) or disposal off-site. Decontamination / cleaning shall only occur in designated areas with appropriate containment and all wastewater shall be contained and disposed of at an authorized Wastewater Treatment and Disposal Facility.

2. PART 2 – PRODUCTS

2.1 Cable Tray

- .1 Cable trays and fittings: to CAN/CSA C22.2 No. 126.2.
- .2 Existing Trays: Remove all cable trays from the existing utility catwalk under the South/West Jetty in accordance with Section 02 41 13 (Selective Site Demolition). Store and re-use in the Work all existing cable trays that are accepted by Departmental Representative as being undamaged and in suitable condition for re-use.
- .3 New Trays: To match existing re-used tray and as specified in this Section. Ladder type, Class C, fibreglass, minimum 300 mm rung spacing, width as indicated on the Drawings, with depth of 100 mm or as indicated.
- .4 Fittings: horizontal elbows, end plates, drop outs, vertical risers and drops, tees, wyes, expansion joints and reducers where required, manufactured accessories for cable tray supplied.
 - .1 Radii on fittings: 300 mm minimum.
- .5 Barriers where different voltage systems are in same cable tray.

- .6 Provide fire stop material at firewall penetrations.

2.2 Supports

- .1 Cable tray shall be wall-mounted as indicated and supported at 1.5 m intervals unless otherwise noted.

3. PART 3 – EXECUTION

3.1 Installation

- .1 Install complete cable tray system in accordance with NEMA VE 2.
- .2 Provide sufficient space surrounding cable trays to permit access for installing and maintaining cables.
- .3 Remove sharp burrs or projections to prevent damage to cables or injury to personnel.

3.2 Cables in Cable Tray

- .1 Install cables individually.
- .2 Lay cables into cable tray. Use rollers when necessary to pull cables.
- .3 Secure cables in cable tray at 6 m centres, with nylon ties.
- .4 Identify cables with size 2 nameplates in accordance with Section 26 05 00 (Common Work Results for Electrical).

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section covers installation of cables in underground ducts, including supply and installation of protection, markers and testing.
- .2 This Section also covers the installation of surface-run cables, including supply and installation of cable protection.

1.2 Related Sections

- .1 Section 01 33 00 (Submittal Procedures)
- .2 Section 26 05 00 (Common Work Results for Electrical)
- .3 Section 26 05 21 (Low Voltage Wires and Cables)
- .4 Section 31 23 10 (Excavating, Trenching and Backfilling)

1.3 Measurement and Payment Procedures

- .1 No measurement or payment will be made under this Section. All work performed to satisfy the requirements of this Section shall be paid under the relevant payment item in Section 26 05 21 (Low Voltage Wires and Cables).

1.4 References

- .1 Canadian Standards Association, (CSA International)
 - .1 CSA-C22.2 No. 38, Thermoset-Insulated Wires and Cables.
 - .2 CSA-C22.2 No. 131, Type Teck 90 Cable.
 - .3 CSA-C22.2 No. 239, Control and Instrumentation Cables.
 - .4 CSA-C22.3 No. 7, Underground Systems.

1.5 Submittals

- .1 At least twenty-eight (28) days prior to commencing work, provide submittals to Departmental Representative in accordance with Section 01 33 00 (Submittal Procedures).
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheets and include product characteristics, performance criteria, physical size, materials, finish and limitations.

- .2 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures and maintenance instructions and manuals.

2. PART 2 – PRODUCTS

2.1 Cable Protection

- .1 Heavy duty polyethylene metalized core detectable warning tape for cables in ducts.

2.2 Cable Pulling Equipment

- .1 Six (6) mm stranded nylon pull rope tensile strength five (5) kN.

3. PART 3 – EXECUTION

3.1 Cable Installation in Ducts

- .1 Install cables as indicated in ducts. Do not pull spliced cables inside ducts.
- .2 Install multiple cables in duct simultaneously.
- .3 Use CSA approved lubricants of type compatible with cable jacket to reduce pulling tension.
- .4 To facilitate matching of colour coded multi-conductor control cables reel off in same direction during installation.
- .5 Before pulling cable into ducts and until cables are properly terminated, seal ends of cables with moisture seal tape to prevent ingress of foreign materials, salt water moisture or gases.
- .6 After installation of cables, seal duct ends with duct sealing compound suitable to prevent ingress of salt water moisture and submit a shop drawing for the material.
- .7 Place warning tape at least 300 mm below finished grade above full length of duct bank.
- .8 Make terminations and splices only as indicated leaving 0.6 m of surplus cable in each direction.
 - .1 Make splices and terminations in accordance with manufacturer's instructions using approved splicing kits.
 - .2 All splices to be watertight and tested in accordance with Clause 3.3 of this Section.
 - .3 Install, support, and stagger splices in locations as indicated on the Drawings.

3.2 Markers

- .1 Mark cable at changes in direction, at cable ends, at cable splices, and where cables enter wall, tunnel, or structure.
- .2 Where markers are removed to permit installation of additional cables, reinstall existing markers.

3.3 Field Quality Control and Testing

- .1 Perform tests in accordance with Section 26 05 00 (Common Work Results for Electrical).
- .2 Perform tests using qualified personnel. Provide necessary instruments and equipment. Instruments and equipment for performing tests shall have calibration certifications in accordance with InterNational Electrical Testing Association (NETA) testing requirements.
- .3 Check phase rotation and identify each phase conductor of each feeder.
- .4 Testing of 350-600 V circuits:
 - .1 After installing cable but before splicing and/or terminating, perform insulation resistance test on each phase conductor.
 - .2 Check insulation resistance after each splice and/or termination.
 - .3 Check each feeder for continuity, short circuits and grounds. Ensure resistance to ground of circuits is not less than 100 megohms for one (1) minute, corrected to 20°C, before energizing.
- .5 Carry out all stipulated electrical tests in presence of Departmental Representative, and upon completion of tests, submit load balance measurements and all electrical test results to Departmental Representative for review.
- .6 Remove and replace entire length of cable if cable fails to meet any of test criteria.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section covers modification of receptacles and cover plates.

1.2 Related Sections

- .1 Section 01 33 00 (Submittal Procedures)
- .2 Section 01 74 19 (Waste Management and Disposal)
- .3 Section 26 05 00 (Common Work Results for Electrical)
- .4 Section 26 05 21 (Low Voltage Wires and Cables)
- .5 Section 26 05 31 (Splitters, Junction Boxes, Pull Boxes and Cabinets)

1.3 Measurement and Payment Procedures

- .1 No measurement or payment will be made under this Section. All work performed to satisfy the requirements of this Section shall be paid under the relevant payment item in Section 26 05 21 (Low Voltage Wires and Cables).

1.4 References

- .1 Canadian Standards Association (CSA International)
 - .1 CSA-C22.2 No.42-99(R2009), General Use Receptacles, Attachment Plugs and Similar Devices.
 - .2 CSA-C22.2 No.42.1-00(R2009), Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).

1.5 Submittals

- .1 Submit shop drawings and product data in accordance with Section 01 33 00 (Submittal Procedures).

2. PART 2 – PRODUCTS

2.1 Materials

- .1 Remove and re-use existing undamaged, good condition receptacles and cover plates as indicated on the Drawings. Take note of all connections. Provide new devices if required to match existing.

2.2 Receptacles

- .1 Single receptacle 208 V, 3 phase, 3 pole, 4 wire grounding, 20-30 A, as indicated on the Drawings with the following features:
 - .1 Suitable for No. 8 AWG for top, bottom, and back wiring.
 - .2 Watertight spring-loaded hinged cover complete with gaskets.
 - .3 Non-metallic enclosure rated NEMA 4X.
- .2 Single receptacle 120 V, single phase, 2 pole, 3 wire grounding, 20 A, as indicated on the Drawings with the following features:
 - .1 Suitable for No. 10 AWG for top, bottom, and back wiring.
 - .2 Watertight spring-loaded hinged cover complete with gaskets.
 - .3 Non-metallic enclosure rated NEMA 4X.

2.3 Cover Plates

- .1 Cover plates for wiring devices to: CSA-C22.2 No.42.1.

3. PART 3 - EXECUTION

3.1 Installation

- .1 Receptacles:
 - .1 Mount receptacles at height in accordance with Section 26 05 00 (Common Work Results for Electrical).

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section covers modifications to fire alarm systems and components, including:
 - .1 Modification and re-installation for fire alarm systems.
 - .2 Manual alarm pull stations.
 - .3 Locator lights.
 - .4 Remote horn terminal box.
 - .5 Fire alarm terminal box.
 - .6 System testing and re-programming as required for system modifications.

1.2 Related Sections

- .1 Section 01 33 00 (Submittal Procedures)
- .2 Section 01 78 30 (Closeout Submittals)
- .3 Section 01 91 13 (Commissioning Requirements)
- .4 Section 26 05 00 (Common Work Results for Electrical)
- .5 Section 26 05 20 (Low Voltage Wire and Box Connectors)
- .6 Section 26 05 21 (Low Voltage Wires and Cables)
- .7 Section 26 05 27 (Grounding)
- .8 Section 26 05 31 (Splitters, Junction Boxes, Pull Boxes and Cabinets)

1.3 Measurement and Payment Procedures

- .1 No measurement or payment will be made under this Section. All work performed to satisfy the requirements of this Section shall be paid under the relevant payment item in Section 26 05 21 (Low Voltage Wires and Cables).

1.4 References

- .1 Government of Canada
 - .1 TB OSH Chapter 3-03, Treasury Board of Canada, Occupational Safety and Health, Chapter 3-03, Standard for Fire Protection Electronic Data Processing Equipment.
 - .2 TB OSH Chapter 3-04, Treasury Board of Canada, Occupational Safety and Health, Chapter 3-04, Standard for Fire Alarm Systems.

- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .3 Underwriter's Laboratories of Canada (ULC)
 - .1 CAN/ULC-S524, Installation of Fire Alarm Systems.
 - .2 CAN/ULC-S525, Audible Signal Device for Fire Alarm Systems.
 - .3 CAN/ULC-S527, Control Units for Fire Alarm Systems.
 - .4 CAN/ULC-S528, Manual Pull Stations for Fire Alarm Systems.
 - .5 CAN/ULC-S536, Inspection and Testing of Fire Alarm Systems.
 - .6 CAN/ULC-S537, Verification of Fire Alarm Systems.
- .4 National Fire Protection Agency
 - .1 NFPA 72, National Fire Alarm Code.

1.5 Submittals

- .1 At least twenty-eight (28) days prior to commencing work, provide submittals to Departmental Representative in accordance with Section 01 33 00 (Submittal Procedures).
- .2 Product Data: (new material is not required for this project)
 - .1 Submit manufacturer's printed product literature, specifications and datasheets and include product characteristics, performance criteria, physical size, materials, finish and limitations.
 - .2 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures and maintenance instructions and manuals.
- .3 Shop Drawings:
 - .1 Submit shop drawings in accordance with Section 01 33 00 (Submittal Procedures).
 - .1 Shop drawings: stamped and signed by professional Engineer registered or licensed in the Province of BC, Canada.
 - .2 Include:
 - .1 Layout of equipment.
 - .2 Equipment and enclosure datasheets and drawings.
 - .3 Complete wiring diagram, including schematics of modules.
- .4 Quality assurance submittals: submit following in accordance with Section 01 33 00 (Submittal Procedures).

- .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties. (not required for this project)
- .2 Instructions: submit manufacturer's installation instructions.
- .5 Closeout Submittals:
 - .1 Submit maintenance and Engineering data for incorporation into manual specified in Section 01 78 30 (Closeout Submittals) in accordance with ANSI/NFPA 20.
 - .2 Departmental Representative will delegate authority for review and approval of submittals required by this Section.
 - .3 Submit to Departmental Representative two (2) sets of approved submittals and drawings immediately after approval but no later than fourteen (14) days to prior to final inspection.
 - .4 Submit following:
 - .1 Manufacturer's Data for: (new material is not required for this project)
 - .1 Manual pull stations.
 - .2 Locator lights and guards.
 - .3 Audible signal devices.
 - .4 Terminal boxes and cabinets.
 - .5 Cables and connectors.
 - .6 Weatherproof enclosures.
 - .7 Submit one (1) original for each item and clear, legible, first-generation photocopies for remainder of specified copies.
 - .2 System wiring diagrams:
 - .1 Submit complete wiring diagrams of system showing points of connection and terminals used for electrical connections in the system.
 - .3 Test Reports:
 - .1 Preliminary testing:
 - .1 Final acceptance testing.
 - .2 Submit for inspections and tests specified under Field Quality Control.

1.6 Quality Assurance

- .1 Qualifications:
 - .1 Installer: company or person specializing in fire alarm system installations with five (5) years of documented experience.
- .2 Provide services of representative or technician from manufacturer of system, experienced in installation and operation of type of system being provided, to supervise installation, adjustment, preliminary testing, and final testing of system and to provide instruction to project personnel.
- .3 System:
 - .1 To TB OSH Chapter 3-04.
 - .2 Subject to Fire Protection Engineering Services, HRSDC approval.
 - .3 Subject to Fire Protection Engineering Services, HRSDC inspection for final acceptance.
- .4 Extra Materials: (new material not required for this project)
 - .1 Provide maintenance materials in accordance with Section 01 78 30 (Closeout Submittals).
 - .2 Include:
 - .1 Spare glass rods for manual pull box stations.
- .5 Maintenance Service: (not required for this project)
 - .1 Provide one (1) year's free maintenance with two (2) inspections by manufacturer during warranty period. Inspection tests to conform to CAN/ULC-S536. Submit inspection report to Departmental Representative.

2. PART 2 – PRODUCTS

2.1 Materials (new materials not required for this project)

- .1 New equipment, devices, nameplates, and labels covered by this Section shall be provided to match existing equipment by Edwards Systems Technology unless otherwise noted.
- .2 Equipment and devices: ULC listed and labelled and supplied by single manufacturer.
- .3 Manual pull stations: to CAN/ULC-S528.

2.2 System Operation

- .1 Remove and re-use existing undamaged, good condition manual fire and emergency pull stations, locator lights, remote horn terminal boxes, and fire alarm terminal boxes as indicated on the Drawings. Take note of all connections.
- .2 Advise Departmental Representative if any existing equipment is not in suitable condition to re-use on the Project. Provide new devices if required to match existing.
- .3 Fire alarm devices shall be electrically supervised, zoned, and annunciated by the existing emergency and fire alarm system.
- .4 Provide separate circuits from the appropriate booster panel fed by the main fire alarm control panel, an Edwards Systems Technology EST-3 type, in the EGD Pump House to the respective zone of initiating devices.
- .5 Single stage operation. Operation to actuation following:
 - .1 Manual pull station.
- .6 Actuation of single operation device to initiate following:
 - .1 Emergency alarm devices to operate continuously.
 - .2 Transmit signal via main control panel the same as with existing devices.
 - .3 Zone of alarm device to be updated and indicated on the main control panel and remote annunciators.
 - .4 Operations to remain in alarm mode (except alarm notification appliances if manually silenced) until system is manually restored to normal.

2.3 Manual Alarm Stations

- .1 Provide non-coded single action type with mechanical reset features. (new material not required for this project)
 - .1 Non-coded single pole normally open contact for single stage.
- .2 Stations: surface mounted in weatherproof cabinet with hinged door to match existing. (new material not required for this project)
 - .1 Acceptable Product: SIGA-270 pull station by Edwards Systems Technology or approved alternate.
 - .2 For surface mounting provide station manufacturer's approved back box.
 - .3 Back box finish to match station finish.
- .3 Equip each station with terminal strip with contacts of proper number and type to perform functions required.
- .4 Stations: type not subject to operation by jarring or vibration. (new material not required for this project)

- .1 Break-glass-front stations are not permitted; pull-lever break-rod type is acceptable provided presence of rod is not required to reset station.
- .5 Station colour: red.
- .6 Provide station with visible indication of operation.
- .7 Restoration to require use of key (if applicable for existing stations).
 - .1 Keys: identical throughout system for stations and control panels.
- .8 Mount stations with operating lever not more than 1.2 m above finished floor.
- .9 Where weatherproof stations are required, provide stations with cast metal, weatherproof housings with hinged access doors to match existing.
 - .1 For fire alarm pull stations, finish housings with red enamel paint to match existing and provide permanently affixed engraved plastic signage indicating “IN CASE OF FIRE LIFT DOOR AND PULL HANDLE” with white letters on red plastic, with text/label size and type to match existing, and in both English and French languages.
 - .2 For emergency pull stations, finish housings with blue enamel paint to match existing and provide permanently affixed engraved plastic signage indicating “IN CASE OF EMERGENCY LIFT DOOR AND PULL HANDLE” with white letters on blue plastic, with text/label size and type to match existing, and in both English and French languages.

2.4 Locator Lights

- .1 Purpose: Locator lights shall be used to find manual pull stations in the dark and shall be continuously energized. Locator lights shall be fed from circuits on the standby power system.
- .2 Lamp and luminaire type: Standard 60 W equivalent compact fluorescent lamp; red glass cover. (new material not required for this project)
- .3 Protection: Mechanically protect with a guard surrounding the glass cover and a steel braced u-shaped bar to protect from falling objects.
- .4 Location: Mount just above manual pull station weatherproof enclosure on a shared steel plate mounted to a pole.

2.5 Audible Signal Devices

- .1 Remote horn terminal boxes: weatherproof, to match existing, for connection to ship horn signaling devices. Ship horn signaling devices are by others. (new material is not required for this project)
- .2 Do not exceed 80 percent of listed rating in amperes of notification appliance circuit. Provide additional circuits above those shown if required to meet this requirement.

- .3 Provide appliances specifically listed for outdoor use in locations exposed to weather.
- .4 Finish housings with red enamel paint and provide permanently affixed engraved plastic signage indicating "F/A HORN XXX" with white letters on red plastic, where "XXX" is the equipment designation/tag, with text/label size and type to match existing, and in both English and French languages.
- .5 For surface mounting provide appliance manufacturer's approved back box. Back box finish to match appliance finish.

2.6 Fire Alarm Terminal Boxes

- .1 Fire alarm terminal boxes: weatherproof, to match existing, for terminating manual fire and emergency pull station and remote ship horn signaling devices. (new material is not required for this project)
- .2 Provide permanently affixed engraved plastic signage indicating "FIRE ALARM XXX" with white letters red plastic, where "XXX" is the equipment designation/tag, with text/label size and type to match existing, and in both English and French languages.

2.7 Wiring

- .1 Wire for 120 V circuits: No. 12 AWG minimum solid copper conductor.
- .2 Wire for low voltage DC circuits: No. 14 AWG minimum solid copper conductor.
- .3 Wire to remote annunciators: No. 18 AWG minimum solid copper conductor.
- .4 Wire for connection to communication data loop: No. 12 AWG minimum solid copper conductor.
- .5 Insulation 75 degrees C minimum with nylon jacket.
- .6 For underground or wet allocations cable from control panel to master box and to telegraphic loop: type UF.
- .7 For fire alarm cables in underground ducts: shielded, FT4 rated, fire alarm cable with an overall Polyolefin jacket, size as indicated on the Drawings.
- .8 Colour code wiring.

3. PART 3 – EXECUTION

3.1 Preparation

- .1 All existing utilities are shown according to available record drawings. The Contractor shall locate all existing utilities prior to construction, and shall notify the Departmental Representative of any conflicts a minimum of seventy-two (72) hours prior to construction. Any additional work required as a result of failing to

pre-locate known or potential conflicts will be completed at the Contractor's expense.

3.2 Manufacturer's Instructions

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.3 Installations

- .1 Install systems in accordance with CAN/ULC-S524 and TB OSH Chapter 3-04.
- .2 Locate and install manual alarm stations and connect to alarm circuit wiring.
- .3 Locate and install locator lights and connect to 120 V standby power supply.
- .4 Connect alarm circuits to fire alarm terminal box.
- .5 Locate and install remote horn terminal boxes and connect to signalling circuits.
- .6 Connect signalling circuits to fire alarm terminal box.
- .7 Locate and install fire alarm terminal boxes and connect to alarm and signalling circuits.
- .8 Connect fire alarm terminal box circuits to booster panel or main fire alarm control panel where required.
- .9 Make grounding and bonding connections in accordance with Section 26 05 27 (Grounding).

3.4 Field Quality Control

- .1 Site Tests and Re-programming:
 - .1 Perform tests in accordance with CAN/ULC-S536, Inspection and Testing of Fire Alarm Systems and Section 26 05 00 (Common Work Results for Electrical).
 - .2 Engage Edwards Systems Technology (Victoria, BC) to test and verify functionality of all installed devices and to re-program the manual pull stations and audible signal devices at the main EST-3 fire alarm control panel in the EGD Pump House. Departmental Representative will provide to Contractor a copy of the original CAN/ULC-S537 Appendix 'C' Fire Alarm Verification Report for the existing EGD fire alarm system for information purposes. Submit a completed CAN/ULC-S537 Appendix 'C' Fire Alarm Verification Report Form for the work to Departmental Representative who will maintain a copy of the Verification Report on the premises for examination by the authority having jurisdiction.

- .3 Liaise with the Departmental Representative to coordinate access into the EGD Pump House to perform the required tests and re-programming work.
- .4 Fire alarm system tests after both temporary and permanent installations:
 - .1 Test each device and alarm circuit to ensure manual pull stations and audible signal devices transmit alarm to control panel and actuate the general alarm.
 - .2 Check annunciator panels to ensure zones are shown correctly.
 - .3 Simulate grounds and breaks on alarm and signalling circuits to ensure proper operation of system.
 - .4 Class A circuits:
 - .1 Test each conductor on circuits for capability of providing alarm signal on each side of single open-circuit fault condition imposed near midmost point of circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.
 - .2 Test each conductor on circuits for capability of providing alarm signal during ground-fault condition imposed near midmost point of circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.
 - .5 Class B circuits:
 - .1 Test each conductor on circuits for capability of providing alarm signal on line side of single open-circuit fault condition imposed at electrically most remote device on circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.
 - .2 Test each conductor on circuits for capability of providing alarm signal during ground-fault condition imposed at electrically most remote device on circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.

3.5 Cleaning

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

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section covers excavation, trenching and backfilling related to termination and modification of underground utilities, as specified in Section 22 15 00 (Compressed Air Systems), Section 22 33 18 (Drainage Waste Piping – Plastic), Section 26 05 00 (Common Work Results for Electrical), and Section 33 11 16 (Water Utility Distribution Piping), and as shown on the Drawings.
- .2 Measurement and payment for upland overburden excavations is covered separately under Section 35 20 23 (Dredging, Barge Dewatering and In-water Transportation).
- .3 Transportation and disposal of upland overburden excavation materials (including measurement and payment thereof), is covered separately under Section 35 20 23.01 (Offloading, Upland Transportation and Disposal).
- .4 Dredging is covered separately under Section 35 20 23 (Dredging, Barge Dewatering, and In-Water Transportation) and Section 35 20 23.01 (Offloading, Upland Transportation and Disposal).

1.2 Related Sections

- .1 Section 01 11 55 (General Instructions)
- .2 Section 01 33 00 (Submittal Procedures)
- .3 Section 01 74 19 (Waste Management and Disposal)
- .4 Section 22 15 00 (Compressed Air Systems)
- .5 Section 22 33 18 (Drainage Waste Piping – Plastic)
- .6 Section 26 05 00 (Common Work Results for Electrical)
- .7 Section 31 24 15 (General Fill)
- .8 Section 32 11 19 (Granular Sub-Base)
- .9 Section 32 11 23 (Aggregate Base Courses)
- .10 Section 33 11 16 (Water Utility Distribution Piping)
- .11 Section 35 20 23 (Dredging, Barge Dewatering and In-Water Transportation)
- .12 Section 35 20 23.01 (Offloading, Upland Transportation and Disposal)

1.3 Measurement and Payment Procedures

- .1 No separate measurement or payment will be made for excavation associated with the work of Section 22 15 00 (Compressed Air Systems), Section 22 33 18 (Drainage Waste Piping – Plastic), Section 26 05 00 (Common Work Results for Electrical), and Section 33 11 16 (Water Utility Distribution Piping).

- .2 No separate payment will be made for shoring support of excavations or for underpinning of structures.
- .3 Measurement and payment for granular fills is covered under Section 31 24 15 (General Fill), Section 32 11 19 (Granular Sub-Base) and Section 32 11 23 (Aggregate Base Courses).

1.4 References

- .1 ASTM C117, Test Method for Materials Finer Than 75- μm (No. 200) Sieve in Mineral Aggregates by Washing.
- .2 ASTM C136, Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- .3 ASTM D1557, Test Methods for Laboratory Compaction Characteristics of Soils Using Modified Effort (56,000 ft-lb/ft³ (2,700 kN-m/m³)).
- .4 CAN/CGSB-8.1, Sieves, Testing, Woven Wire, Inch Series.
- .5 CAN/CGSB-8.2, Sieves, Testing, Woven Wire, Metric.
- .6 Esquimalt Harbour – Practices and Procedures. Section 7: Towing of Ships.

1.5 Definitions

- .1 Overburden: Soil material that is not bedrock.
- .2 Minimum Line of Excavation: Line or plane, beyond which no soil or rock will be permitted to protrude.

1.6 Submittals

- .1 Soil Management Plan: At least twenty-eight (28) days prior to commencing upland bulk excavation work, and in accordance with Section 01 33 00 (Submittal Procedures), submit for review by Departmental Representative design, drawings and supporting data prepared by qualified professional engineer registered or licensed in the Province of British Columbia, showing proposed method and sequencing of work and product data for excavation, shoring and underpinning for excavations. The Soil Management Plan shall address removal of surface vegetation, excavation of overburden materials at upland excavations, sampling and testing for contaminants within excavations and in excavated soils, and disposal of excavated materials off-site to an approved location.
- .2 Waste Reduction Work Plan: At least twenty-eight (28) days prior to start of bulk excavation work, submit detailed Waste Reduction Work Plan in accordance with Section 01 74 19 (Waste Management and Disposal) and indicate:
 - .1 Descriptions of types and anticipated quantities of materials to be salvaged, reused, recycled, and land-filled.
 - .2 Schedule of excavation, shoring, and underpinning.
 - .3 Number and location of dumpsters.

- .4 Anticipated frequency of tippage.
- .5 Names and addresses of hauliers, waste facilities, and waste receiving organizations.

2. PART 2 – PRODUCTS

2.1 Materials

- .1 Bedding and surround of underground services (compressed air, sanitary, fire main), and bedding at termination pits: Granular material as specified in Section 33 11 16 (Water Utility Distribution Piping) and as shown on the Drawings.
- .2 Other backfill material below subgrade level: General fill to Section 31 24 15 (General Fill), or selected material from excavation on site, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials.
- .3 During backfilling, Contractor shall, at its own cost, conduct ongoing quality control sampling and testing to confirm that the gradations, physical and chemical properties, and compaction of the specified backfill materials conform to the relevant Sections of the specification. All quality control test reports shall be submitted to Departmental Representative for review and approval prior to placement of that material in the Work.
- .4 During placement, Departmental Representative may, at its discretion, inspect the backfilled materials for conformance to the specification. This quality assurance inspection may include sampling and testing at no cost to Contractor, unless material does not conform, whereon the testing shall be at Contractor's expense.
- .5 Failure of a sample to meet any one of the specified gradation and physical and chemical properties constitutes an unacceptable material and such material may be subject to rejection by Departmental Representative.

3. PART 3 – EXECUTION

3.1 Site Preparation

- .1 Prior to start of excavation work, remove obstructions, ice, snow, trees, shrubs and all organic matter from surfaces to be excavated.

3.2 Protection of Existing Features

- .1 Comply with Section 01 11 55 (General Instructions) and Laws and Regulations to protect existing features.
- .2 Existing buried/overhead utilities, retaining walls, and buried structures:
 - .1 Several utilities exist within the work area, such as: electrical power, control and telecommunication lines; electrical duct banks; potable water

- lines; high mast lighting; fire protection mains; compressed air lines; sanitary sewers and storm water drains.
- .2 Many utilities and structures exist within the adjacent areas of the Esquimalt Graving Dock Facility.
- .3 Protect existing buried/overhead utilities, duct banks, retaining walls and buried structures from damage while work is in progress and repair damage resulting from work.
- .4 Where excavations cross or run adjacent to existing utilities, hand excavate in the vicinity of the existing utilities to determine actual location.
- .3 Existing buildings and surface features:
 - .1 Protect existing buildings, structures, fences, bench marks and monuments from damage while work is in progress and repair damage resulting from work.

3.3 Shoring, Bracing and Underpinning

- .1 Engage services of a qualified Professional Engineer who is registered in B.C. to design and inspect shoring, bracing, and underpinning required for work.
- .2 Construct temporary works to depths, heights and locations as required for the Works, and as required by the relevant Authorities and Codes.
- .3 Shotcrete and/or soil nails shall not be used as temporary shoring for excavations.
- .4 Sheet-piling, if used by Contractor as temporary shoring for excavations, shall not be left in place permanently.
- .5 During backfill operations:
 - .1 Remove sheeting and shoring from excavations, except as allowed otherwise in this Section.
 - .2 Do not remove bracing until backfilling has reached respective levels of such bracing.
 - .3 Pull sheeting in increments that will ensure compacted backfill is maintained at an elevation at least 500 mm above toe of sheeting.

3.4 Upland Excavation

- .1 Do all work in accordance with approved Soil Management Plan and Waste Reduction Work Plan (as described in Clause 1.6 of this Section).
- .2 Excavate upland overburden soils to the minimum lines of excavation as shown on the Drawings, or if minimum lines of excavation are not shown excavate to lines, grades, elevations, and dimensions as indicated.
- .3 Protect stockpiled materials from contamination and freezing.

- .4 The upland overburden soils required to be excavated are contaminated and, along with any entrained water or water arising in excavations, shall be considered IL+ waste classification material for disposal. Refer to Section 35 20 23 (Dredging, Barge Dewatering and In-Water Transportation) and Section 35 20 23.01 (Offloading, Upland Transportation and Disposal) for removal and disposal requirements. Handling, transportation, and disposal of upland excavation soil (and any entrained water or water arising in excavations) shall be performed the same as dredged material.
- .5 If Hazardous Waste Quality Sediment is suspected or observed during upland excavation activities, the Contractor shall notify the Departmental Representative. The Contractor shall perform, at its own cost, sampling and testing for contaminants within excavations and in excavated overburden soils that may be required for health and safety, transport, disposal, or to meet Laws and Regulations or permit requirements.
- .6 Excavation must not interfere with the foundation bearing support area at existing adjacent footings, defined as being within lines extending downwards from bottom edges of the footing at 45° outward splay from the vertical plane.
- .7 Soil at inverts of excavations to be undisturbed soil or fill, level, free from loose, soft, or organic matter.
- .8 Notify Departmental Representative when bottom of excavation is reached. The Departmental Representative, at its sole discretion, may elect to sample the excavated surfaces prior to backfilling.
- .9 Obtain Departmental Representative approval of completed excavation.
- .10 Remove unsuitable material from trench bottom to extent and depth as directed by Departmental Representative.
- .11 Where required due to unauthorized over-excavation, correct by backfilling with general fill compacted as specified in Section 31 24 15 (General Fill), or to the specified compaction density for the backfill material for which the excavation was being prepared, as appropriate to the situation.
- .12 Hand trim, make firm and remove loose material and debris from excavations. Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.

3.5 Dewatering and Heave Prevention

- .1 Keep excavations free of water while work is in progress.
- .2 Avoid excavation below groundwater (tidal) level, except where indicated on the Drawings.
- .3 Protect open excavations against flooding and damage due to surface run-off.
- .4 Dispose of water in a manner not detrimental to any portion of work completed or under construction. Provide flocculation tanks, settling basins, or other treatment

facilities to remove suspended solids or other materials before discharging to storm sewers or the sea.

- .5 Refer to Clause 3.4.4 of this Section for constraints on disposal of contaminated water (entrained in excavated soil or water arising in excavations).

3.6 Transportation and Disposal of Upland Excavated Materials

- .1 Transport and dispose of all upland excavated materials as stipulated in Section 35 20 23 (Dredging, Barge Dewatering and In-Water Transportation) and Section 35 20 23.01 (Offloading, Upland Transportation and Disposal).
- .2 All upland excavated materials shall be transported from the EGD Work Site using waterborne equipment (i.e., barges). No re-use of excavated materials in the work is allowed. Contractor shall use principal and trailing tugboats whenever towing barges or other vessels to the EGD Work Site in accordance with the Esquimalt Harbour Practices and Procedures for towing of ships.
 - .1 The current Esquimalt Harbour Practices and Procedures can be viewed and downloaded from:
<http://www.navy-marine.forces.gc.ca/en/about/structure-marpac-poesb-practices-procedures.page>.
- .3 All transportation manifests for upland excavated materials leaving the work site shall be collected and submitted to Department Representative on a daily basis. If this proves impractical for waterborne transportation, then daily submittal of a summary form followed by weekly submittal of manifests will be acceptable.
- .4 For transportation and disposal of dredged materials, refer to Section 35 20 23 (Dredging, Barge Dewatering and In-Water Transportation) and Section 35 20 23.01 (Offloading, Upland Transportation and Disposal).

3.7 Bedding and Surround of Underground Services

- .1 Place and compact granular material for bedding and surround of underground services (compressed air, sanitary, fire main), and bedding at termination pits, as specified in Section 33 11 16 (Water Utility Distribution Piping), and as shown on the Drawings.

3.8 General Backfilling and Compaction at Upland Excavations

- .1 Do not proceed with backfilling operations at upland excavations until Departmental Representative has inspected and approved installations.
- .2 Areas to be backfilled to be free from organic material, debris, snow, ice, water, and frozen ground.
- .3 Do not use backfill material which is frozen or contains ice, snow or debris.

- .4 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.
- .5 Backfilling around installations.
 - .1 Place bedding and surround material as specified elsewhere.
 - .2 Do not backfill around or over cast-in-place concrete within twenty-four (24) hours after placing of concrete.
 - .3 Place layers simultaneously on both sides of installed work to equalize loading. Difference not to exceed 300 mm.
- .6 Where temporary unbalanced earth pressures are liable to develop on walls or other structures:
 - .1 Permit concrete to cure for minimum fourteen (14) days or until it has sufficient strength to withstand earth and compaction pressure, and approval has been obtained from Departmental Representative.
 - .2 If approved by Departmental Representative, erect bracing or shoring to counteract unbalanced loads, and leave in place until removal is approved by Departmental Representative.
- .7 Compact general backfill as specified in Section 31 24 15 (General Fill).

3.9 Restoration

- .1 Upon completion of work, remove surplus materials and debris, trim slopes, and correct defects as directed by Departmental Representative.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section describes the supply and placement of otherwise unspecified fills in the work, including trench backfill (between pipe surround and pavement subgrade) for underground services (compressed air, sanitary, fire main) and at termination pits, as indicated on the Drawings.
- .2 For supply and placement of Engineered Capping materials, refer to Section 35 37 10 (Engineered Capping).

1.2 Related Sections

- .1 Section 01 33 00 (Submittal Procedures)
- .2 Section 02 55 10 (Dust Control)
- .3 Section 31 23 10 (Excavation, Trenching and Backfilling)
- .4 Section 32 11 19 (Granular Sub-Base)
- .5 Section 33 11 16 (Water Utility Distribution Piping)
- .6 Section 35 37 10 (Engineered Capping)

1.3 Measurement and Payment Procedures

- .1 General fill for trench backfill (between pipe surround and pavement subgrade) for underground services (compressed air, sanitary, fire main) and at termination pits will not be measured separately, but considered incidental to the work. All costs in connection with such general fill shall be included in the relevant unit price tendered for the associated utility modifications.
- .2 Survey and other quality control activities will not be measured separately, but considered incidental to the work.
- .3 Engineered Capping will be measured and paid for under Section 35 37 10 (Engineered Capping).

1.4 References

- .1 ASTM C117, Test Method for Materials Finer than 75- μ m (No. 200) Sieve in Mineral Aggregates by Washing.
- .2 ASTM C136, Test Method for Sieve Analysis of Fine and Coarse Aggregates.

1.5 Definitions – Not Used

1.6 Submittals

- .1 Refer to Clause 2.1.2 of this Section.

2. PART 2 – PRODUCTS

2.1 General Fill

- .1 General fill shall consist of durable, natural granular material, free of organics, with no more than 8 % by weight passing the 75 µm (No. 200) sieve. Recycled materials from off site sources, including but not limited to concrete, asphalt pavement, and glass, shall not be used as fill. The maximum particle size shall not exceed 150 mm.
- .2 At least twenty-eight (28) days prior to commencing the placement of general fill material, the Contractor shall at its cost identify the proposed off site source(s) and, in accordance with Section 01 33 00 (Submittal Procedures), submit to Departmental Representative for review:
 - .1 Qualification test data, including material gradation curves, physical and chemical properties for each source, confirming that the proposed material(s) meet or exceed the requirements of this specification. Submit chemical properties in accordance with the requirements of Section 35 37 10 (Engineered Capping). Contractor shall also provide access for qualification sampling by Departmental Representative. Departmental Representative may, at its discretion, collect qualification samples from the proposed source(s) and carry out independent tests, all at no cost to Contractor;
 - .2 Details of the processing required, if any, to meet the gradation requirements; and,
 - .3 Details of the ongoing quality control procedures during production.
- .3 Departmental Representative will, within fourteen (14) days of receiving the above submission, advise Contractor of the acceptability of the proposed materials and procedures.
- .4 During general fill material production, Contractor shall, at its own cost, conduct ongoing quality control sampling and testing at the loading conveyor to confirm that the general fill materials conform to the specification. The material gradation testing rate for general fill shall be not less than one test for every 10 m³ placed in the work (two tests at minimum). The testing rate for in-situ compacted density of general fill shall be not less than one test for every 10 m³ placed in the work (two tests at minimum); the testing rate for reference dry density (ASTM D1557) shall be not less than one test for every 10 m³ placed in the work. All quality control test reports shall be submitted to Departmental Representative for review and approval prior to placement of that material in the Work.

- .5 During placement, Departmental Representative may at its discretion inspect the general fill materials for conformance to the specification. This quality assurance inspection may include sampling and testing at no cost to Contractor, unless material does not conform, whereon the testing shall be at Contractor's expense.
- .6 Failure of a general fill sample to meet any one of the specified gradation and physical properties constitutes an unacceptable material and such material may be subject to rejection by Departmental Representative.

3. PART 3 – EXECUTION

3.1 General

- .1 All general fill may be imported by road transport, unloaded directly within the EGD Work Site.
- .2 Provide adequate flag-persons and/or traffic signal devices to prevent interference with emergency vehicles or traffic of other dock users and contractors.
- .3 Priority shall be given to all other traffic over Contractor's construction traffic.
- .4 At the end of each working day, sweep roadway and clean up all fallen soil, dust and debris arising from fill deliveries, to Departmental Representative's satisfaction.
- .5 Select appropriate fill material and placing methods, provide suitable equipment and sequence the work so that the specified quality of fill is produced.
- .6 Fill above water level shall not be placed at temperatures which, in the opinion of Departmental Representative, will cause freezing of the materials before they are adequately compacted.
- .7 Ensure no organic material, snow, ice, silt pockets, or other deleterious material is incorporated within the general fill.
- .8 Cover or wet down general fill material to prevent blowing dust and sand, in accordance with Section 02 55 10 (Dust Control).
- .9 Maintain and protect the general fill against erosion and other damage.

3.2 Compaction of General Fill

- .1 Contractor shall submit its proposed methodology for the compaction of the general fill, not less than twenty-eight (28) days prior to commencing the placing of the general fill. This submittal shall contain:
 - .1 List and specifications for compaction equipment;
 - .2 Name(s) and outline of relevant experience of shift supervisor(s);
 - .3 Proposed methods and sequence of work; and,
 - .4 A detailed schedule for the work.

- .2 Place all general fill in maximum 300 mm lifts and compact to a minimum of 95 % modified Proctor maximum dry density per ASTM D1557 and corrected for oversize materials in accordance with ASTM D4718, unless otherwise directed by the Departmental Representative.
- .3 Modify the moisture content of the material as necessary, or as directed by Departmental Representative, to obtain the specified density. If the material becomes excessively moist and cannot be properly compacted, it shall be removed and replaced with a suitable material.
- .4 During the work only hand-operated compaction equipment shall be used within a distance of 0.6 m from any concrete structure.
- .5 Ensure that the compaction does not impact or damage any structures.
- .6 Repair any damage to structures arising from compaction.
- .7 Fill densities and moisture contents shall be measured by nuclear methods in accordance with ASTM D2922 and ASTM D3017. All moisture contents measured using nuclear methods shall be confirmed by oven dry method in accordance with ASTM D2216 or microwave method in accordance with ASTM D4643. In the event of a discrepancy between moisture content determinations, the moisture content determined by oven dry method shall apply. Oversize materials shall be determined for each density test and the measured density corrected for oversize materials. Departmental Representative may, at its sole discretion, approve corrections to densities measured with a nuclear gauge for a material type, if Contractor provides site specific and material-specific correlation tests between nuclear density test methods and volumetric test methods approved by Departmental Representative.
- .8 If an area of general fill compaction fails to meet the acceptance criteria, conduct additional tests, as directed by Departmental Representative, to delineate the extent of the area. Remediate the area and conduct additional tests, as directed by Departmental Representative, to confirm that the area meets the acceptance criteria. No additional payment will be made for these tests or remediation work.
- .9 After compaction, the final surface of the general fill shall be graded to within a tolerance of +/- 25 mm, but not uniformly high or low. For final grade elevations, refer to the Drawings.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section covers the maintenance and adjustment of existing geotextiles at overlap joints in the existing sheet pile wall (during re-driving of the sheet pile wall), to provide an effective barrier for suspended solids in the water column, as shown on the Drawings.
- .2 This Section also covers the maintenance and adjustment of existing geotextile at the sheet pile wall overlap joint at the northwest corner of the timber crib.
- .3 The design, supply, installation, maintenance and removal of the Temporary Re-suspension Barriers (TRBs) to be provided around the external perimeter of the South Jetty and at other locations as stipulated is covered under Section 01 35 13.43 (Special Procedures for Contaminated Sites) and Section 31 62 17 (Steel Sheet Piling).

1.2 Related Sections

- .1 Section 01 33 00 (Submittal Procedures)
- .2 Section 01 35 13.43 (Special Procedures for Contaminated Sites)
- .3 Section 05 50 00 (Metal Fabrications)
- .4 Section 31 62 17 (Steel Sheet Piling)

1.3 Measurement and Payment Procedures

- .1 The maintenance and adjustment of existing geotextile at sheet pile wall overlap joints (and for the sheet pile wall overlap joint at the northwest corner of the timber crib) will not be measured individually. Payment for maintenance and adjustment of existing geotextile at sheet pile wall overlap joints (and for the sheet pile wall overlap joint at the northwest corner of the timber crib) will be made at the Lump Sum price tendered for GEOTEXTILE: SHEET PILE WALL OVERLAP JOINTS. Payment shall be full compensation for all work in connection with underwater and above-water maintenance and adjustment of existing geotextile, and its attachment to existing structures, at sheet pile wall overlap joints (and for the sheet pile wall overlap joint at the northwest corner of the timber crib) as described in this Section and on the Drawings.

1.4 References

- .1 Canadian Standards Association (CSA):
 - .1 CAN/CSA-G40.21-M, Structural Quality Steel.
- .2 American Society for Testing and Materials (ASTM):

- .1 ASTM D4491, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
- .2 ASTM D4533, Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
- .3 ASTM D4632, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
- .4 ASTM D4751, Standard Test Method for Determining Apparent Opening Size of a Geotextile.
- .5 ASTM D4833, Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products.

1.5 Definitions – Not Used

1.6 Submittals

- .1 At least twenty-eight (28) days prior to start of geotextile maintenance and adjustment, and in accordance with Section 01 33 00 (Submittal Procedures), submit to Departmental Representative the Contractor's method statement for the underwater and above-water maintenance and adjustment of the geotextiles in the work.
- .2 Before re-driving any sheet piles, submit to Departmental Representative the Contractor's initial dive survey to document the existing "as-found" condition of the geotextile and its attachment at the sheet pile wall overlap joints (and for the sheet pile wall overlap joint at the northwest corner of the timber crib).
- .3 Within forty-eight (48) hours of completion of sheet pile wall re-driving, submit to Departmental Representative the Contractor's final dive survey to document the condition of the geotextile and its attachment at the sheet pile wall overlap joints (and for the sheet pile wall overlap joint at the northwest corner of the timber crib).

2. PART 2 – PRODUCTS – NOT USED

3. PART 3 – EXECUTION

3.1 Geotextile at Overlap Joints in Sheet Pile Wall

- .1 Before re-driving any sheet piles, Contractor shall conduct an initial dive survey to document the existing "as-found" condition of the geotextile and its attachment to the sheet piles at the sheet pile wall overlap joints (and for the sheet pile wall overlap joint at the northwest corner of the timber crib), and submit the "as-found" condition survey results to Departmental Representative.
- .2 During re-driving of the sheet piles, maintain and adjust the existing geotextile at overlap joints in the existing steel sheet pile wall (and at the northwest corner of

- the timber crib), to provide a continuous and unbroken barrier for the full height of the re-driven sheet pile wall above mud-line.
- .3 It is anticipated that the maintenance and adjustment of the geotextile will require underwater work by divers.
 - .4 The geotextile is attached to the rear face of the sheet piles and to the concrete face of the timber crib, as indicated on the Reference Drawings. It is anticipated that (depending on Contractor's chosen method of work) the re-driving of the sheet piles may require disconnection of the geotextile from the sheet piles and subsequent re-connection to the sheet piles (and to the concrete face of the timber crib) after re-driving the affected piles.
 - .5 Prevent any damage to geotextile during re-driving of the sheet piles by execution of Contractor's maintenance and adjustment procedures. After re-driving of sheet piles is complete, carry out a final dive inspection and report any damage or holes in the geotextile or other deficiencies to Departmental Representative.
 - .6 Repair any damaged geotextile to existing "as-found" condition (i.e., condition as documented in the initial dive survey stipulated in Clause 3.1.1 of this Section), to the satisfaction of Departmental Representative.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section describes the extraction, storage and subsequent re-installation of existing steel pipe piles for the tug boat wharf.
- .2 Requirements for re-driving of steel sheet piles, extraction and disposal of steel sheet piles, are covered separately under Section 31 62 17 (Steel Sheet Piling).
- .3 Requirements for extraction and disposal, or storage and subsequent reinstallation, of timber piles are covered separately under Section 02 41 16.01 (Structure Demolition) and Section 31 62 19 (Timber Piling), respectively.

1.2 Related Sections

- .1 Section 01 11 55 (General Instructions)
- .2 Section 01 33 00 (Submittal Procedures)
- .3 Section 01 35 13.43 (Special Procedures for Contaminated Sites)
- .4 Section 01 50 00 (Mobilization and Demobilization)
- .5 Section 02 41 16.01 (Structure Demolition)
- .6 Section 31 62 17 (Steel Sheet Piling)
- .7 Section 31 62 19 (Timber Piling)
- .8 Section 35 20 23 (Dredging, Barge Dewatering and In-Water Transportation)
- .9 Section 35 37 10 (Engineered Capping)

1.3 Measurement and Payment Procedures

- .1 Measurement for the dredging and removal of Obstructions encountered during driving of pipe piles will be the hours of equipment time, as accepted by Departmental Representative.
- .2 Payment for REMOVAL OF PIPE PILING OBSTRUCTIONS encountered during driving of pipe piles shall be the agreed Obstruction dredging and removal time multiplied by the tendered hourly rate. The agreed Obstruction dredging and removal time shall be calculated as outlined at Clause 3.9.3 of this Section. A nominal total Obstruction removal time is included in the Unit Price Table for tender pricing purposes. Due to the nature of the potential work involved, for tender pricing purposes it shall be assumed that marine-based equipment (floating derrick with attendant tug) will be required for removal of pipe piling Obstructions.

- .3 Disposal of Obstructions encountered during driving of pipe piles will be measured in tonnes of Obstruction material disposed offsite, as accepted by Departmental Representative.
- .4 Disposal of Obstructions, for Obstructions disposed offsite that were encountered during driving of pipe piles, will be paid for at the unit price tendered for DISPOSAL OF PIPE PILING OBSTRUCTIONS. Payment for disposal of Obstructions shall be full compensation for transportation and disposal off site to a Disposal Facility, including any environmental fees/levies and all work incidental thereto.
- .5 Extraction, storage, and re-installation of steel pipe piles for the tug boat wharf shall be measured and paid for as specified in the Section 02 41 16.02 (Structure Relocation).
- .6 All costs associated with design, procurement, installation, operation, maintenance, monitoring, repairs, cleaning, removal, and disposal (at completion of under-pier sediment remediation works) of any temporary piling works that Contractor chooses to undertake in connection with the Temporary Re-suspension Barrier (TRB) system are covered under Section 01 35 13.43 (Special Procedures for Contaminated Sites).
- .7 All costs associated with design, installation, extraction, and disposal (at completion of under-pier sediment remediation works) of any temporary piling works that Contractor chooses to undertake in connection with temporary soil support for the dredged cut at the southwest corner of the timber crib will be considered as incidental to the work covered under Section 31 62 17 (Steel Sheet Piling).
- .8 All costs associated with mobilization and demobilization of pile-driving equipment are covered under Section 01 50 00 (Mobilization and Demobilization).
- .9 All costs associated with quality control and quality control testing (except as noted otherwise) will be considered as incidental to the work.
- .10 There will be no additional payment for delays or downtime incurred by marine vessel traffic, permit requirements, water quality requirements, closures required by Fisheries and Oceans Canada or other applicable authority, or shutdowns due to Contractor's non-compliance with Laws and Regulations, Project Permits, and the Environmental Management Plan (EMP)/Water Quality Monitoring Plan (WQMP).
- .11 Failure of Contractor to satisfy himself as to the acceptable means of undertaking the works in compliance with Laws and Regulations, Project Permits, and the EMP/WQMP shall not constitute a basis for any additional payment.
- .12 Approved Stand-by Time, as defined and explained in Section 01 11 55 (General Instructions), shall be measured and paid for as specified in the Section 01 11 55 (General Instructions).

1.4 References – Not Used

1.5 Definitions

- .1 See Section 01 11 55 (General Instructions) for all definitions related to the Contract documents.

1.6 Submittals

- .1 At least twenty-eight (28) days prior to mobilization of pile-driving equipment to site, and in accordance with Section 01 33 00 (Submittal Procedures), submit to Departmental Representative a method statement for piling work (as a component of the Construction Work Plan). In the Method Statement provide details of proposed pile-driving equipment, work methods, sequencing and construction schedule as follows:
 - .1 Proposed method for extracting and for driving steel pipe piles. If proposed piling method does not utilize vibratory piling hammer, then submit alternative equivalent method for review by Departmental Representative.
 - .2 Contractor's method designed to reduce underwater sound levels to no greater than 30 kPa at 1.0 m distance from face of pipe pile, and to monitor underwater sound levels during the pile-driving work.
 - .3 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.
 - .4 Non-impact methods of installation such as augering, jacking, vibratory hammers, or other means: provide full details of characteristics necessary to evaluate performance.
 - .5 Pile layout drawings, general installation sequence, and overall construction schedule for pile-driving. For detailed submittal, refer to Clause 1.6.2 of this Section.
 - .6 Methods for vertical and lateral support of piles during pile installation, including method for protection of coatings against damage.
 - .7 Proposed method of pile head protection during pile driving, and proposed method of protection from abrasion and / or impact by Contractor's plant and equipment during the Work.
- .2 At least fourteen (14) days prior to commencement of pile driving, and in accordance with Section 01 33 00 (Submittal Procedures), submit detailed pile layout drawings, detailed installation sequence and construction schedule for pile driving to Departmental Representative for review. Design work sequence to ensure that all pipe piles are installed accurately and correctly.

- .3 When spliced piles are authorized by Departmental Representative, submit design details of splice complete with signature and stamp of qualified professional engineer registered or licensed in Province of British Columbia, Canada.

1.7 Requirements of Regulatory Authorities

- .1 The scheduling of the piling work shall be carried out in strict accordance with all Laws and Regulations and Project Permit requirements. Contractor shall hold harmless and protect PWGSC from all claims, costs and delays that could or do arise from Contractor's non-compliance with any Laws and Regulations or Project Permit requirement.
- .2 Notwithstanding the acquisition of permits by Departmental Representative, Contractor shall investigate and satisfy itself as to the acceptable means of undertaking the works in compliance with the permits, the EMP, and Laws and Regulations.
- .3 Contractor shall notify Departmental Representative not less than five (5) days prior to commencing the piling work. If Contractor receives any directive from DFO, then Contractor is to inform Departmental Representative before carrying out any such DFO directive. If Contractor is requested to stop work by DFO, then Contractor shall comply immediately and then inform Departmental Representative prior to carrying out any other DFO directive or work.
- .4 Contractor shall notify the Queens Harbour Master and Canadian Coast Guard (MCTS Victoria) not less than fourteen (14) days prior to commencing the piling work, for major marine equipment moves during the work and at completion of the piling work, shall maintain liaison with both those parties as the work progresses, and shall keep Departmental Representative informed of all such communications.
- .5 Ensure that equipment used in construction does not block marine navigation.

1.8 Existing Conditions and Site Information

- .1 For existing tug boat wharf conditions, refer to the Reference Drawings and Data Reports listed in the Specification Index.
- .2 For geotechnical investigation reports, dive inspection reports (including dive video) and other background data, refer to the Data Reports listed in the Specification Index.
- .3 Contractor is informed that Obstructions may lie fully embedded within the seabed soils in the area of the pile-driving work.
- .4 Contractor is informed that variable pile-driving conditions may be encountered in the work, especially in the area of the rubble mound foundation for the existing timber crib (as indicated on the Drawings).

- .5 Notify Departmental Representative in writing if subsurface conditions at site differ from those indicated and await further instructions from Departmental Representative.

1.9 Operating Environment

- .1 Management of environmental effects (such as wind, tidal state, and sea state) during the work shall be the sole responsibility of Contractor.
- .2 The steel pipe piles are to be installed in seawater. The normal tidal range at Esquimalt Harbour is indicated on the Drawings. Extreme tidal elevations including surge effects will exceed the indicated tidal range.
- .3 The design ambient temperature range is from -6°C minimum to 24°C maximum.
- .4 Historical wind records taken in the vicinity of Esquimalt Harbour may be obtained from Environment Canada.

2. PART 2 – PRODUCTS

2.1 Materials

- .1 Existing steel pipe piles (uncoated) at tug boat wharf are as specified on the Drawings and Reference Drawings.

2.2 Fabrication – Not Used

2.3 Fabrication Quality Control – Not Used

2.4 Equipment

- .1 Comply with the Coasting Trade Act for vessels used for this Contract.

3. PART 3 – EXECUTION

3.1 General

- .1 The sequence of work shall be as described on the Drawings.
- .2 Comply with live loading restrictions at the existing timber piled jetty structures, as shown on the Drawings and on the Reference Drawings.
- .3 Contractor is responsible for all temporary conditions during construction, including moorage and loads from floating construction equipment and environmental effects during the work.
- .4 Contractor's floating construction equipment shall not impede vessels entering the Esquimalt Graving Dock Facility, or vessels visiting or moored at the North Landing Wharf, or vessels visiting or moored at DND's Naden facility in Pilgrim

Cove. Comply with moorage requirements described on the Drawings during non-working hours.

- .5 Make adequate provision for access and support of piling equipment during performance of the work.
- .6 Ensure that pile driving and methods of construction do not cause traffic disruptions, damage to existing jetty structures or jetty furniture, damage to existing utilities, or damage to the environment. In the event that Contractor causes such damage, then he shall be responsible for all necessary repairs at Contractor's own expense.

3.2 Protection

- .1 Take all necessary precautions, including the provision of suitable screening fences and barriers to protect public, existing structures, facilities and services from damage due to pile installation and associated works.
- .2 Protect existing structures, services, and work of other Sections of the Specification from hazards due to pile-driving operations and against damage caused by Contractor's floating construction equipment, tugboats, or by other construction activities.
- .3 Protect public and construction personnel from hazards attributable to pile-driving operations.
- .4 Sequence all pile-driving operations and methods to avoid damage to existing structures.
- .5 Contractor shall visually monitor the existing steel-piled concrete jetty structure for damage or distress caused by pipe pile driving operations for the re-installation of the tug boat float, and submit written monitoring reports to the Departmental Representative on a daily basis during periods when pipe pile driving is occurring within 25 m of the existing structure.
- .6 Contractor shall survey the existing steel-piled concrete jetty structure to monitor for settlements / movements caused by pipe pile driving operations for the reinstallation of the tug boat float, and submit written monitoring reports to the Departmental Representative. Perform these monitoring surveys on a daily basis during periods when pipe pile driving is occurring within 25 m of the existing steel-piled concrete jetty structure. The monitoring surveys shall achieve an accuracy of +/- 5 mm in each orthogonal direction (plan and elevation).
- .7 Submit written monitoring reports and settlement / movement surveys for the steel-piled concrete jetty structure, in electronic tabular format acceptable to Departmental Representative (e.g., Microsoft Excel), within 4 working hours of completion of each survey.
- .8 Visual monitoring and settlement / movement surveys for the steel-piled concrete jetty structure are only required when pipe pile driving is occurring within 25 m of the existing steel-piled concrete jetty structure.

- .9 Contractor shall, within twenty-four (24) hours, repair any damage made to the existing jetty structure, jetty hardware, or utilities and restore to original or better condition at Contractor's sole expense.
- .10 Do not allow buoyant items that have been demolished or detached from their original position (i.e., floating debris) to float beyond the EGD Work Site. Do not allow such floating debris to cause any hindrance or obstacle to marine traffic and EGD operations. Identify and collect such floating debris, and dispose in accordance with the Specification.

3.3 Handling and Storage of Extracted Piles

- .1 Use slings for lifting piling so that mass is evenly distributed and piles are not subjected to excessive bending stresses, impact, or abrasion.
- .2 Store piles on level surface or provide supports so that piles are level when stored. Provide blocking at spacing not exceeding 4 m so that there is no excessive sagging in piles. Overhang at ends not to exceed 0.5 m. Block between lifts directly above blocking in lower lift. Maximum height of stacked pile bundles not to exceed 4 m. Stagger bundles on plan.
- .3 If material is stockpiled on structure, ensure that structure is not overloaded.

3.4 Preparation

- .1 Make provision for access and support of piling equipment during performance of Work.
- .2 Use highly visible, contrasting colour of paint to clearly mark each pipe pile with its number and its overall length. In addition, clearly mark each pipe pile at intervals of 305 mm on opposing faces along its full length prior to driving. As a minimum, label every fifth mark with the appropriate value from pile tip.

3.5 Piling Sequence

- .1 Contractor shall sequence the pile driving work to minimize construction duration.
- .2 Drive steel pipe piles for re-installation of tug boat wharf only after timber jetty demolition and marine dredging has been completed in the affected area.
- .3 In order to prevent damage to the pipe piles or their coatings, Contractor shall determine the optimum timing and sequence for installing the pipe piles, relative to the placement of Engineered Capping materials.

3.6 Pile Driving

- .1 Carry out pile-driving, re-driving and pile extraction work using marine-based floating equipment in conformance with the EMP, and the requirements of this Section.

- .2 Carry out pile extraction and pile driving work in conformance with Township of Esquimalt noise by-laws, and City of Colwood noise by-laws.
- .3 Use pile-driving equipment appropriate for the soil conditions. Use pile-driving equipment that generates the minimum amount of energy necessary to drive the piles.
- .4 Submit details of pile-driving equipment, in accordance with Clause 1.6 of this Section. Piles for the tug boat wharf are to be re-installed to the pile tip elevations shown on the Drawings. No termination criteria for tug boat wharf pile installation will be provided by Departmental Representative.
- .5 If proposed method to drive piles into the seabed does not utilize vibratory piling hammer, then submit alternative equivalent method for review by Departmental Representative, in accordance with Clause 1.6 of this Section.
- .6 When the required pile embedment cannot be achieved with the proposed hammer, propose larger or alternate hammer as required and allow seven (7) working days for Departmental Representative's review.
- .7 Use work procedures and marine-based floating equipment that will ensure turbidity in the water column does not exceed the prescribed limits throughout the work.
- .8 At start of, and during pile-driving work, monitor underwater sound pressures to confirm that the pressures do not exceed the maximum allowable levels.
- .9 Underwater noise during pile-driving shall be controlled and monitored in accordance with the following performance criteria:
 - .1 Underwater sound levels shall not exceed 30 kPa at 1.0 m distance from the face of pipe pile;
 - .2 If underwater sound levels exceed 30 kPa at a distance of 1.0 m from the face of pipe pile, modify the pile-driving method to reduce the intensity of the sound generated to below the 30 kPa limit.
- .10 Sequence the pile-driving work to minimize construction duration, and in conformance with the sequence described on the Drawings. Design piling work sequence to ensure piles are installed accurately and correctly.
- .11 In the event that underwater sound levels exceed the performance criteria, implement mitigation measures to reduce underwater overpressure to comply with the performance criteria. The design of the mitigation measures shall be the responsibility of Contractor, but must meet DFO requirements and adhere to the EMP.
- .12 Contractor shall provide equipment and all accessories necessary to install the piles as specified and to meet driving criteria as determined by Departmental Representative.

3.7 Installation

- .1 Acceptance of each installed pile will be subject to approval of Departmental Representative.
 - .1 Departmental Representative will be sole judge of acceptability of each pipe pile with respect to final driving resistance, depth of penetration, installation accuracy or other criteria used to determine pile capacity.
 - .2 Do not remove pile-driving equipment from site until Departmental Representative has accepted final driving of all piles.
- .2 All pipe piles for re-installation of the tug boat wharf are to be driven open-end. Drive each pile to the pile tip elevations shown on the Drawings.
- .3 Use driving caps and cushions to protect piles as necessary. Reinforce pile heads if necessary. Piles with damaged heads after cut-off will be rejected by Departmental Representative.
- .4 Contractor shall be responsible for any damage to the pipe piles, and related costs for pile replacement if warranted.
- .5 Hold piles securely and accurately in position while driving. Deliver hammer blows along axis of pile. Ensure pile is not overstressed.
- .6 Drive all piles continuously to final penetration.
- .7 Ensure that the leads of the pile-driving equipment do not exert lateral forces on the piles during driving. No adjustment of a possible misalignment will be permitted during driving, except at the very initial stage.
- .8 During pile-driving, provide rubber rollers (or similar technique) for lateral support and to protect pile coating from damage.
- .9 Ensure that pile driving equipment, including the hammer, leads, gates and other components that could “catch” coating and coating repairs, has provision to eliminate damage to the coating and coating patches during handling and driving. Submit, for review and approval, procedures, equipment modifications and measures that will accommodate the coating system.
- .10 If conditions are encountered which make it difficult to drive a pile in the location shown and to advance the pile to the termination criteria, employ all reasonable means to advance the pile.

3.8 Field Splices

- .1 Make field splices only with written authorization of Departmental Representative. Splice piles in place during installation by complete joint penetration groove welds. To prevent distortion, tack opposite points first and then weld opposite sections. Use a backing ring for field splices. Hold members in alignment during splicing.
- .2 Field welds shall be in accordance with CSA W59 Clause 11.

- .3 Ensure that no debris from welding enters the marine environment.

3.9 Driving Tolerances

- .1 Pile heads shall be within 75 mm of plan locations indicated on the Drawings.
- .2 Piles shall not be more than 1/100 (1%) of length out of vertical alignment.
- .3 Tolerances specified in Clauses 3.9.1 and 3.9.2 shall be met after all piles are driven.

3.10 Identification and Removal of Obstructions

- .1 Notify Departmental Representative immediately in writing upon encountering an object which causes sudden unexpected change in penetration resistance, or deviation from specified tolerances, or prevents driving a pipe pile to full penetration and which might be classified as an Obstruction. Include all pertinent details in the notification. Proceed as directed by Departmental Representative.
- .2 If any Obstructions are encountered during pipe pile-driving and are agreed by Departmental Representative to be Obstructions, remove the obstructed pile(s), bypass the affected area after clearly marking the Obstruction location, and proceed to drive remaining piles. Leave sufficient gap to allow for Obstruction removal. After removal of Obstruction, return and attempt to complete driving of pipe piles.
- .3 Remove Obstruction by clamshell bucket or other suitable means as appropriate at time agreed to by Departmental Representative, and in the presence of Departmental Representative. The agreed time for measurement and payment purposes shall include:
 - .1 The actual time for mobilizing the equipment to the Obstruction location, to a maximum of sixty (60) minutes; plus,
 - .2 The actual time spent in recovery of Obstruction; plus,
 - .3 The actual time for de-mobilizing the equipment back to its original position, to a maximum of sixty (60) minutes.
- .4 Downtime for equipment maintenance, repairs, safety briefings or other reasons shall not be included in the time recorded for payment for removal of Obstruction.
- .5 Record agreed Obstruction removal time and submit to Departmental Representative.

3.11 Disposal of Obstructions

- .1 Dispose of Obstructions off site to same requirements as stipulated for offsite disposal of structure demolition in Section 02 41 16.01 (Structure Demolition).

3.12 Damaged or Defective Piles

- .1 The integrity of the pipe piles shall remain at all times the responsibility of Contractor. Should any pile be damaged by overdriving or by pile installation techniques or other causes including attempting to pass an Obstruction, or be out of position as a result of improper survey or driving practice, drive an extra pile or piles in its place as directed by Departmental Representative. Extract rejected piles and replace with new ones. No extra compensation will be made for removing and replacing piles, driving extra piles or other work made necessary through rejection of a defective or damaged pile.
- .2 If, in the judgment of Departmental Representative, the Contractor is unable to properly complete installation of any pile by resorting to reasonable methods, Departmental Representative may order an additional pile or piles to be installed for which the Contractor will be paid as an extra work item in accordance with the Contract. Piles abandoned because of Obstructions, as approved by Departmental Representative, will be paid for as completed piles. Such abandoned piles may be removed if required by Departmental Representative and their removal paid as an extra work item in accordance with the Contract.
- .3 Repair all damaged sections of pile coating, both above and below the water level as specified Section 09 97 19 (Painting Exterior Metal Surfaces). Ensure that personnel completing such repairs above water have been trained by the coating representative. Repairs completed below water shall be completed using a material suitable for application below water. Application below water shall be by personnel experienced with such application. Inspections by Departmental Representative shall not relieve the Contractor of its obligations for quality control.

3.13 Pile Cut Off and Completion

- .1 Cut off pipe piles neatly and squarely at the elevations indicated to tolerance of +/- 25 mm. Provide sufficient length above cut-off elevation so that the part damaged during driving is cut off. Remove cut-off lengths from site.
- .2 Install pile cap plates where indicated.

3.14 Pile Driving Records

- .1 Maintain accurate records of driving for each pile, including:
 - .1 Date, weather, and tidal levels.
 - .2 Type and make of hammer, stroke, and related energy.
 - .3 Other driving equipment including water jet, driving cap, cushion block type and thickness.
 - .4 Pile size, overall length, length pitched in the leads, splice positions, and location of pile.

- .5 Sequence of driving piles in pre-selected pile numbering system.
- .6 Blow counts for each 305 mm of penetration for entire length of pile and for each 25 mm for the final 150 mm of penetration.
- .7 Impact rate at least every 5.0 m of penetration including final set.
- .8 Seating procedures where relevant.
- .9 Final tip and cut-off elevations.
- .10 Other pertinent information such as interruption of continuous driving, pile damage.
- .2 Provide Departmental Representative with pile driving records for all piles driven or partly driven at the end of each work shift.
- .3 Provide Departmental Representative with three (3) copies of all pile driving records at completion of the Work.

3.15 Cleaning

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

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section covers re-driving of the sheet pile perimeter wall, survey monitoring thereof, and extraction and disposal (at completion of under-pier sediment remediation works) of the sheet pile perimeter wall, all as described on the Drawings.
- .2 This Section also covers materials and construction execution aspects (see Clause 1.6.3, Clause 2.1.2, and Clause 3 of this Section) for supply, installation, extraction and disposal (at completion of under-pier sediment remediation works) of any temporary piling works (driving and extracting of pipe piles, sheet piles or timber piles) that Contractor chooses to undertake in connection with the Temporary Re-suspension Barrier (TRB) support system. Information shown on the Drawings (related to the TRB support system) is intended to be conceptual and for informational purposes only, in order to assist the Contractor with planning for design of the TRB system. Performance criteria required for design, procurement, installation, operation, maintenance, monitoring, repairs, cleaning, removal and disposal of the TRB system are provided in Section 01 35 13.43 (Special Procedures for Contaminated Sites).
 - .1 The TRB system, in conjunction with the re-driven sheet pile wall, is intended to provide an effective barrier against transmission of turbidity (suspended solids), to the water column outside the work area, generated during in-water construction activities within the area enclosed by the perimeter sheet pile wall (TRBCA). The TRB system is intended to withstand environmental effects and to meet the water quality requirements of the Environmental Management Plan (EMP)/Water Quality Monitoring Plan (WQMP).
 - .2 The TRB system shall be installed, monitored, maintained throughout the in-water works (in accordance with Contractor's third party engineer proposed design), and then removed at completion of the in-water works.
 - .3 Conceptual TRB locations are shown on the Drawings in order to illustrate the functional intent and to assist with development of Contractor's third party design of the TRB system, and are not intended to represent the final design.
 - .4 In addition to its primary function of providing an effective barrier against turbidity, the TRB at the perimeter of the TRBCA also delineates the underwater hazard posed by the re-driven sheet pile perimeter wall.
 - .5 The re-driven sheet pile wall is designed to resist environmental forces (but not vessel impact) exerted as pressure distributions against its face.
 - .6 The re-driven sheet pile wall is not designed to resist environmental forces exerted as pressure distributions on the face of the TRB (or vessel impact).

- .7 Contractor's third party engineer shall determine the design, arrangement, and location of the TRB system as necessary to meet the requirements of the Specification.
- .8 Details regarding layout of the proposed TRB system shall be provided in the Environmental Protection Plan for review and acceptance by Departmental Representative.
- .9 Refer also to Section 01 35 13.43 (Special Procedures for Contaminated Sites) for specific performance criteria for the TRB system.
- .3 This Section also covers materials and construction execution aspects (see Clause 1.6.4, Clause 2.1.2, and Clause 3 of this Section) for supply, installation, extraction and disposal (at completion of under-pier sediment remediation works) of any temporary piling works (driving and extracting of pipe piles, sheet piles or timber piles) that Contractor chooses to undertake in connection with temporary soil support for the dredged cut at the southwest corner of the timber crib.
 - .1 Contractor shall determine the design and layout of the temporary soil support system required for the dredged cut at the southwest corner of the timber crib. A potential soil support system is shown in concept form on the Drawings, solely in order to illustrate the functional intent.
- .4 Maintenance and adjustment of geotextile at overlap joints in the sheet pile perimeter wall is covered under Section 31 32 19.01 (Geotextiles).

1.2 Related Sections

- .1 Section 01 11 55 (General Instructions)
- .2 Section 01 33 00 (Submittal Procedures)
- .3 Section 01 35 13.43 (Special Procedures for Contaminated Sites)
- .4 Section 01 50 00 (Mobilization and Demobilization)
- .5 Section 02 41 16.01 (Structure Demolition)
- .6 Section 02 41 16.02 (Structure Relocation)
- .7 Section 05 50 00 (Metal Fabrications)
- .8 Section 31 32 19.01 (Geotextiles)

1.3 Measurement and Payment Procedures

- .1 Measurement for the dredging and removal of Obstructions encountered during re-driving of sheet piles or during driving of temporary piles will be the hours of equipment time, as accepted by Departmental Representative.
- .2 Payment for REMOVAL OF SHEET PILING OBSTRUCTIONS encountered during re-driving of sheet piles or during driving of temporary piles shall be the agreed Obstruction dredging and removal time multiplied by the tendered hourly rate. The agreed Obstruction dredging and removal time shall be calculated as

- outlined at Clause 3.5.4 of this Section. A nominal total Obstruction removal time is included in the Unit Price Table for tender pricing purposes. Due to the imposed loading limitations at the South Jetty structures, for tender pricing purposes it shall be assumed that marine-based equipment (floating derrick with attendant tug) will be required for removal of Obstructions.
- .3 Disposal of Obstructions encountered during re-driving of sheet piles or during driving of temporary piles will be measured in tonnes of Obstruction material disposed offsite, as accepted by Departmental Representative.
 - .4 Disposal of Obstructions, for Obstructions disposed offsite that were encountered during re-driving of sheet piles or during driving of temporary piles, will be paid for at the unit price tendered for DISPOSAL OF SHEET PILING OBSTRUCTIONS. Payment for disposal of Obstructions shall be full compensation for transportation and disposal offsite to an authorized Disposal Facility, including any environmental fees/levies and all work incidental thereto.
 - .5 Re-driving of steel sheet piling will not be measured individually. Payment for re-driving of steel sheet piling will be made at the Lump Sum price tendered for each type of sheet piled wall, as listed below. Payment shall be full compensation for all work in connection with handling and re-driving of sheet piles and corner connectors including temporary bracing, re-driving templates and false work (and including survey monitoring as described in this Section).
 - .1 STEEL SHEET PILING: RE-DRIVE WALL TYPE A (AZ26-700).
 - .2 STEEL SHEET PILING: RE-DRIVE WALL TYPE B (AZ38-700N).
 - .3 STEEL SHEET PILING: RE-DRIVE WALL TYPE C (AZ50).
 - .4 STEEL SHEET PILING: RE-DRIVE WALL TYPE D (AZ50).
 - .5 STEEL SHEET PILING: RE-DRIVE WALL TYPE E (AZ38-700N).
 - .6 Cut off and disposal of existing steel sheet piling adjacent to the timber crib will not be measured individually. Payment for cut off and disposal of existing steel sheet piling adjacent to the timber crib will be made at the Lump Sum price tendered for STEEL SHEET PILING: CUT OFF AND DISPOSE WALL TYPE D AT TIMBER CRIB (AZ50). Payment shall be full compensation for all work in connection with cut off, handling and off-site disposal of cut off portions of sheet piles.
 - .7 Extraction, cleaning, handling and disposal (at completion of under-pier sediment remediation works) of the re-driven steel sheet piling will not be measured individually. Payment for extraction, cleaning, handling and disposal of the re-driven steel sheet piling will be made at the Lump Sum price tendered for each type of sheet piled wall, as listed below. Payment shall be full compensation for all work in connection with extraction, cleaning, handling and disposal of sheet piles and corner connectors including temporary bracing, pile extraction templates, false work, and off-site disposal.

- .1 STEEL SHEET PILING: EXTRACT AND DISPOSE WALL TYPE A (AZ26-700).
- .2 STEEL SHEET PILING: EXTRACT AND DISPOSE WALL TYPE B (AZ38-700N).
- .3 STEEL SHEET PILING: EXTRACT AND DISPOSE WALL TYPE C (AZ50).
- .4 STEEL SHEET PILING: EXTRACT AND DISPOSE WALL TYPE D (AZ50).
- .5 STEEL SHEET PILING: EXTRACT AND DISPOSE WALL TYPE E (AZ38-700N).
- .8 All costs associated with design, procurement, installation, maintenance, extraction, cleaning and removal (at completion of under-pier sediment remediation works) of the Temporary Re-suspension Barrier (TRB) system, and any temporary piling works that Contractor chooses to undertake in connection with the TRB system, shall be included in the payment items for the TRB system as stipulated in Section 01 35 13.43 (Special Procedures for Contaminated Sites).
- .9 All costs associated with design, procurement, installation, maintenance, extraction, cleaning and removal (at completion of under-pier sediment remediation works) of any temporary piling works that Contractor chooses to undertake in connection with temporary soil support for the dredged cut at the southwest corner of the timber crib will be considered as incidental to the work of this Section of the Specification.
- .10 Maintenance and adjustment of geotextile at sheet pile overlap joints will be measured separately, with payment as stipulated by Section 31 32 19.01 (Geotextiles).
- .11 All costs associated with mobilization and demobilization of pile-driving equipment are covered under Section 01 50 00 (Mobilization and Demobilization).
- .12 All costs associated with quality control and quality control testing (except as noted otherwise) will be considered as incidental to the work.
- .13 There will be no additional payment for delays or downtime incurred by marine vessel traffic, permit requirements, water quality requirements, closures required by Fisheries and Oceans Canada or other authority, or shutdowns due to Contractor's non-compliance with Laws and Regulations, Project Permits, and the EMP/WQMP.
- .14 Failure of Contractor to satisfy himself as to the acceptable means of undertaking the works in compliance with Laws and Regulations, Project Permits, and the EMP shall not constitute a basis for any additional payment.
- .15 Approved Stand-by Time, as defined and explained in Section 01 11 55 (General Instructions), shall be measured and paid for as specified in the Section 01 11 55 (General Instructions).

1.4 References

- .1 ASTM A6/A6M-05, Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes and Sheet Piling.
- .2 CAN/CSA G40.20-04/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .3 CAN/CSA-W47.1, Certification of Companies for Fusion Welding of Steel.
- .4 CAN/CSA-W48, Filler Metals and Allied Materials for Metal Arc Welding (Developed in cooperation with the Canadian Welding Bureau).
- .5 CAN/CSA-W59, Welded Steel Construction.
- .6 CAN/CSA-W59-S1, Supplement No. 1 to W59, Welded Steel Construction.
- .7 ASTM A1008/A1008M-05b, Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened and Bake Hardenable.
- .8 ASTM A1011/A1011M-05a, Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.

1.5 Definitions

- .1 See Section 01 11 55 (General Instructions) for all definitions related to the Contract documents.

1.6 Submittals

- .1 At least fourteen (14) days prior to fabrication, submit to Departmental Representative, two copies of steel producer certificates in accordance with ASTM A572/A572M, ASTM A1008/A1008M and ASTM A1011/A1011M, and mill test reports in accordance with CAN/CSA-G40.20.
- .2 Provide Departmental Representative with copy of certification for fusion welding in accordance with CSA W47.1 and CSA W47.1S1.
- .3 At least twenty-eight (28) days prior to mobilization of pile-driving equipment to site, and in accordance with Section 01 33 00 (Submittal Procedures), submit to Departmental Representative a method statement for piling work (as a component of the Construction Work Plan). In the method statement provide details of proposed pile-driving equipment, pile-extraction equipment, work methods, sequencing and construction schedule as follows:
 - .1 Proposed method for re-driving, cut off and extracting sheet piles. If proposed pile-driving and pile-extraction methods do not utilize vibratory piling hammer, then submit alternative equivalent method for review by Departmental Representative.

- .2 Contractor's method designed to reduce underwater sound levels to no greater than 30 kPa at 1.0 m distance from face of sheet pile, and to monitor underwater sound levels during the pile re-driving, temporary pile installation and pile extraction work as per the EMP.
 - .3 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.
 - .4 Non-impact methods of installation such as vibratory hammers, jacking or other means: provide full details of characteristics necessary to evaluate performance.
 - .5 Pile layout drawings, detailed installation sequence and construction schedule for pile-driving and pile-extraction. Design work sequence to ensure that sheet piles are installed accurately and correctly.
 - .6 Methods for vertical and lateral support of sheet piles during pile-driving and pile-extraction.
 - .7 Proposed method of pile head protection during pile-driving, and proposed method of protection from abrasion and / or impact by Contractor's plant and equipment during the Work.
 - .8 Proposed method for monitoring the integrity of, and surveying to confirm lateral position and verticality of the re-driven sheet pile perimeter wall throughout the period that work is being carried out within the TRBCA.
 - .9 Proposed method to minimize potential for re-distribution or re-suspension of contaminated sediments during pile re-driving, temporary pile installation and pile-extraction work as per the EMP.
 - .10 Proposed cleaning procedure for sheet piles extracted from seabed.
- .4 At least twenty-eight (28) days prior to mobilization of pile-driving equipment to site, and in accordance with Section 01 33 00 (Submittal Procedures), submit to Departmental Representative a method statement for any temporary piling works (driving and extracting of pipe piles, sheet piles or timber piles) that the Contractor chooses to undertake in connection with Temporary Re-suspension Barriers (TRBs) and in connection with temporary soil support for the dredged cut at the southwest corner of the timber crib. In the method statement provide details of proposed pile-driving equipment, pile-extraction equipment, work methods, sequencing and construction schedule in similar detail as described in Clause 1.6.3 of this Section.

1.7 Source Quality Control

- .1 Provide results of two (2) tension tests from each heat of piling material to be used on project, if any.
- .2 Tension tests to be in accordance with CAN/CSA-G40.20.

1.8 Quality Assurance

- .1 Inspection and testing of piling materials may be carried out by testing laboratory designated by Departmental Representative at any time during course of work.
- .2 Materials inspected or tested by Departmental Representative which fail to meet contract requirements will be rejected.
- .3 Where tests or inspections by designated testing laboratory reveal work not in accordance with contract requirements, the Contractor shall pay costs for additional tests or inspections. Departmental Representative will verify acceptability of corrected Work.

1.9 Requirements of Regulatory Authorities

- .1 The scheduling of the piling work shall be carried out in strict accordance with all Laws and Regulations and Project Permit requirements. Contractor shall hold harmless and protect PWGSC from all claims, costs and delays which could or do arise from Contractor's non-compliance with Laws and Regulations or Project Permit requirement.
- .2 Notwithstanding the acquisition of permits by Departmental Representative, Contractor shall investigate and satisfy itself as to the acceptable means of undertaking the works in compliance with the Laws and Regulations, Project Permits, and the EMP.
- .3 Contractor shall notify Departmental Representative not less than five (5) days prior to commencing the piling work. If Contractor receives any directive from DFO, then Contractor is to inform Departmental Representative before carrying out any such DFO directive. If Contractor is requested to stop work by DFO, then Contractor shall comply immediately and then inform Departmental Representative prior to carrying out any other DFO directive or work.
- .4 Contractor shall notify the Queens Harbour Master and Canadian Coast Guard (MCTS Victoria) not less than fourteen (14) days prior to commencing the piling work, for major marine equipment moves during the work and at completion of the piling work, shall maintain liaison with both those parties as the work progresses, and shall keep Departmental Representative informed of all such communications.
- .5 Ensure that equipment used in construction does not block marine navigation.

1.10 Existing Conditions and Site Information

- .1 For existing jetty conditions, refer to the Reference Drawings and Data Reports listed in the Specification Index.
- .2 For geotechnical investigation reports, dive inspection reports (including dive video) and other background data, refer to the Data Reports listed in the Specification Index.

- .3 Contractor is informed that Obstructions may lie fully embedded within the seabed soils in the area of the pile-driving work.
- .4 Notify Departmental Representative in writing if subsurface conditions at site differ from those indicated and await further instructions from Departmental Representative.

1.11 Operating Environment

- .1 Management of environmental effects (such as wind, tidal state and sea state) during the work shall be the sole responsibility of Contractor.
- .2 The existing steel sheet piles are installed in seawater. The normal tidal range at Esquimalt Harbour is indicated on the Drawings. Extreme tidal elevations including surge effects will exceed the indicated tidal range.
- .3 The design ambient temperature range is from -6°C minimum to 24°C maximum.
- .4 Historical wind records taken in the vicinity of Esquimalt Harbour may be obtained from Environment Canada.

2. PART 2 – PRODUCTS

2.1 Materials

- .1 Existing steel sheet piles (uncoated) at South Jetty perimeter wall: To CAN/CSA-G40.21 grade 350W or equivalent, including chemical and mechanical requirements, and the following:
 - .1 Existing steel sheet piling: as manufactured by Arcelor (formerly Trade Arbed), section designations and details as indicated on the Drawings and on the Reference Drawings. Existing steel sheet piling is not coated.
 - .2 Except where indicated otherwise, all sheet piles are in pairs: Arcelor Double Piles, Z-Profile. Existing pile pairs may or may not be crimped together at the common interlock. Existing pile pairs may include steel bracing bars that were utilized by the installation contractor to maintain pile wall alignment, as indicated on the Drawings.
- .2 Piling materials for any temporary piling works undertaken in connection with the TRB support system, and in connection with temporary soil support for the dredged cut at the southwest corner of the timber crib, shall be selected by Contractor to suit the requirements of the temporary works and in accordance with its engineered design.

2.2 Fabrication – Not Used

2.3 Fabrication Quality Control – Not Used

2.4 Equipment

- .1 Comply with the Coasting Trade Act for vessels used for this Contract.

3. PART 3 – EXECUTION

3.1 General

- .1 The sequence of work shall be as described on the Drawings and in the Specification. For construction sequencing and scheduling constraints, refer to Section 01 11 55 (General Instructions).
- .2 Comply with live loading restrictions at the existing timber piled jetty structures, as shown on the Drawings and on the Reference Drawings.
- .3 Contractor is responsible for all temporary conditions during construction, including moorage and loads from floating construction equipment and environmental effects during the work.
- .4 Contractor's floating construction equipment shall not impede vessels entering the Esquimalt Graving Dock, or vessels visiting or moored at the North Landing Wharf, or vessels visiting or moored at DND's Naden facility in Pilgrim Cove. Comply with moorage requirements described on the Drawings during non-working hours.
- .5 Make adequate provision for access and support of piling equipment during performance of the work.
- .6 Ensure that pile driving, pile re-driving and methods of construction do not cause traffic disruptions, damage to existing jetty structures or jetty furniture, damage to existing utilities, or damage to the environment. In the event that Contractor causes such damage, then he shall be responsible for all necessary repairs at Contractor's own expense.

3.2 Protection and Monitoring

- .1 Take all necessary precautions, including the provision of suitable screening fences and barriers to protect public, existing structures, facilities and services from damage due to pile installation and associated works.
- .2 Protect existing structures, services and work of other Sections of the Specification from hazards due to pile-driving operations and against damage caused by Contractor's floating construction equipment, tugboats, or by other construction activities.
- .3 Protect public and construction personnel from hazards attributable to pile-driving operations.

- .4 Sequence all pile-driving operations and methods to avoid damage to existing structures.
- .5 Protect existing sheet piles, re-driven sheet piles, partially re-driven sheet piles, and unaltered sheet piles from damage during the Work (until extraction and removal of sheet piles is required).
- .6 Provide temporary fender protection along the waterside (outside) face of the steel sheet pile perimeter wall to protect the re-driven portions of the sheet piles from abrasion, impact damage, or being displaced as a result of contact with Contractor's floating construction equipment, tugboats, or by other construction activities. Note that the top of re-driven sheet piles will be underwater on most tidal states. The temporary fender protection shall be to Departmental Representative's satisfaction, and shall remain in place until the sheet piles are extracted in that area of the work.
- .7 Protect all components of the TRB system from abrasion, impact damage, or being displaced as a result of vessel prop wash or contact with Contractor's floating construction equipment, tugboats or by other construction activities (inside and outside the TRBCA) to prevent impacts to water quality outside of the TRBCA and to maintain the TRB system as designed by Contractor's third party engineer.
- .8 Contractor shall visually monitor the integrity of, and carry out surveys to confirm lateral position and verticality of the re-driven sheet pile perimeter wall, and submit written monitoring reports to the Departmental Representative. Perform these monitoring surveys on a **weekly** basis throughout the period that work is being carried out within the TRBCA. These monitoring surveys shall achieve an accuracy of +/- **25 mm** in each orthogonal direction (plan and elevation), and may be carried out with diver assistance or by remote sensors attached to the sheet pile wall. Contractor shall also complete diver surveys to inspect integrity and performance of the re-driven sheet pile and TRB system in accordance with requirements of Section 01 35 13.43 (Special Project Procedures for Contaminated Sites).
- .9 Contractor shall visually monitor the existing timber crib structure for damage or distress caused by sheet pile driving or re-driving operations, and submit written monitoring reports to the Departmental Representative on a **daily** basis during periods when sheet pile driving is occurring within 25 m of the timber crib structure.
- .10 Contractor shall survey the concrete parapet above the existing timber crib structure to monitor for settlements / movements caused by sheet pile driving or re-driving operations, and submit written monitoring reports to the Departmental Representative. Perform these monitoring surveys on a **daily** basis during periods when sheet pile driving or re-driving is occurring within 25 m of the existing timber crib structure. These monitoring surveys shall achieve an accuracy of +/- **5 mm** in each orthogonal direction (plan and elevation).

- .11 Submit written monitoring reports and settlement / movement surveys for the re-driven sheet pile perimeter wall, timber crib and its concrete parapet, in electronic tabular format acceptable to Departmental Representative (e.g., Microsoft Excel), within four (4) working hours of completion of each survey.
- .12 Visual monitoring and settlement / movement surveys for the timber crib and its concrete parapet are only required when sheet pile driving or re-driving is occurring within 25 m of the existing timber crib structure.
- .13 Contractor shall, within twenty-four (24) hours, repair any damage made to the re-driven sheet pile perimeter wall, existing timber crib structure, its concrete parapet, adjacent jetty hardware or utilities and restore to original or better condition at Contractor's sole expense.
- .14 Do not allow buoyant items that have been demolished or detached from their original position (i.e., floating debris) to float beyond the EGD Work Site. Do not allow such floating debris to cause any hindrance or obstacle to marine traffic and EGD operations. Identify and collect such floating debris, and dispose in accordance with the Specification.

3.3 Pile Re-driving and Pile Extraction

- .1 Carry out pile-driving, re-driving and pile extraction work using marine-based floating equipment in conformance with the EMP, and the requirements of this Section.
- .2 Carry out pile-driving, re-driving and extraction work in conformance with Laws and Regulation including but not limited to Township of Esquimalt noise by-laws and City of Colwood noise by-laws.
- .3 If proposed method to re-drive the sheet piles (or to drive temporary piles) into the seabed does not utilize vibratory piling hammer, then submit alternative equivalent method for review by Departmental Representative, in accordance with Clause 1.6 of this Section.
- .4 Use work procedures and marine-based floating equipment that will ensure turbidity in the water column does not exceed the prescribed limits throughout the work.
- .5 Use pile-driving equipment appropriate for the soil conditions. Use pile-driving equipment that generates the minimum amount of energy necessary to drive the piles to the design elevations described on the Drawings.
- .6 At start of, and during pile-driving, re-driving and extraction work, monitor underwater sound pressures to confirm that the pressures do not exceed the maximum allowable levels.
- .7 Underwater noise during pile-driving, re-driving and extraction work shall be controlled and monitored in accordance with the following performance criteria:
 - .1 Underwater sound levels shall not exceed 30 kPa at 1.0 m distance from the face of sheet pile or temporary pile;

- .2 If underwater sound levels exceed 30 kPa at a distance of 1.0 m from the face of sheet pile or temporary pile, modify the pile-driving method to reduce the intensity of the sound generated to below the 30 kPa limit.
- .8 Sequence the pile-driving, re-driving and extraction work to minimize construction duration, and in conformance with any sequencing requirements described in the Specification and on the Drawings. Design piling work sequence to ensure piles are installed accurately and correctly.
- .9 In the event that underwater sound levels exceed the performance criteria, implement mitigation measures to reduce underwater overpressure to comply with the performance criteria. The design of the mitigation measures shall be the responsibility of Contractor, but must meet DFO requirements and adhere to the EMP.
- .10 Provide pile-driving equipment and all accessories necessary to install the piles as specified, and as described on the Drawings.
- .11 Use driving caps and cushions to protect piles as necessary. Reinforce pile heads if necessary. Piles with damaged heads after cut-off will be rejected by Departmental Representative.
- .12 Use templates to hold piles securely and accurately in position while driving.
- .13 Deliver hammer blows along axis of pile. Ensure pile is not overstressed.
- .14 Ensure that the leads of the pile-driving equipment do not exert lateral forces on the piles during driving. No adjustment of a possible misalignment will be permitted during driving, except at the very initial stage.
- .15 During pile-driving or re-driving, do not allow sheet piles to creep and become tilted along the wall's longitudinal axis. Correct as necessary during the pile-driving and re-driving work.
- .16 Drive each sheet pile and temporary pile continuously to final tip elevation as indicated on the Drawings.
- .17 Cut off piles neatly and squarely at the elevations indicated to tolerance of +/- 25 mm (only where cutoff is indicated on the Drawings). Remove cut-off lengths from site.
- .18 No Alignment or Positional Tolerance: No vertical alignment (lateral axis or longitudinal axis) or positional tolerance is stipulated for re-driving of sheet piles under this Contract, because the existing piles are to be re-driven to deeper embedment from a pre-existing positional / alignment condition.
- .19 If conditions are encountered which make it difficult to re-drive a sheet pile in the location shown and to advance the pile to the tip elevation shown on the Drawings, employ all reasonable means to advance the pile.
- .20 Acceptance of each installed pile will be subject to approval of Departmental Representative.

- .1 Departmental Representative will be sole judge of acceptability of each sheet pile with respect to depth of penetration, depth of embedment, integrity of interlock clutch connection to adjacent pile, and installation accuracy.
- .2 Do not remove pile-driving equipment from site until Departmental Representative has accepted final re-driving of all sheet piles.

3.4 Piling Difficulties, Identification and Removal of Obstructions

- .1 Notify Departmental Representative immediately in writing upon encountering an object which causes sudden unexpected change in penetration resistance, or deviation from specified tolerances, or prevents driving a sheet pile to full penetration and which might be classified as an Obstruction. Include all pertinent details in the notification. Proceed as directed by Departmental Representative.
- .2 Piling difficulties (e.g., jamming at interlock clutch) caused by misalignment during pile-driving or re-driving will not be considered an Obstruction, unless Contractor can demonstrate to Departmental Representative's satisfaction that the fault lies with a pre-existing alignment condition of the sheet piles.
- .3 Piling difficulties (e.g., jamming at interlock clutch) during pile-driving or re-driving caused by corrosion or rust coating on the existing sheet piles will not be considered an Obstruction or cause of delay or additional cost.
- .4 If any Obstructions are encountered during sheet pile-driving or re-driving, and are agreed by Departmental Representative to be Obstructions, remove the obstructed pile(s), bypass the affected area after clearly marking the Obstruction location, and proceed to drive remaining piles. Leave sufficient gap in sheet-piling to allow for Obstruction removal. After removal of Obstruction, return and attempt to complete driving of sheet piles.
- .5 Remove Obstruction by clamshell bucket or other suitable means as appropriate at time agreed to by Departmental Representative, and in the presence of Departmental Representative. The agreed time for measurement and payment purposes shall include:
 - .1 The actual time for mobilizing the equipment to the Obstruction location, to a maximum of sixty (60) minutes; plus,
 - .2 The actual time spent in recovery of Obstruction; plus,
 - .3 The actual time for de-mobilizing the equipment back to its original position, to a maximum of sixty (60) minutes.
- .6 Downtime for equipment maintenance, repairs, safety briefings or other reasons shall not be included in the time recorded for payment for removal of Obstruction.
- .7 Record the agreed Obstruction removal time and submit to Departmental Representative.

3.5 Disposal of Obstructions

- .1 Dispose of Obstructions off site to same requirements as stipulated for off-site disposal of structure demolition in Section 02 41 16.01 (Structure Demolition).

3.6 Damaged or Defective Piles

- .1 The integrity of the existing sheet piles, and any temporary sheet piles that the Contractor chooses to use in the work, shall remain at all times the responsibility of Contractor. Should any sheet pile be damaged by overdriving or by pile installation or re-driving techniques or other causes including attempting to pass an Obstruction, or be out of position as a result of improper survey or driving practice, drive an extra sheet pile or sheet piles in its place as directed by Departmental Representative. Extract rejected sheet piles and replace with new ones. No extra compensation will be made for removing and replacing sheet piles, driving extra sheet piles or other work made necessary through rejection of a defective or damaged sheet pile.
- .2 If, in the judgment of Departmental Representative, Contractor is unable to properly complete the installation or re-driving of any sheet pile by resorting to reasonable methods, Departmental Representative may order an additional sheet pile or sheet piles to be installed for which the Contractor will be paid as an extra work item in accordance with the Contract. Sheet piles abandoned because of Obstructions, as accepted by Departmental Representative, will be paid for as completed sheet piles. Such abandoned sheet piles may be removed if required by Departmental Representative and their removal paid as an extra work item in accordance with the Contract.

3.7 Cutting Piles

- .1 Sheet piles shall not be cut or trimmed after installation (except where shown thus on the Drawings), and except when no other course of action is available and then only with the acceptance of Departmental Representative.
- .2 When flame cutting tops of piles and flame cutting holes in piles, adopt 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). Tempil sticks temperature indicating crayon marks may be used to measure temperature.
 - .3 Use torch guiding device to ensure smooth round holes or straight edges.
 - .4 Make cut smooth and free from notches throughout thickness. If grinding is employed to remove notch or crack, finished radius to be minimum 5 mm.

- .3 Contractor shall ensure that no debris from cutting enters the marine environment.

3.8 Pile Completion

- .1 Re-drive sheet piles to the design elevations described on the Drawings to tolerance of +/- 25 mm.
- .2 Re-install geotextile at sheet pile overlap joints as described in Section 31 32 19.01 (Geotextiles).

3.9 Pile Driving Records

- .1 Maintain accurate records of driving or re-driving for each sheet pile and temporary pile, including:
 - .1 Date, weather and tidal levels.
 - .2 Type and make of hammer, stroke and related energy.
 - .3 Other driving equipment including water jet, driving cap, cushion block type and thickness.
 - .4 Pile size, pile length, and location of pile in the work.
 - .5 Sequence of driving piles in pre-selected pile numbering system.
 - .6 If impact hammer method is used, record blow counts for each 305 mm of penetration for entire length of pile and for each 25 mm for the final 150 mm of penetration.
 - .7 Elevation of bedrock where bedrock is encountered.
 - .8 Seating procedures where relevant.
 - .9 Final tip and cut-off elevations.
 - .10 Elevation of adjacent piles before and after driving of each pile.
 - .11 Other pertinent information such as interruption of continuous driving, or pile damage.
- .2 Provide Departmental Representative with pile-driving records for all sheet piles driven or partly driven at the end of each work shift.
- .3 Provide Departmental Representative with all pile-driving records at completion of the Work.

3.10 Cleaning of Extracted Sheet Piles

- .1 After extraction of the re-driven sheet pile wall, clean off all sediment and other objects that are attached to the surface of the sheet piles.
 - .1 Handle, store, and transport the extracted sheet piles in the same manner as contaminated sediment prior to cleaning the sheet piles.

- .2 Prevent the removed sediment or other removed objects from entering the marine environment outside of the TRBCA, and shall comply with water quality criteria of the EMP/WQMP during extraction, transport, and cleaning of the extracted re-driven sheet piles.
- .3 All sediment and other objects that were cleaned off the surface of the sheet piles shall be managed for disposal in accordance with the Specification.
- .4 Prevent removed sediment or other removed objects from re-contaminating areas where Required Dredging or Engineered Capping is in process or has been completed.

3.11 Handling and Storage of Extracted Sheet Piles

- .1 Use slings for lifting piling so that mass is evenly distributed and piles are not subjected to excessive bending stresses, impact or abrasion.
- .2 Store piles on level surface or provide supports so that piles are level when stored. Provide blocking at spacing not exceeding 4 m so that there is no excessive sagging in piles. Overhang at ends not to exceed 0.5 m. Block between lifts directly above blocking in lower lift. Maximum height of stacked pile bundles not to exceed 4 m. Stagger bundles on plan.
- .3 If material is stockpiled on structure, ensure that structure is not overloaded.

3.12 Removal from Site and Disposal of Extracted Sheet Piles

- .1 Contractor becomes the owner of, and is responsible for, all steel sheet piles extracted from the EGD Facility and loaded onto a vehicle, barge, or other vessel for transport to a Contractor Off-Site Offload Facility, Disposal Facility, or other recycling/re-use facility.
- .2 Transport all extracted steel sheet piles off-site from the EGD Facility only by use of waterborne transport. Do not use trucks to transport extracted steel sheet piles from the EGD Facility.
- .3 Remove materials that cannot be salvaged for re-use or recycling, and dispose of in accordance with the Laws and Regulations at authorized facilities.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section covers the re-installation of existing timber fender piles (to protect concrete structures) and corner dolphin piles (as navigation markers) as shown on the Drawings. Re-use of selected salvaged timber piles as indicated on the Drawings is a Project requirement. It is not anticipated that any new timber piles or timber components will be required for the work.
- .2 Removal of existing timber fender piles and corner dolphin piles as described on the Drawings, including storage for re-use, and identification and disposal where unsuitable for re-use, is covered under Section 02 41 16.01 (Structure Demolition).
- .3 For re-use of other timber components (e.g., as bull rail or fender chocks), refer to Section 06 10 10 (Timber).

1.2 Related Sections

- .1 Section 01 33 00 (Submittal Procedures)
- .2 Section 01 35 13.43 (Special Procedures for Contaminated Sites)
- .3 Section 01 35 33 (Health and Safety Requirements)
- .4 Section 01 35 43 (Environmental Procedures and Sustainability)
- .5 Section 02 41 13 (Selective Site Demolition)
- .6 Section 02 41 16.01 (Structure Demolition)
- .7 Section 02 41 16.02 (Structure Relocation)
- .8 Section 06 10 10 (Timber)
- .9 Section 06 05 73 (Wood Treatment)
- .10 Section 31 62 17 (Steel Sheet Piling)

1.3 Measurement and Payment Procedures

- .1 Re-installation of existing timber fender piles (to protect concrete structures) and re-installation of corner dolphin piles (as navigation markers) will not be measured individually. Payment for re-installation of existing timber piles will be made at the Lump Sum prices tendered for TIMBER PILING: RE-INSTALL SOUTH JETTY FENDER PILES (at concrete jetty perimeter) and TIMBER PILING: RE-INSTALL SOUTH JETTY CORNER DOLPHIN PILES (as navigation markers), respectively. Payment shall be full compensation for all work in connection with re-installation of existing timber piles as described in this Section and on the Drawings.

- .2 Mobilization and demobilization of pile-driving equipment will be measured to Section 01 50 00 (Mobilization and Demobilization), and payment shall include all costs in connection with mobilization and demobilization as specified in that Section.
- .3 Aluminum pile coverings (caps), steel through-bolts, straps, accessories, and preservative treatment are considered as incidental to the re-installation of timber piles.
- .4 There will be no additional payment for delays or downtime incurred by marine vessel traffic, permit requirements, water quality requirements, environmental closures required by Fisheries and Oceans Canada (DFO), or shutdowns due to Contractor's non-compliance with Laws and Regulations, Project Permits, and the Environmental Management Plan (EMP)/Water Quality Monitoring Plan (WQMP).
- .5 Failure of Contractor to satisfy himself as to the acceptable means of undertaking the works in compliance with Laws and Regulations, Project Permits, and the EMP shall not constitute a basis for any additional payment.

1.4 References

- .1 Canadian Standards Association (CSA):
 - .1 CAN/CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
 - .2 CAN/CSA-O56-10, Round Wood Piles.
 - .3 CAN/CSA-O80 Series, Wood Preservation.
- .2 American Society for Testing and Materials (ASTM):
 - .1 ASTM A 307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - .2 ASTM A123/A123M, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - .3 ASTM A153/A153M, Standard Specification for Zinc Coating (Hot-dip) on Iron and Steel Hardware.
 - .4 ASTM D 25-99(2005), Standard Specification for Round Timber Piles.
- .3 Canadian Institute of Treated Wood and Western Wood Preservers Institute (CITW): "Best Management Practices for the use of Treated Wood in Aquatic Environments."

1.5 Definitions

- .1 Refer to Section 01 11 55 (General Instructions) for all definitions related to this Contract.

1.6 Submittals

- .1 Provide submittals in accordance with Section 01 33 00 (Submittal Procedures).
- .2 As part of the detailed Construction Work Plan, and in accordance with Section 01 33 00 (Submittal Procedures), Contractor shall prepare a section that describes the methods and procedures for timber pile re-installation at the South Jetty. Timber pile re-installation activities shall not begin until: 1) the Construction Work Plan has been reviewed and accepted by the Departmental Representative; and 2) other notifications and review have been completed as necessitated by the permits or other requirements of the Contract. At a minimum, the timber pile re-installation method and procedures shall contain the following information:
 - .1 Proposed method of driving timber piles: Indicate proposed method of pile-driving. If proposed method to drive the piles does not utilize vibratory piling hammer, then submit alternative equivalent method for review by Departmental Representative.
 - .2 Contractor's method designed to reduce underwater sound levels to no greater than 30 kilopascals (kPa) at 1.0 metre distance from face of timber pile, and to monitor underwater sound levels during the pile-driving work.
 - .3 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.
 - .4 Non-impact methods of installation such as vibratory hammers, jacking, or other means: Provide full details of characteristics necessary to evaluate performance.
 - .5 Methods for vertical and lateral support of timber piles during pile installation.
 - .6 Proposed method of pile head / tip protection during pile-driving, and proposed method of protection from abrasion and / or impact by Contractor's plant and equipment during the work.
 - .7 Pile layout drawings and planned sequence of pile-driving.

1.7 Requirements of Regulatory Authorities

- .1 The scheduling of the timber piling work shall be carried out in strict accordance with Laws and Regulations and Project Permit requirements. Contractor shall hold harmless and protect PWGSC from all claims, costs, and delays that could or do arise from Contractor's non-compliance with Laws and Regulations or permit requirement.
- .2 Notwithstanding the acquisition of permits by Departmental Representative, Contractor shall investigate and satisfy itself as to the acceptable means of

- undertaking the works in compliance with the Laws and Regulations, Project Permits, and the EMP.
- .3 Contractor shall notify Departmental Representative not less than five (5) days prior to commencing the timber piling work. If Contractor receives any directive from DFO, then Contractor is to inform Departmental Representative before carrying out any such DFO directive. If Contractor is requested to stop work by DFO, then Contractor shall comply immediately and then inform Departmental Representative prior to carrying out any other DFO directive or work.
 - .4 Contractor shall notify the Queens Harbour Master and Canadian Coast Guard (MCTS Victoria) not less than fourteen (14) days prior to commencing the timber piling work, for major marine equipment moves during the work and at completion of the timber piling work, shall maintain liaison with both those parties as the work progresses, and shall keep Departmental Representative informed of all such communications.
 - .5 Ensure that equipment used in construction does not block marine navigation.

1.8 Existing Conditions and Site Information

- .1 For existing jetty conditions, refer to the Reference Drawings and Data Reports listed in the Specification Index.
- .2 For geotechnical investigation reports, dive inspection reports, and other background data, refer to the Data Reports listed in the Specification Index.
- .3 Contractor is informed that debris may lie on, or be partly or fully embedded within the seabed soils in the area of the pile-driving work.
- .4 Contractor is informed that Obstructions may lie fully embedded within the seabed soils in the area of the pile-driving work.
- .5 Contractor is informed that variable pile-driving conditions may be encountered in the work, especially in the area of the rubble mound foundation for the existing timber crib (as indicated on the Drawings).
- .6 Notify Departmental Representative in writing if subsurface conditions at the EGD Work Site differ from those indicated and await further instructions from Departmental Representative.

1.9 Operating Environment

- .1 Management of environmental effects (such as wind, tidal state, and sea state) on timber piling work shall be the sole responsibility of the Contractor.
- .2 The timber piles will be installed in seawater. The normal tidal range at Esquimalt Harbour is indicated on the Drawings. Extreme tidal elevations including surge effects will exceed the indicated tidal range.
- .3 The design ambient temperature range is from -6°C minimum to 24°C maximum.

- .4 Historical wind records taken in the vicinity of Esquimalt Harbour may be obtained from Environment Canada.

2. PART 2 – PRODUCTS

2.1 Materials

- .1 New round timber piles: (not required for this project)
- .2 Pile branding: (not required for this project)
- .3 Piles to be clean peeled: (not required for this project)
- .4 Do not damage the pile surface: (not required for this project)
- .5 Pile species: (not required for this project)
- .6 Each re-used pile is to be supplied in one piece; splices are not permitted.
- .7 Departmental Representative will be sole judge of quality and dimension of piles. Remove rejected piles from site of work.
- .8 Bolts, nuts, and washers: To ASTM A307.
- .9 Wire nails, spikes, staples: To CAN/CSA B111.
- .10 Pile Coverings: Annealed aluminum sheet, gauge as described on the Drawings.
- .11 Hot dip galvanize bolts, nuts, washers and, unless otherwise specified, staples, cable clamps, pipe sleeves, spikes, and nails: to ASTM A153/A153M. Galvanize other hardware to ASTM A123/A123M.

2.2 Wood Preservation

- .1 Additional wood preservation of re-used timber piles is not required.
- .2 For field preservation treatment of re-used timber components refer to Section 06 05 73 (Wood Treatment).

2.3 Equipment

- .1 Pile hammer: Select and use pile hammer of sufficient weight and energy to suitably install specified pile without damage into soils expected to be encountered.
- .2 Comply with the Coasting Trade Act for vessels used for this contract.

3. PART 3 – EXECUTION

3.1 General

- .1 The sequence of work shall be as described on the Drawings.

- .2 Comply with live loading restrictions at the existing timber piled jetty structures, as shown on the Drawings and on the Reference Drawings.
- .3 The Contractor is responsible for all temporary conditions during construction, including moorage and loads from floating construction equipment and environmental effects during the work.
- .4 Contractor's floating construction equipment shall not impede vessels entering the EGD Facility, or vessels visiting or moored at the North Landing Wharf. Comply with moorage requirements described on the Drawings during non-working hours.
- .5 Make adequate provision for access and support of piling equipment during performance of the work.
- .6 Ensure that pile-driving and methods of construction do not cause traffic disruptions, damage to existing jetty structures or jetty hardware, damage to existing utilities, or damage to the environment. In the event that Contractor causes such damage, then he shall be responsible for all necessary repairs and at his sole expense.
- .7 Monitor existing adjacent structures for damage or distress caused by pile-driving operations, and submit written monitoring reports to Departmental Representative on a daily basis.
- .8 Contractor shall, within twenty-four (24) hours, repair any damage made to the existing jetty structures, jetty hardware, or utilities and restore to original or better condition at Contractor's sole expense. Failure to do so will be considered non-compliance by Contractor as defined by the Contract.

3.2 Preparation and Protection

- .1 Take all necessary precautions, including the provision of suitable screening fences and barriers to protect public, existing structures, facilities, and services from damage due to pile installation and associated works.
- .2 Protect existing jetty structures, services, and work of other sections from hazards due to pile-driving operations and against damage caused by Contractor's floating construction equipment, tugboats, or by other construction activities throughout the work.
- .3 Protect public and construction personnel, and adjacent structures from hazards attributable to pile-driving operations.
- .4 Sequence all pile-driving operations and methods to avoid damage to existing jetty structures.
- .5 Provide temporary fender protection along the waterside (exposed face) of the existing timber crib and steel-piled concrete deck structures to protect those structures from abrasion or impact damage caused by Contractor's floating construction equipment, tugboats, or by other construction activities. The temporary fender protection shall comprise timber or rubber fender units, or

- combination thereof, to Departmental Representative's satisfaction, and shall remain in place until re-installation of the timber fender piles has been completed in that area of the work.
- .6 Avoid dropping, bruising, or breaking of wood fibres. Fibre slings shall be used, except where accepted otherwise by Departmental Representative.
 - .7 Avoid breaking surfaces of treated piles.
 - .8 Do not damage surfaces of treated piles below cutoff elevation.
 - .9 Protect timber piles from damage, abrasion, or impact by Contractor's plant and equipment during the work
 - .10 Treat cuts, breaks, or abrasions on surfaces of treated piles, bolt holes, and field cuts in accordance with CSA-O80 Series and as specified on the Drawings.
 - .11 During all in-water and above-water timber piling work, environmental protection shall comply with the requirements of Section 01 35 43 (Environmental Procedures and Sustainability), Section 01 35 13.43 (Special Procedures for Contaminated Sites), the EMP, and the Environmental Protection Plan (EPP).
 - .12 Do not allow buoyant items that have been demolished or detached from their original position (i.e., floating Demolition Debris) to float beyond the EGD Work Site. Do not allow floating Demolition Debris to cause any hindrance or obstacle to marine traffic and EGD dry dock operations. Identify and collect floating Demolition Debris on a daily basis, and dispose in accordance with the Specifications.

3.3 Selection of Piles for Re-use in the Work

- .1 Timber piles salvaged and chosen by Contractor for re-use in the work are to be pre-selected by Contractor, after extraction from the seabed, as generally suitable for intended use (as fender piles or as dolphin piles).
- .2 Upon notification of readiness by Contractor, with minimum notification time of twenty-four (24) hours, Departmental Representative will inspect the pre-selected piles and either accept the piles as being generally suitable for intended use, or require Contractor to replace any unsuitable piles with spare piles available from the jetty demolition work.
- .3 In the event that some pre-selected piles are deemed by Departmental Representative as being unacceptable for re-use, those piles shall not be re-used in the work, and Contractor shall then select alternate piles for inspection by Departmental Representative. The notification time may, at Departmental Representative's sole discretion, be waived for this inspection of alternate piles.
- .4 Alternately, to facilitate the pile selection process, Contractor may pre-select a number of piles additional to the minimum number required for re-use, and submit all the selected piles for inspection by Departmental Representative.

- .5 Departmental Representative's decision as to acceptability of timber piles for re-use in the work is final.

3.4 Pile Installation

- .1 Carry out pile-driving using marine-based floating equipment in conformance with the Laws and Regulations, EMP, EPP, and the requirements of this Section.
- .2 Carry out pile-driving in conformance with noise requirements described in Section 01 35 43 (Environmental Procedures and Sustainability).
- .3 If proposed method to drive the timber piles into the seabed does not utilize vibratory piling hammer, then submit alternative equivalent method for review by Departmental Representative, in accordance with Clause 1.6 of this Section.
- .4 Use work procedures and marine-based floating equipment that will ensure turbidity in the water column does not exceed the prescribed limits throughout the work.
- .5 Use pile-driving equipment appropriate for the soil conditions. Use pile-driving equipment that generates the minimum amount of energy necessary to drive the timber piles to the design elevations described on the Drawings.
- .6 In the event that Contractor's pile-driving equipment is inadequate to perform the work or to maintain schedule, then Contractor shall mobilize and use larger pile-driving equipment suitable for the work, at Contractor's sole expense.
- .7 At start of, and during pile-driving operations, monitor underwater sound pressures to confirm that the pressures do not exceed the maximum allowable levels.
- .8 Underwater noise during pile-driving operations shall be controlled and monitored in accordance with the following performance criteria:
 - .1 Underwater sound levels shall not exceed 30 kPa at 1.0 m distance from the face of timber pile;
 - .2 If underwater sound levels exceed 30 kPa at a distance of 1.0 m from the face of timber pile, modify the pile-driving method to reduce the intensity of the sound generated to below the 30 kPa limit.
- .9 Sequence the pile-driving work to minimize construction duration, and in conformance with the sequence described on the Drawings.
- .10 In the event that underwater sound levels exceed the performance criteria, implement mitigation measures to reduce underwater overpressure to comply with the performance criteria. The design of the mitigation measures shall be the responsibility of Contractor, but must meet DFO requirements and adhere to the EMP.
- .11 Provide pile-driving equipment and all accessories necessary to install the piles as specified, and as described on the Drawings.

- .12 Use driving caps and cushions to protect piles as necessary. Reinforce pile heads if necessary. Piles with damaged heads after cut-off will be rejected by Departmental Representative.
- .13 Use templates to hold piles securely and accurately in position while driving.
- .14 Deliver hammer blows along axis of pile. Ensure pile is not overstressed.
- .15 Ensure that the leads of the pile-driving equipment do not exert lateral forces on the piles during driving. No adjustment of a possible misalignment will be permitted during driving, except at the very initial stage.
- .16 Drive each pile continuously to final tip elevation as indicated on the Drawings.
- .17 Piles are to be driven so that splitting, brooming, or other damage does not occur.
- .18 Place driving helmet, cap, and cushion block combination capable of protecting pile head between top of pile and ram to prevent impact damage to pile. Use block helmet to transmit energy uniformly to pile and to minimize loss of energy.
- .19 Replace block if it is damaged, split, highly compressed, charred, or burned or has become spongy or deteriorated, with a new block.
- .20 During driving, restrain lateral movement of piles at intervals not exceeding 6 metres over length between ground surface and driving head.
- .21 Treat bolt holes and exposed ends of cut off piles as specified by Section 06 05 73 (Wood Treatment), and as indicated on the Drawings.
- .22 Install aluminum pile coverings on tops of piles immediately after treatment; bend edges down over sides of pile, neatly trim and fasten with eight (8) large headed roofing nails.
- .23 If conditions are encountered that make it difficult to drive a pile in the location shown and to advance the pile to the tip elevation shown on the Drawings, employ all reasonable means to advance the pile. Refer to Section 31 62 17 (Steel Sheet Piling) for requirements related to pile-driving difficulties and obstructions.
- .24 Installed piles will be subject to acceptance of Departmental Representative:
 - .1 Departmental Representative will be sole judge of acceptability of each pile with respect to acceptable quality of re-used piles, depth of penetration, depth of embedment, and installation accuracy.
 - .2 Do not remove pile-driving equipment from site until Departmental Representative has accepted final driving of all piles.

3.5 Tolerances in Driving

- .1 Variation of not more than 6 mm per 300 mm of pile length from vertical is permitted for plumb piles, fender piles, and navigation marker piles.
- .2 Center of butts: within 100 mm of location indicated.

- .3 Manipulation of piles shall not be permitted.
- .4 Re-drive heaved piles to required tip elevation.
- .5 Remove and replace damaged piles, mislocated piles, and piles driven out of alignment, and provide additional piles driven as directed.

3.6 Pile-Driving Records

- .1 Maintain accurate records of driving for each timber pile, including:
 - .1 Date, weather, and tidal levels.
 - .2 Type and make of hammer, stroke, and related energy.
 - .3 Other driving equipment including water jet, driving cap, cushion block type and thickness.
 - .4 Pile size, length, and location of pile.
 - .5 Sequence of driving piles in pre-selected pile numbering system.
 - .6 If impact hammer method is used, record blow counts for each 305 mm of penetration for entire length of pile and for each 25 mm for the final 150 mm of penetration.
 - .7 Elevation of bedrock where bedrock is encountered.
 - .8 Seating procedures where relevant.
 - .9 Final tip and cut-off elevations.
 - .10 Elevation of adjacent piles before and after driving of each pile.
 - .11 Other pertinent information such as interruption of continuous driving, or pile damage.
- .2 Provide Departmental Representative with pile-driving records for all piles driven or partly driven at the end of each work shift.
- .3 Provide Departmental Representative with three (3) copies of all pile-driving records at completion of the work.

3.7 Waste Management and Disposal

- .1 Separate waste materials for re-use and/or recycling.
- .2 Place materials defined as hazardous or toxic in designated containers.
- .3 Dispose of removed materials at Disposal Facilities in accordance with Section 35 20 23.01 (Offloading, Upland Transportation and Disposal), and in accordance with Laws and Regulations.
- .4 Dispose of creosoted or preservative-treated timber components, end pieces, wood scraps, and sawdust in accordance with Laws and Regulations. Creosoted

or preservative-treated wood must not be disposed of through incineration. Creosoted or preservative-treated wood must not be disposed of with other materials destined for recycling or re-use.

- .5 Dispose of unused wood preservative at official hazardous material collections site that is permitted to accept such materials.
- .6 Do not dispose of unused preservative material into sewer system, streams or lakes, onto ground, or in other locations where they will pose health or environmental hazards.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section covers the supply, placement and compaction of the granular sub-base underlying granular base where shown on the Drawings.

1.2 Related Sections

- .1 Section 01 33 00 (Submittal Procedures)
- .2 Section 31 24 15 (General Fill)
- .3 Section 31 23 10 (Excavating, Trenching and Backfilling)
- .4 Section 32 11 23 (Aggregate Base Courses)
- .5 Section 35 37 10 (Engineered Capping)

1.3 Measurement and Payment Procedures

- .1 Granular sub-base shall be measured after compaction, in cubic metres of material actually incorporated into work at the various thicknesses shown to neat lines within the areas defined on the Drawings. No measurement will be made for material that is placed on a temporary basis or materials that are subsequently removed.
- .2 Granular sub-base will be paid for at the unit price tendered for GRANULAR SUB-BASE. This payment shall be full compensation for supply of material, sampling and testing, placing, grading, moisture conditioning, compacting, trimming, and all related activity necessary to complete the work as specified.

1.4 References

- .1 ASTM C117, Test Method for Materials Finer than 75- μm (No. 200) Sieve in Mineral Aggregates by Washing.
- .2 ASTM C136, Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- .3 ASTM D1557, Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
- .4 ASTM D4718, Standard Practice for Correction of Unit Weight and Water Content for Soils Containing Oversize Particles.

1.5 Definitions – Not Used

1.6 Submittals

- .1 Refer to Clause 2.1.3 of this Section.

2. PART 2 – PRODUCTS

2.1 Granular Sub-Base

- .1 Granular sub-base shall be hard, durable, crushed or pit run sand and gravel free of organic and any deleterious matter, and capable of forming a competent surface for the granular base.
- .2 Material shall comply with the gradation limits given in Table 32 11 19-1, when tested in accordance with ASTM C117 and ASTM C136, and have a smooth curve without sharp breaks when plotted on a semi-log grading chart.

Table 32 11 19-1

Sub-Base Gradation

Sieve Size (U.S. Standard)	Gradation Limits (% Passing by Dry Weight)
75 mm (3 in)	100
19 mm (3/4 in)	65 – 100
4.75 mm (No. 4)	30 – 100
2.00 mm (No. 10)	15 – 100
0.40 mm (No. 40)	5 – 50
0.075 mm (No. 200)	0 – 5

- .3 At least twenty-eight (28) days prior to commencing granular sub-base placement, and in accordance with Section 01 33 00 (Submittal Procedures), Contractor shall submit to Departmental Representative for review the proposed material source(s) and placement procedures and provide, at Contractor's cost, qualification test results confirming that the proposed material from each source (gradation curves, physical and chemical properties) meets or exceeds the requirements of this specification. Submit chemical properties in accordance with the requirements of Section 35 37 10 (Engineered Capping).
- .4 Departmental Representative will, within fourteen (14) days of receiving the above submission, advise Contractor of the acceptability of the proposed materials and procedures.
- .5 During granular sub-base production, Contractor shall, at its own cost, conduct ongoing quality control sampling and testing at the loading conveyor to confirm that the granular sub-base material conforms to the specification. The material gradation testing rate for granular sub-base shall be not less than one test for every 10 m³ placed in the work (two tests at minimum). The testing rate for in-situ compacted density of granular sub-base shall be not less than one test for every 10 m³ placed in the work (two tests at minimum); the testing rate for reference dry density (ASTM D1557) shall be not less than one test for every 10 m³ placed in the work. All quality control test reports shall be submitted to Departmental

Representative for review and approval prior to placement of that material in the Work.

- .6 During placement, Departmental Representative may, at its discretion, inspect the granular sub-base material for conformance to the specification. This quality assurance inspection may include sampling and testing at no cost to Contractor, unless material does not conform, whereon the testing shall be at Contractor's own expense.
- .7 Failure of a sample to meet any one of the specified gradation and physical properties constitutes an unacceptable material and such material may be subject to rejection by Departmental Representative. Subject to Departmental Representative's agreement, rejected granular sub-base material may be used instead as general fill material.

3. PART 3 – EXECUTION

3.1 General

- .1 All granular sub-base may be imported by road transport, unloaded directly within the EGD Work Site.
- .2 Provide adequate flag-persons and/or traffic signal devices to prevent interference with emergency vehicles or traffic of other dock users and contractors.
- .3 Priority shall be given to all other traffic over Contractor's construction traffic.
- .4 At the end of each working day, sweep roadway and clean up all fallen rock, dust and debris arising from rock deliveries, to Departmental Representative's satisfaction.

3.2 Placing

- .1 Placing of granular sub-base material shall commence only after approval by Departmental Representative of the finished grade of excavations or finished grade of general fill, as appropriate to the location. Refer to Section 31 24 15 (General Fill) and Section 31 23 10 (Excavating, Trenching and Backfilling) for requirements.
- .2 Surfaces shall at all times be kept free of snow, ice or any other deleterious material.
- .3 Placement shall be conducted using methods that avoid segregation or degradation of the material. Any areas where segregation occurs shall be over-excavated, reworked, and replaced to the satisfaction of Departmental Representative.
- .4 Material lift thickness shall not exceed 200 mm after compaction unless otherwise approved by Departmental Representative.
- .5 Placing of subsequent lifts shall proceed only after acceptance by Departmental Representative of the compacted surface to be covered.

3.3 Compacting

- .1 Granular sub-base material shall be compacted to a minimum of 95 % modified Proctor maximum dry density (ASTM D1557) corrected for oversize materials in accordance with ASTM D4718, and as shown on the Drawings.
- .2 Modify the moisture content of the material as necessary, or as directed by Departmental Representative, to obtain the specified density. If the material becomes excessively moist and cannot be properly compacted, it shall be removed and replaced with a suitable material.
- .3 During the work only hand-operated compaction equipment shall be used within a distance of 0.6 m from any concrete structure.
- .4 Ensure that the compaction does not impact or damage any structures.
- .5 Repair any damage to structures arising from compaction.
- .6 Fill densities and moisture contents shall be measured by nuclear methods in accordance with ASTM D2922 and ASTM D3017. All moisture contents measured using nuclear methods shall be confirmed by oven dry method in accordance with ASTM D2216 or microwave method in accordance with ASTM D4643. In the event of a discrepancy between moisture content determinations, the moisture content determined by oven dry method shall apply. Oversize materials shall be determined for each density test and the measured density corrected for oversize materials. Departmental Representative may, at its sole discretion, approve corrections to densities measured with a nuclear gauge for a material type, if the Contractor provides site specific and material-specific correlation tests between nuclear density test methods and volumetric test methods approved by Departmental Representative.
- .7 If an area of granular sub-base compaction fails to meet the acceptance criteria, conduct additional tests, as directed by Departmental Representative, to delineate the extent of the area. Remediate the area and conduct additional tests, as directed by Departmental Representative, to confirm that the area meets the acceptance criteria. No additional payment will be made for these tests or remediation work.
- .8 Contractor shall make available compacted areas for density testing for quality assurance purposes, as required by Departmental Representative.

3.4 Final Tolerances

- .1 Final compacted and graded surface shall be within ± 25 mm of the specified grade, but not uniformly high or low.

3.5 Maintenance

- .1 Maintain finished granular sub-base in same condition as that upon acceptance until granular base is placed.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section covers the supply, placement and compaction of the granular base underlying asphalt paving and underlying certain concrete structures as shown on the Drawings.

1.2 Related Sections

- .1 Section 01 33 00 (Submittal Procedures)
- .2 Section 03 39 00 (In-Situ Concrete Structures)
- .3 Section 31 24 15 (General Fill)
- .4 Section 32 12 16 (Asphalt Paving)
- .5 Section 32 11 19 (Granular Sub-Base)
- .6 Section 35 37 10 (Engineered Capping)

1.3 Measurement and Payment Procedures

- .1 Granular base shall be measured after compaction, in cubic metres of material actually incorporated into work at the various thicknesses shown to neat lines within the areas defined on the Drawings. No measurement will be made for material that is placed on a temporary basis or materials that are subsequently removed.
- .2 Granular base will be paid for at the unit price tendered for GRANULAR BASE. This payment shall be full compensation for supply of material, sampling and testing, placing, grading, moisture conditioning, compacting, proof rolling, trimming, and all related activity necessary to complete the work as specified.

1.4 References

- .1 ASTM C136, Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- .2 ASTM C117, Test Method for Materials Finer than 75- μm (No. 200) Sieve in Mineral Aggregates by Washing.
- .3 ASTM D1557, Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
- .4 ASTM D4718, Practice for Correction of Unit Weight and Water Content for Soils Containing Oversize Particles.
- .5 ASTM D5821, Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate.

1.5 Definitions – Not Used

1.6 Submittals

- .1 Refer to Clause 2.1.3 of this Section.

2. PART 2 – PRODUCTS

2.1 Granular Base

- .1 Granular base shall be hard, durable crushed sand and gravel free of organic and any deleterious matter, and capable of forming a smooth, competent surface for placement of asphalt paving or for use as foundation for miscellaneous concrete structures. Coarse aggregate to have a minimum of 50% fractured faces when tested in accordance with ASTM D5821.
- .2 Material shall comply with the gradation limits given in Table 32 11 23-1, when tested in accordance with ASTM C136 and ASTM C117, and have a smooth curve without sharp breaks when plotted on a semi-log grading chart.

Table 32 11 23-1

Granular Base Gradation

Sieve Size (U.S. Standard)	Gradation Limits % Passing by Dry Weight
25 mm (1 in)	100
19 mm (3/4 in)	85 – 100
9.5 mm (3/8 in)	60 – 85
4.75 mm (No. 4)	40 – 70
2.0 mm (No. 10)	25 – 50
0.40 mm (No. 40)	5 – 25
0.075 mm (No. 200)	0 – 5

- .3 At least twenty-eight (28) days prior to commencing granular base placement, and in accordance with Section 01 33 00 (Submittal Procedures), Contractor shall submit to Departmental Representative for review the proposed material source(s) and placement procedures and provide, at Contractor’s own cost, qualification test results confirming that the proposed material from each source (gradation curves, physical and chemical properties) meets or exceeds the requirements of this specification. Submit chemical properties in accordance with the requirements of Section 35 37 10 (Engineered Capping).
- .4 Departmental Representative will, within fourteen (14) days of receiving the above submission, advise Contractor of the acceptability of the proposed materials and procedures.

- .5 During granular base production, Contractor shall, at its own cost, conduct ongoing quality control sampling and testing at the loading conveyor to confirm that the gradation of the granular base material conforms to the specification. The material gradation testing rate for granular base shall be not less than one test for every 10 m³ placed in the work (two tests at minimum). The testing rate for in-situ compacted density of granular base shall be not less than one test for every 10 m³ placed in the work (two tests at minimum); the testing rate for reference dry density (ASTM D1557) shall be not less than one test for every 10 m³ placed in the work. All quality control test reports shall be submitted to Departmental Representative for review and approval prior to placement of that material in the Work.
- .6 During placement, Departmental Representative may, at its discretion, inspect the granular base material for conformance to the specification. This quality assurance inspection may include sampling and testing at no cost to Contractor, unless material does not conform, whereon the testing shall be at Contractor's expense.
- .7 Failure of a sample to meet any one of the specified gradation and physical properties constitutes an unacceptable material and such material may be subject to rejection by Departmental Representative. Subject to Departmental Representative's agreement, rejected granular base material may be used instead as general fill material.

3. PART 3 – EXECUTION

3.1 General

- .1 All granular base may be imported by road transport, unloaded directly within the EGD Work Site.
- .2 Provide adequate flag-persons and/or traffic signal devices to prevent interference with emergency vehicles or traffic of other dock users and contractors.
- .3 Priority shall be given to all other traffic over Contractor's construction traffic.
- .4 At the end of each working day, sweep roadway and clean up all fallen rock, dust and debris arising from rock deliveries, to Departmental Representative's satisfaction.

3.2 Placing

- .1 Placing of granular base material shall commence only after approval of the granular sub-base by Departmental Representative. Refer to Section 32 11 19 (Granular Sub-Base) for granular sub-base requirements.
- .2 Surfaces shall at all times be kept free of snow, ice or any other deleterious material.

- .3 Placement shall be conducted using methods that avoid segregation or degradation of the material. Any areas where segregation occurs shall be over-excavated, reworked, and replaced to the satisfaction of Departmental Representative.
- .4 Material lift thickness shall not exceed 200 mm after compaction unless otherwise approved by Departmental Representative.
- .5 Placing of subsequent lifts shall proceed only after acceptance by Departmental Representative of the compacted surface to be covered.

3.3 Compacting

- .1 Granular base material shall be compacted to a minimum of 95 % modified Proctor maximum dry density (ASTM D1557) corrected for oversize materials in accordance with ASTM D4718, and as shown on the Drawings.
- .2 Modify the moisture content of the material as necessary, or as directed by Departmental Representative, to obtain the specified density. If the material becomes excessively moist and cannot be properly compacted, it shall be removed and replaced with a suitable material.
- .3 During the work only hand-operated compaction equipment shall be used within a distance of 0.6 m from any concrete structure.
- .4 Ensure that the compaction does not impact or damage any structures.
- .5 Repair any damage to structures arising from compaction.
- .6 Fill densities and moisture contents shall be measured by nuclear methods in accordance with ASTM D2922 and ASTM D3017. All moisture contents measured using nuclear methods shall be confirmed by oven dry method in accordance with ASTM D2216 or microwave method in accordance with ASTM D4643. In the event of a discrepancy between moisture content determinations, the moisture content determined by oven dry method shall apply. Oversize materials shall be determined for each density test and the measured density corrected for oversize materials. Departmental Representative may, at its sole discretion, approve corrections to densities measured with a nuclear gauge for a material type, if Contractor provides site specific and material-specific correlation tests between nuclear density test methods and volumetric test methods approved by Departmental Representative.
- .7 If an area of granular base compaction fails to meet the acceptance criteria, conduct additional tests, as directed by Departmental Representative, to delineate the extent of the area. Remediate the area and conduct additional tests, as directed by Departmental Representative, to confirm that the area meets the acceptance criteria. No additional payment will be made for these tests or remediation work.
- .8 Contractor shall make available compacted areas for density testing for quality assurance purposes, as required by Departmental Representative.

3.4 Final Tolerances

- .1 Final compacted and graded surface shall be within ± 10 mm of the specified grade, but not uniformly high or low.

3.5 Proof Rolling

- .1 Proof roll top of granular base upon completion of fine grading and compaction.
- .2 For proof rolling use a 50 tonne pneumatic roller, or a 20 tonne unballasted static mass vibratory roller operated at normal walking speed.
- .3 Make sufficient passes with proof roller to subject every point on surface to two separate passes under the maximum load.
- .4 Where proof rolling reveals areas of inadequate compaction, compact the granular base course and proof roll again.
- .5 Where proof rolling reveals areas of defective or fines-contaminated general fill:
 - .1 Remove granular base, sub-base and general fill materials to depth and extent directed by Departmental Representative.
 - .2 Backfill excavated area with approved general fill and compact in accordance with Section 31 24 15 (General Fill).
 - .3 Replace granular sub-base material and compact in accordance with Section 32 11 19 (Granular Sub-Base); and,
 - .4 Replace granular base material and compact in accordance with this section.

3.6 Maintenance

- .1 Maintain finished granular base in same condition as that upon acceptance until asphalt or concrete is placed.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section covers the supply and placement of asphalt prime coat to the granular base surface prior to asphalt paving operations.

1.2 Related Work

- .1 Section 01 33 00 (Submittal Procedures)
- .2 Section 32 11 23 (Aggregate Base Courses)
- .3 Section 32 12 15 (Asphalt Tack Coat)
- .4 Section 32 12 16 (Asphalt Paving)

1.3 Measurement and Payment Procedures

- .1 Asphalt prime will not be measured separately, but considered incidental to the work. All costs in connection with asphalt prime shall be included in the unit price tendered for asphalt paving under Section 32 12 16 (Asphalt Paving).
- .2 No separate measurement or payment will be made for asphalt prime at overlapping areas, overspray or asphalt prime which must be re-applied due to weather conditions, contamination, disruption or other causes.
- .3 No separate measurement or payment will be made for supply and application of sand blotter and sweeping of excess.
- .4 No separate measurement or payment will be made for asphalt prime on contact surfaces at concrete structures.

1.4 References

- .1 ASTM D140, Practice for Sampling Bituminous Materials.
- .2 ASTM D977 (2003), Standard Specification for Emulsified Asphalt.
- .3 CAN/CGSB 16.1 M, Cutback Asphalts for Road Purposes.
- .4 CAN/CGSB 16.2 M, Emulsified Asphalts, Anionic Type, for Road Purposes.

1.5 Definitions – Not Used

1.6 Submittals, Samples and Material Certification

- .1 Make all submittals in accordance with Section 01 33 00 (Submittal Procedures).
- .2 Submit, in plastic containers, to Departmental Representative two 4.0 L samples of asphalt prime proposed for use at least fourteen (14) days prior to commencing work.

- .3 Provide access on tank truck for Departmental Representative to sample asphalt material to be incorporated into work, in accordance with ASTM D140.
- .4 Upon request from Departmental Representative, submit manufacturer's test data and certification that asphalt prime material meets requirements of this Section.

2. PART 2 – PRODUCTS

2.1 Material

- .1 Asphalt material: To ASTM D977 grade SS 1 or SS-1h.
- .2 Sand blotter: clean granular material passing 4.75 mm sieve and free from organic matter or other deleterious materials.

3. PART 3 – EXECUTION

3.1 Equipment

- .1 Pressure distributor to be:
 - .1 Designed, equipped, maintained, and operated so that asphalt material:
 - .1 Is maintained at even temperature.
 - .2 May be applied uniformly on variable widths of surface up to 5 m.
 - .3 May be applied at readily determined and controlled rates from 0.2 to 5.4 L/m² with uniform pressure, and with an allowable variation from any specified rate not exceeding 0.1 L/m².
 - .2 Capable of distributing asphalt material in uniform spray without atomization at temperature required.
 - .3 Equipped with meter registering metres of travel per minute visibly located to enable truck driver to maintain constant speed required for application at specified rate.
 - .4 Equipped with pump having flow meter graduated in units of 5 L or less per minute passing through nozzles and readily visible to operator. Pump power unit to be independent of truck power unit.
 - .5 Equipped with easily read, accurate, and sensitive device that registers temperature of liquid in reservoir.
 - .6 Equipped with accurate volume measuring device or calibrated tank.
 - .7 Equipped with nozzles of same make and dimensions, adjustable for fan width and orientation.

3.2 Application

- .1 Obtain Departmental Representative's approval of surface before applying asphalt prime.
- .2 Anionic emulsified asphalt:
 - .1 Dilute asphalt emulsion with clean water at 1:1 ratio for application. Mix thoroughly by pumping or other method approved by Departmental Representative.
 - .2 Apply diluted asphalt emulsion at a minimum rate of 0.9 L/m² but not to exceed 3.0 L/m².
 - .3 Apply diluted asphalt emulsion on damp surface unless otherwise directed by Departmental Representative.
- .3 Paint contact surfaces of concrete structures with thin, uniform coat of asphalt prime material.
- .4 Do not apply prime when air temperature is less than 5°C or when rain is forecast within two (2) hours.
- .5 Where traffic is to be maintained, treat no more than one half width of surface in one application.
- .6 Prevent overlap at junction of spreads.
- .7 Do not prime surfaces that will be visible when paving is complete.
- .8 Apply additional material to areas not sufficiently covered as directed by Departmental Representative.
- .9 Keep traffic off primed areas until asphalt prime has set.
- .10 Permit prime to set before placing asphalt paving.
- .11 Contractor is responsible for taking all measures necessary to prevent an accidental release (spill) of asphalt or contaminated runoff to the marine environment, and measures outlined or monitoring required by the Environmental Management Plan (EMP) or Water Quality Monitoring Plan (WQMP). In the event of accidental release, Contractor is responsible for providing an appropriate spill response to limit potential deleterious substances from entering the marine environment and to meet water quality criteria as detailed in the WQMP.

3.3 Use of Sand Blotter

- .1 If asphalt prime fails to penetrate within twenty-four (24) hours, spread sand blotter material in amounts required to absorb excess material.
- .2 Sweep and remove excess blotter material.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section covers the supply and placement of an asphalt tack coat on the vertical saw cut edge of the existing asphalt and on contact surfaces at existing concrete and asphalt features prior to application of a lift of asphalt paving.

1.2 Related Work

- .1 Section 01 33 00 (Submittal Procedures)
- .2 Section 32 11 23 (Aggregate Base Courses)
- .3 Section 32 12 14 (Asphalt Prime)
- .4 Section 32 12 16 (Asphalt Paving)

1.3 Measurement and Payment Procedures

- .1 Asphalt tack coat will not be measured separately, but considered incidental to the work. All costs in connection with asphalt tack coat shall be included in the unit price tendered for asphalt paving under Section 32 12 16 (Asphalt Paving).
- .2 No separate measurement or payment will be made for asphalt tack coat at overlapping areas, overspray or asphalt tack coat which must be re-applied due to weather conditions, contamination, disruption or other causes.
- .3 No separate measurement or payment will be made for asphalt tack coat on contact surfaces at concrete structures.

1.4 References

- .1 ASTM D140, Practice for Sampling Bituminous Materials.
- .2 ASTM D977 (2003), Standard Specification for Emulsified Asphalt.
- .3 CAN/CGSB 16.1 M, Cutback Asphalts for Road Purposes.
- .4 CAN/CGSB 16.2 M, Emulsified Asphalts, Anionic Type, for Road Purposes.

1.5 Definitions – Not Used

1.6 Submittals, Samples and Material Certification

- .1 Make all submittals in accordance with Section 01 33 00 (Submittal Procedures).
- .2 Submit, in plastic containers, to Departmental Representative two 4.0 L samples of asphalt tack coat proposed for use at least fourteen (14) days prior to commencing work. Samples may be omitted if source and material is identical to

that for asphalt prime and samples of asphalt prime have previously been provided.

- .3 Provide access on tank truck for Departmental Representative to sample asphalt material to be incorporated into work, in accordance with ASTM D140.
- .4 Upon request from Departmental Representative, submit manufacturer's test data and certification that asphalt tack coat material meets requirements of this Section.

2. PART 2 – PRODUCTS

2.1 Material

- .1 Anionic emulsified asphalt material: To ASTM D977 grade SS 1 or SS-1h.

3. PART 3 – EXECUTION

3.1 Equipment

- .1 Pressure distributor to be:
 - .1 Designed, equipped, maintained, and operated so that the asphalt material:
 - .1 Is maintained at even temperature.
 - .2 May be applied uniformly on variable widths of surface up to 5 m.
 - .3 May be applied at readily determined and controlled rates from 0.2 to 5.4 L/m² with uniform pressure, and with an allowable variation from any specified rate not exceeding 0.1 L/m².
 - .2 Capable of distributing asphalt material in uniform spray without atomization at temperature required.
 - .3 Equipped with meter registering metres of travel per minute visibly located to enable truck driver to maintain constant speed required for application at specified rate.
 - .4 Equipped with pump having flow meter graduated in units of 5 L or less per minute passing through nozzles and readily visible to operator. Pump power unit to be independent of truck power unit.
 - .5 Equipped with easily read, accurate, and sensitive device which registers temperature of liquid in reservoir.
 - .6 Equipped with accurate volume measuring device or calibrated tank.
 - .7 Equipped with nozzles of same make and dimensions, adjustable for fan width and orientation.

3.2 Application

- .1 Apply tack coat only on clean and dry surface. Obtain Departmental Representative's approval of surface before applying asphalt tack coat.
- .2 Anionic emulsified asphalt:
 - .1 Dilute asphalt emulsion with clean water at 1:1 ratio for application. Mix thoroughly by pumping or other method approved by Departmental Representative.
 - .2 Apply tack coat evenly to pavement surface at a minimum rate of 0.25 L/m², but do not exceed 0.7 L/m².
- .3 Paint contact surfaces of concrete structures with thin, uniform coat of asphalt tack coat material.
- .4 Do not apply tack coat when air temperature is less than 5°C or when rain is forecast within two (2) hours.
- .5 Apply tack coat only to surfaces that are expected to be overlaid on same day.
- .6 Where traffic is to be maintained, treat no more than one half width of surface in one application.
- .7 Evenly distribute localized excessive deposits of tack coat by brooming as directed by Departmental Representative.
- .8 Re-tack contaminated or disturbed areas as directed by Departmental Representative.
- .9 Apply additional material to areas not sufficiently covered as directed by Departmental Representative.
- .10 Keep traffic off tacked areas until tack coat has set.
- .11 Permit tack coat to set before placing asphalt paving.
- .12 Contractor is responsible for taking all measures necessary to prevent an accidental release (spill) of asphalt or contaminated runoff to the marine environment, and measures outlined or monitoring required by the Environmental Management Plan (EMP) or Water Quality Monitoring Plan (WQMP). In the event of accidental release, Contractor is responsible for providing an appropriate spill response to limit potential Deleterious Substances from entering the marine environment and to meet water quality criteria as detailed in the WQMP.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section covers the supply, placement and compaction of hot mix asphalt concrete pavement to lines, grades and typical sections as shown on the Drawings for the apron roadway.

1.2 Related Work

- .1 Section 01 33 00 (Submittal Procedures)
- .2 Section 02 41 13.14 (Asphalt Paving Removal)
- .3 Section 32 11 23 (Aggregate Base Courses)
- .4 Section 32 12 14 (Asphalt Prime)
- .5 Section 32 12 15 (Asphalt Tack Coat)

1.3 Measurement and Payment Procedures

- .1 Asphalt concrete paving shall be measured in square metres of asphalt concrete paving actually incorporated into work for the various courses and thicknesses shown within the areas defined on the Drawings. No measurement will be made for material which is placed on a temporary basis or materials which are subsequently removed.
- .2 Asphalt concrete paving will be paid for at the unit price tendered for ASPHALT PAVING. This payment shall be full compensation for supplying, placing, and compacting the asphalt mix, adjustments to levels of catch basin gratings, quality control, and all other work necessary and incidental thereto for which separate payment is not elsewhere provided. This payment shall include for all costs in connection with supplying and installing asphalt prime and asphalt tack coat.
- .3 Removal of existing asphalt paving will be measured to Section 02 41 13.14 (Asphalt Paving Removal), and payment shall include all costs in connection with asphalt paving removal and disposal.

1.4 References

- .1 ASTM C88, Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.
- .2 ASTM C117, Test Method for Material Finer Than 0.075 mm Sieve in Mineral Aggregates by Washing.
- .3 ASTM C123, Test Method for Lightweight Pieces in Aggregate.
- .4 ASTM C127, Test Method for Specific Gravity and Absorption of Coarse Aggregate.

- .5 ASTM C128, Test Method for Specific Gravity and Absorption of Fine Aggregate.
- .6 ASTM C131, Test Method for Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
- .7 ASTM C136, Method for Sieve Analysis of Fine and Coarse Aggregates.
- .8 ASTM C1252, Standard Test Method for Uncompacted Void Content for Fine Aggregate.
- .9 ASTM D995, Specification for Requirements for Mixing Plants for Hot Mixed, Hot Laid Bituminous Paving Mixtures.
- .10 ASTM D1559, Test Method for Resistance to Plastic flow of Bituminous Mixtures Using Marshall Apparatus.
- .11 ASTM D2419, Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
- .12 ASTM D2726, Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures.
- .13 ASTM D2950, Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods.
- .14 ASTM D3203, Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures.
- .15 ASTM D4791, Test Method for Flat and Elongated Particles in Coarse Aggregate.
- .16 ASTM D5821, Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate.
- .17 CAN/CGSB 8.1, Sieves Testing, Woven Wire.
- .18 CAN/CGSB 8.2 M, Sieves Testing, Woven Wire, Metric.
- .19 BC MoT 2006 Standard Specification for Highway Construction: Section 951, Asphalt and Paving Materials for Highway Use; and Section 952, Asphalt Supply.
- .20 Asphalt Institute MS-2, Sixth Edition 1993, Mix Design Method for Asphalt Concrete.
- .21 AASHTO M320-5, Asphalt Cement.

1.5 Definitions – Not Used

1.6 Submittals, Samples, and Material Certification

- .1 Make all submittals in accordance with Section 01 33 00 (Submittal Procedures).
- .2 Submit aggregate gradation, asphalt concrete mix design, and trial mix test results to Departmental Representative for approval at least twenty-eight (28) days prior to commencing work.

- .3 At least twenty-eight (28) days prior to commencing work, inform Departmental Representative of proposed source of aggregates and provide access for sampling. Allow continual sampling by Departmental Representative during production. Install sampling facilities at discharge end of production conveyor, to allow Departmental Representative to obtain representative samples of items being produced. Stop conveyor belt when requested by Departmental Representative to permit full cross section sampling.
- .4 Submit viscosity temperature chart for asphalt cement to be supplied showing either Saybolt Furol viscosity in seconds or Kinematic Viscosity in centistokes, temperature range 105°C to 175°C at least twenty-eight (28) days prior to commencing work.
- .5 Upon request, submit manufacturer's test data and certification that asphalt cement meets requirements of this Section.

2. PART 2 – PRODUCTS

2.1 Asphalt Cement

- .1 Asphalt cement: AASHTO PG 64-11 Grade or BC MoT Standard, Table 951-C, Penetration Grade 80-100 asphalt cement.

2.2 Aggregates

- .1 Crushed stone or gravel consisting of sound, hard, durable, angular particles, free from soft, thin, elongated or laminated particles, clay lumps, cementation, minerals, organic material, frozen material and other substances that would act in a deleterious manner for the use intended.
- .2 Material shall comply with the gradation limits given in Table 32 12 16-1 when tested in accordance with ASTM C136 and ASTM C117, sieve sizes to CAN/CGSB 8.1, and have a smooth curve without sharp breaks when plotted on a semi-log grading chart:

Table 32 12 16-1

Aggregate Gradation Limits

Sieve Size	Gradation Limits % Passing by Dry Weight	
	Fine Mix (Surface Course)	Medium Mix (Lower Course)
37.5 mm	-	-
25 mm	-	-
19 mm	-	100
12.5 mm	100	84 – 95
9.5 mm	90 – 100	73 – 90
4.75 mm	55 – 80	50 – 75
2.36 mm	32 – 64	35 – 57
1.18 mm	24 – 51	26 – 45
0.600 mm	17 – 40	18 – 34
0.300 mm	13 – 29	10 – 26
0.150 mm	8 – 18	6 – 17
0.075 mm	3 – 7	3 – 7

- .3 Coarse aggregate is aggregate retained on 4.75 mm sieve and fine aggregate is aggregate passing 4.75 mm sieve when tested to ASTM C136.
- .4 When dryer drum plant or plant without hot screening is used, process fine aggregate through 4.75 mm sieve and stockpile separately from coarse aggregate.
- .5 Do not use aggregates having known polishing characteristics in mixes for surface courses.
- .6 Sand equivalent: to ASTM D2419. Minimum: 50
- .7 Magnesium Sulphate soundness: to ASTM C88. Maximum percent loss by mass:
 - .1 Coarse aggregate: 12.
 - .2 Fine aggregate: 16.
- .8 Los Angeles degradation: Grading B, to ASTM C131. Maximum percent loss by mass:
 - .1 Coarse aggregate: 25.
- .9 Absorption: to ASTM C127. Maximum percent by mass:
 - .1 Coarse aggregate: 1.75.
- .10 Loss by washing: to ASTM C117. Maximum percent passing 0.075 mm sieve:

- .1 Coarse aggregate: 1.20.
- .11 Lightweight particles: to ASTM C123. Maximum percent by mass less than 1.95 relative density: 1.50.
- .12 Flat and elongated particles: to ASTM D4791, (with length to thickness ratio greater than 5). Maximum percent by mass:
 - .1 Coarse aggregate: 10.
- .13 Crushed fragments: 100% of particles by mass retained on the 4.75 mm sieve. Minimum 100% one fractured face, 95% two fractured faces. Material to be divided into ranges, using methods of ASTM C136.
- .14 Uncompacted voids by ASTM C1252: minimum 45%.
- .15 Regardless of compliance with specified physical requirements, fine aggregates may be accepted or rejected on basis of past field performance.

2.3 Mineral Filler

- .1 Mineral filler is finely ground particles of limestone, hydrated lime, Portland cement, or other approved non plastic mineral matter, thoroughly dry and free from lumps.
- .2 Add mineral filler when necessary to meet job mix aggregate gradation or as directed by Departmental Representative to improve mix properties.
- .3 Mineral filler to be dry and free flowing when added to aggregate.

2.4 Mix Design

- .1 Job mix formula to be approved by Departmental Representative.
- .2 Mix shall not contain Recycled Asphalt Pavement (RAP).
- .3 Design of mix: by Marshall method to requirements below.
 - .1 Compaction blows on each face of test specimens: 75.
 - .2 Mix physical requirements shall conform to the values given in Table 32 12 16-2.
- .4 Measure physical requirements as follows:
 - .1 Marshall stability and flow value: to ASTM D1559.
 - .2 Compute void properties on basis of bulk specific gravity of aggregate (to ASTM C127 and ASTM C128). Make allowance for volume of asphalt absorbed into pores of aggregate.
 - .3 Voids in mineral aggregates: to Asphalt Institute MS-2, chapter 4.

Table 32 12 16-2

Mix Design

Test Property	Value or Range for Fine Mix (Surface Course)	Value or Range for Medium Mix (Lower Course)
Marshall Stability at 60°C (kN), Minimum	10.0	10.0
Flow Value (mm), Range	2 – 4	2 – 4
Air Voids in Mixture (%), Range	3 – 5	3 – 5
Voids in Mineral Aggregate (%), Minimum	14	12
Index of Retained Stability (%), Minimum	85	85

- .5 Do not change job mix without prior approval of Departmental Representative. Should change in material source be proposed, new job mix formula to be approved by Departmental Representative.
- .6 Add dust to effective asphalt cement ratio of 0.6 to 1.2.

3. PART 3 – EXECUTION

3.1 Plant and Mixing Requirements

- .1 Batch and continuous mixing plants:
 - .1 To ASTM D995.
 - .2 Feed aggregates from individual stockpiles through separate bins to cold elevator feeders. Do not load frozen materials into bins.
 - .3 Feed cold aggregates to plant in proportions that will ensure continuous operations.
 - .4 Calibrate bin gate openings and conveyor speeds to ensure mix proportions are achieved.
 - .5 Before mixing, dry aggregates to a moisture content not greater than 1% by mass or to a lesser moisture content if required to meet mix design requirements. Heat to temperature required to meet mixing temperature.
 - .6 Immediately after drying, screen aggregates into hot storage bins in sizes to permit recombining into gradation meeting job mix requirements.
 - .7 Store hot screened aggregates in a manner to minimize segregation and temperature loss.

- .8 Heat asphalt cement and aggregate to mixing temperature appropriate for the approved mix design. Do not heat asphalt cement above 160°C.
- .9 Make available current asphalt cement viscosity data at plant. With information relative to viscosity of asphalt being used, control the temperature of completed mix at plant and at paver after considering hauling and placing conditions.
- .10 Maintain temperature of materials within plus or minus 5°C of specified mix temperature during mixing.
- .11 Mixing time:
 - .1 In batch plants, both dry and wet mixing times shall be as required for the approved mix design. Continue wet mixing as long as necessary to obtain a thoroughly blended mix but not less than 30 seconds or more than 75 seconds.
 - .2 In continuous mixing plants, mixing time shall be as required for the approved mix design, but not less than 45 seconds.
 - .3 Do not alter mixing time unless allowed by Departmental Representative.
- .2 Dryer drum mixing plant:
 - .1 Load aggregates from individual stockpiles to separate cold feed bins. Do not load frozen materials into bins.
 - .2 Feed aggregates to burner end of dryer drum by means of a multi bin cold feed unit and blend to meet job mix requirements by adjustments of variable speed feed belts and gates on each bin.
 - .3 Meter total flow of aggregate by an electronic weigh belt system with an indicator that can be monitored by plant operator and which is interlocked with asphalt pump so that proportions of aggregate and asphalt entering mixer remain constant.
 - .4 Provide for easy calibration of weighing systems for aggregates without having material enter mixer.
 - .5 Calibrate bin gate openings and conveyor speeds to ensure mix proportions are achieved. Calibrate weigh bridge on charging conveyor by weighing amount of aggregate passing over weigh bridge in set amount of time. Difference between this value and amount shown by plant computer system to differ by not more than plus or minus 2%.
 - .6 Make provision for conveniently sampling the full flow of materials from the cold feed.
 - .7 Provide screens or other suitable devices to reject oversize particles or lumps of aggregate from cold feed prior to entering drum.

- .8 Provide a system interlock that will stop all feed components if either asphalt or aggregate from any bin stops flowing.
- .9 Accomplish heating and mixing of asphalt mix in an approved parallel flow dryer mixer in which aggregate enters drum at burner end and travels parallel to flame and exhaust gas stream. Control heating to prevent fracture of aggregate or excessive oxidation of asphalt. Equip system with automatic burner controls and provide for continuous temperature sensing of asphalt mixture at discharge, with a printing recorder that can be monitored by the plant operator. Submit printed record of mix temperatures at end of each day.
- .10 Mixing period and temperature to produce a uniform mixture in which particles are thoroughly coated, and moisture content of material as it leaves mixer to be less than 2%.
- .3 Temporary storage of hot mix:
 - .1 Provide mix storage of sufficient capacity to permit continuous operation and designed to prevent segregation.
 - .2 Do not store asphalt mix in storage bins in excess of three (3) hours.
- .4 While producing asphalt mix for this project, do not produce mix for other users unless separate storage and pumping facilities are provided for materials supplied to this project.
- .5 Mixing tolerances:
 - .1 Permissible variation in aggregate gradation from job mix (percent of total mass) shall conform to the values given in Table 32 12 16-3.

Table 32 12 16-3

Variation in Aggregate Gradation

Sieve Size	Maximum Variation in Aggregate Gradation (as % of total mass)
4.75 mm sieve and larger	5.0
2.36 mm sieve	4.0
0.600 mm sieve	3.0
0.180 mm sieve	2.0
0.075 mm sieve	1.0

- .2 Permissible variation of asphalt cement from job mix: 0.25%.
- .3 Permissible variation of mix temperature at discharge from plant: 5°C.

- .6 Temperature Monitoring: Monitor temperature of completed mix at plant and/or paver after considering hauling and placing conditions.

3.2 Equipment

- .1 Pavers: mechanical grade controlled self powered pavers capable of spreading mix within specified tolerances, true to line, grade, and crown indicated.
- .2 Rollers: sufficient number of rollers of type and weight to obtain specified density of compacted mix.
- .3 Vibratory rollers:
 - .1 Minimum drum diameter: 1,200 mm.
 - .2 Maximum amplitude of vibration (machine setting): 0.5 mm for lifts less than 40 mm thick.
- .4 Haul trucks: of adequate size, speed, and condition to ensure orderly and continuous operation and as follows:
 - .1 Boxes with tight metal bottoms.
 - .2 Covers of sufficient size and weight to completely cover and protect asphalt mix when truck fully loaded.
 - .3 In cool weather or for long hauls, insulate entire contact area of each truck box.
 - .4 Use only trucks which can be weighed in a single operation on scales supplied.
- .5 Hand tools:
 - .1 Lutes or rakes with covered teeth for spreading and finishing operations.
 - .2 Tamping irons having mass not less than 12 kg and a bearing area not exceeding 310 cm² for compacting material along curbs, gutters and other structures inaccessible to roller. Mechanical compaction equipment, when approved by Departmental Representative, may be used instead of tamping irons.
 - .3 Straight edges, 4.5 m in length, to test finished surface.

3.3 Preparation

- .1 Reshape granular roadbed if required and obtain approval of Departmental Representative prior to paving.
- .2 When paving over existing asphalt surface, clean pavement surface. When levelling course is not required, patch and correct depressions and other irregularities to approval of Departmental Representative before beginning paving operations.
- .3 When matching new pavement with existing pavement, make a vertical saw cut in the existing pavement at the junction with the new pavement.

- .4 Apply prime coat and tack coat in accordance with Section 32 12 14 (Asphalt Prime) and 32 12 15 (Asphalt Tack Coat) prior to paving.
- .5 Prior to laying mix, clean surfaces of loose and foreign material.

3.4 Transportation of Mix

- .1 Transport mix to job site in vehicles cleaned of foreign material.
- .2 Paint or spray truck beds with limewater, soap or detergent solution, or non petroleum based commercial product, at least once a day or as required. Elevate truck bed and thoroughly drain. No excess solution will be permitted.
- .3 Schedule delivery of material for placing in daylight, unless Departmental Representative approves artificial light.
- .4 Deposit mix from surge or storage silo to trucks in multiple drops to reduce segregation. Do not dribble mix into trucks.
- .5 Deliver material to paver at a uniform rate and in an amount within capacity of paving and compacting equipment.
- .6 Deliver loads continuously in covered vehicles and immediately spread and compact. Deliver and place mixes at temperature within range appropriate for the approved mix design, but not less than 135°C.

3.5 Protection of Existing Features

- .1 The existing dock apron pavement shall be fully preserved, except as indicated for pavement removal on the Drawings.
- .2 Contractor shall, within 24 hours, repair any damage made to the dock pavement surface caused by Contractor.

3.6 Placing

- .1 Obtain Departmental Representative's approval of base, existing surface, tack coat and prime coat prior to placing asphalt.
- .2 Place asphalt concrete to thicknesses, grades and lines as indicated or as directed by Departmental Representative.
- .3 Placing conditions:
 - .1 Place asphalt mixtures only when air temperature is above 5°C;
 - .2 When temperature of surface on which material is to be placed falls below 10°C, provide extra rollers as necessary to obtain required compaction before cooling; and,
 - .3 Do not place hot mix asphalt when pools of standing water exist on surface to be paved, during rain, or when surface is damp.
- .4 Place asphalt concrete in compacted lifts of thickness not to exceed:
 - .1 Surface Course: 40 mm thickness of Fine Mix material; and,

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- .2 Lower Course: 50 mm thickness of Medium Mix material.
 - .5 Where possible do tapering and levelling where required in lower lifts. Overlap joints by not less than 300 mm.
 - .6 Commence spreading at high side of pavement or at crown and span crowned centerlines with initial strip.
 - .7 Spread and strike off mixture with self propelled mechanical finisher.
 - .1 Construct longitudinal joints and edges true to line markings on roadways. Contractor to establish lines for paver to follow, parallel to centerline of proposed pavement. Position and operate paver to follow established line.
 - .2 When using pavers in echelon, have first paver follow marks or lines, and second paver follow edge of material placed by first paver. Work pavers as close together as possible and in no case permit them to be more than 30 m apart.
 - .3 Maintain constant head of mix in auger chamber of paver during placing.
 - .4 If segregation occurs, immediately suspend spreading operation until cause is determined and corrected.
 - .5 Correct irregularities in alignment left by paver by trimming directly behind machine.
 - .6 Correct irregularities in surface of pavement course directly behind paver. Remove by shovel or lute excess material forming high spots. Fill and smooth indented areas with hot mix. Do not broadcast material over such areas.
 - .7 Do not throw surplus material on freshly screeded surfaces.
 - .8 When hand spreading is used:
 - .1 Approved wood or steel forms, rigidly supported to ensure correct grade and cross section, may be used. Use measuring blocks and intermediate strips to aid in obtaining required cross section.
 - .2 Distribute material uniformly. Do not broadcast material.
 - .3 During spreading operation, thoroughly loosen and uniformly distribute material by lutes or covered rakes. Reject material that has formed into lumps and does not break down readily.
 - .4 After placing and before rolling, check surface with templates and straightedges and correct irregularities.
 - .5 Provide heating equipment to keep hand tools free from asphalt. Avoid high temperatures which may burn material. Do not use tools at a higher temperature than temperature of mix being placed.
 - .9 Contractor is responsible for taking all measures necessary to prevent an accidental release (spill) of asphalt or contaminated runoff to the marine environment, and measures outlined or monitoring required by the Environmental

Management Plan (EMP) or Water Quality Monitoring Plan (WQMP). In the event of accidental release, Contractor is responsible for providing an appropriate spill response to limit potential deleterious substances from entering the marine environment and to meet water quality criteria as detailed in the WQMP.

3.7 Compacting

- .1 Roll asphalt continuously using a uniform rolling pattern.
- .2 Do not change rolling pattern unless mix changes or lift thickness changes.
- .3 Roll asphalt continuously to density not less than 98% of 75 blow density in accordance with ASTM D1559, except as noted otherwise. At pavement joints, and at constricted areas where asphalt is placed using small hand-operated compaction equipment, the acceptance criteria is 95% of 75 blow density in accordance with ASTM D1559. Average in-situ air void content shall be between 6% and 7% with no result higher than 8%. In-situ air void content shall be based on Maximum Theoretical Specific Gravity of the Marshall samples.
- .4 General:
 - .1 Provide at least two rollers and as many additional rollers as necessary to achieve specified pavement density. When more than two rollers are required, one roller must be pneumatic tired type.
 - .2 Start rolling operations as soon as placed mix can bear weight of roller without undue displacement of material or cracking of surface.
 - .3 Operate roller slowly initially to avoid displacement of material. Do not exceed 5 km/h for breakdown and intermediate rolling for static steel wheeled and pneumatic tired rollers. Do not exceed 9 km/h for finish rolling.
 - .4 Use static compaction for levelling course less than 25 mm thick.
 - .5 For lifts 50 mm thick and greater, adjust speed and vibration frequency of vibratory rollers to produce minimum of 30 to 40 impacts per metre of travel. For lifts less than 50 mm thick, impact spacing should not exceed compacted lift thickness.
 - .6 Overlap successive passes of roller by minimum of 200 mm and vary pass lengths.
 - .7 Keep wheels of roller slightly moistened with water to prevent pick up of material but do not over water.
 - .8 Do not stop vibratory rollers on pavement that is being compacted with vibratory mechanism operating.
 - .9 Do not permit heavy equipment or rollers to stand on finished surface before it has been compacted and has thoroughly cooled.
 - .10 After traverse and longitudinal joints and outside edge have been compacted, start rolling longitudinally at low side and progress to high

- side. Ensure that all points across width of pavement receive essentially equal numbers of passes of compactors.
- .11 When paving in echelon, leave unrolled 50 to 75 mm of edge which second paver is following and roll when joint between lanes is rolled.
 - .12 Where rolling causes displacement of material, loosen affected areas at once with lutes or shovels and restore to original grade of loose material before re-rolling.
- .5 Breakdown rolling:
- .1 Commence breakdown rolling with static steel wheeled roller immediately following rolling of transverse and longitudinal joints and edges.
 - .2 Operate rollers as close to paver as necessary to obtain adequate density without causing undue displacement.
 - .3 Operate breakdown roller with drive roll or wheel nearest finishing machine. Exceptions may be made when working on steep slopes or super-elevated sections.
 - .4 Use only experienced roller operators for this work.
- .6 Intermediate rolling:
- .1 Use pneumatic tired, steel wheel or vibratory rollers and follow breakdown rolling as closely as possible and while paving mix temperature allows maximum density from this operation.
 - .2 Rolling to be continuous after initial rolling until mix placed has been thoroughly compacted.
- .7 Finish rolling:
- .1 Accomplish finish rolling with two axle or three axle tandem steel wheeled rollers while material is still warm enough for removal of roller marks. If necessary to obtain desired surface finish, Departmental Representative may specify use of pneumatic tired rollers.
 - .2 Conduct rolling operations in close sequence.

3.8 Joints

- .1 General:
- .1 Remove surplus material from surface of previously laid strip. Do not deposit on surface of freshly laid strip.
 - .2 Paint contact surfaces of existing structures such as manholes, curbs or gutters or cold asphaltic concrete joints with bituminous material prior to placing adjacent pavement.
- .2 Transverse joints:
- .1 Offset transverse joint in succeeding lifts by at least 600 mm.

- .2 Cut back to full depth vertical face and tack face with thin coat of hot asphalt prior to continuing paving.
- .3 Compact transverse joints to provide a smooth riding surface. Use methods to prevent rounding of compacted surface at joints.
- .3 Longitudinal joints:
 - .1 Offset longitudinal joints in succeeding lifts by at least 150 mm.
 - .2 Cold joint is defined as joint where asphalt mix is placed, compacted, and left to cool below 100°C prior to paving of adjacent lane. If cold joint cannot be avoided, cut back by saw cutting previously laid lane, by at least 150 mm, to full depth vertical face, and tack face with thin coat of hot asphalt of adjacent lane.
 - .3 Overlap previously laid strip with spreader by 35 to 38 mm.
 - .4 Before rolling, carefully remove and discard coarse aggregate in material overlapping joint with a lute or rake.
 - .5 Roll longitudinal joints directly behind paving operation.
 - .6 When rolling with static or vibratory rollers, have most of drum width ride on newly placed lane with remaining 150 mm extending onto previously placed and compacted lane.
- .4 Construct feather joints so that thinner portion of joint contains fine graded material obtained by changed mix design or by raking out coarse aggregate in mix. Place and compact joint so that joint is smooth and without visible breaks in grade. Feather joints may not be constructed without the approval of Departmental Representative. If Departmental Representative does not approve feather joint, construct full depth butt joint.
- .5 Construct butt joints at locations and to details shown on the Drawings.

3.9 Finish Tolerances

- .1 Finished asphalt surface to be within ± 5 mm of specified grade, but not uniformly high or low.
- .2 Finished asphalt surface not to have irregularities exceeding 5 mm when checked with a 4.5 m straight edge placed in any direction.
- .3 Water ponding is not permitted.
- .4 Surface drainage: slopes to gutters, catch basins, etc. to conform with existing contours, in accordance with Drawings and eliminating puddles and ponds.
- .5 Paving shall be placed with a slight fall (2% min.) away from buildings.

3.10 Test Program

- .1 Contractor shall undertake a Quality Control program at its cost to ensure the material supplied and the placement of the paving complies with the specification.

- .2 The following test program shall form part of Contractor's Quality Control program.
 - .1 Aggregate Gradation: Regular sieve analysis to determine aggregate gradation during the crushing operation in accordance with ASTM C136. One (1) test will be carried out for each 300 to 500 tonnes of production, or a minimum of once per day.
 - .2 Mix Quality:
 - .1 Marshall Stability: One (1) test of three (3) briquettes for each asphalt mix per production day.
 - .2 Specific Gravity: as above.
 - .3 Air Voids and VMA: as above.
 - .4 Flow Index: as above.
 - .5 Asphalt Content Extraction: as above.
 - .6 Maximum Theoretical Specific Gravity: as above.
 - .3 Density Testing: In-place density testing shall be carried out for Quality Control at representative areas of the asphalt pavement placed, including at joints, areas near shoulders and areas near the centre of the mat. The acceptance criteria for compaction of asphalt pavement shall be the density as specified herein, measured to ASTM D2726 (bulk specific gravity method). Density testing program shall be as follows:
 - .1 Carry out Quality Control field density testing on a continuous basis (i.e., while the product is still warm and compactable) throughout the paving production work, to ASTM D2950 (nuclear method). These initial test results may be used as a general guide to the level of compaction achieved, but are not the acceptance criteria for pavement compaction. The Contractor shall be aware that compaction test results to ASTM D2950 (nuclear method) often overestimate the actual compaction achieved as measured by pavement cores to ASTM D2726 (bulk specific gravity method), and he shall interpret the initial ASTM D2950 (nuclear method) compaction results accordingly.
 - .2 Carry out Quality Control testing for pavement acceptance purposes as follows:
 - .1 Field Density: After asphaltic concrete has been laid and compacted, extract pavement core(s) for determining the compacted (in-place) density of the pavement. Determine the compacted density to ASTM D2726 (bulk specific gravity method). Obtain one (1) core for every 50 m of pavement strip placed. In addition, for joint density testing, obtain one (1) core for every 50 m of joints. Locations of

pavement cores shall be determined in consultation with Departmental Representative.

- .2 Pavement Thickness: Measure pavement cores that are extracted for field density as described above to determine the compacted thickness of the pavement in place.
- .3 Should any core sample fail to meet the specified field density and thickness requirements, additional sampling/testing of cores and remedial action may be required as directed by Departmental Representative, at Contractor's own expense, to correct such deficiencies.
- .4 Contractor shall backfill core holes.
- .5 Contractor shall pay all costs in connection with sampling and testing of aggregates and finished paving which fail to meet specified requirements.
- .6 A testing firm retained and paid for by Departmental Representative will undertake such tests as Departmental Representative may carry out, at its sole discretion, for Quality Assurance purposes.

3.11 Defective Work

- .1 Correct irregularities which develop before completion of rolling by loosening surface mix and removing or adding material as required. If irregularities or defects remain after final compaction, remove surface course promptly and lay new material to form a true and even surface and compact immediately to specified density.
- .2 Repair areas showing checking, rippling, or segregation.
- .3 Adjust roller operation and screed settings on paver to prevent further defects such as rippling and checking of pavement.

3.12 Maintenance

- .1 Contractor shall be responsible for maintaining the condition of, and cleaning of the asphalt pavement throughout the entire duration of the Contract. Unless Contractor can prove otherwise, defects shall be attributed to Contractor's construction activities, and Contractor shall correct any such defects or irregularities (i.e., cracking, rutting, depression) prior to final acceptance.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section covers the modification of fire water mains (surface run and buried), hydrants, valves, and valve boxes, as shown on the Drawings. Surface run pipe includes pipework in the existing catwalk and pipework hung under the jetty deck.
- .2 Demolition, removal, and salvage of existing fire water main is further covered under Section 02 41 13 (Selective Site Demolition).

1.2 Related Sections

- .1 Section 01 33 00 (Submittal Procedures)
- .2 Section 01 74 11 (Cleaning)
- .3 Section 01 78 30 (Closeout Submittals)
- .4 Section 01 91 13 (Commissioning Requirements)
- .5 Section 02 41 13 (Selective Site Demolition)
- .6 Section 31 23 10 (Excavating, Trenching and Backfilling)
- .7 Section 03 30 00 (Cast-in-Place Concrete)

1.3 Measurement Procedures

- .1 Fire water mains will not be measured individually. Fire water mains will be paid for at the Lump Sum price tendered for MODIFICATIONS TO FIRE WATER MAINS. Payment shall be full compensation for trenching, laying, jointing, installation, flushing, testing, backfill, supply and delivery of materials including pipe, fittings, hydrants, valves, hangers, supports, thrust blocks and all work necessary or incidental thereto for which separate measurement is not provided elsewhere.

1.4 References

- .1 ANSI/AWWA B300, Hypochlorites.
- .2 ANSI/AAW B301, Liquid Chlorine.
- .3 ANSI/AWWA C900, Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. through 12 in., for Water Distribution.
- .4 ANSI/AWWA C207, Steel Pipe Flanges for Waterworks Service, 4 in. – 44 in.
- .5 ANSI/AWWA C208, Dimensions for Fabricated Steel Water Pipe Fittings.
- .6 ANSI/AWWA C509, Resilient-Seated Gate Valves for Water-Supply Service.

- .7 ANSI/AWWA C502, Standard for Dry-Barrel Fire Hydrants.
- .8 ANSI/AWWA C601, Flushing and Disinfecting.
- .9 ANSI/AWWA C110/A21.10, Ductile-Iron and Gray Iron Fittings, 3 inch through 48 inch (75 mm through 1200 mm), for Water.
- .10 ANSI/AWWA C150/A21.50, Thickness Design of Ductile-Iron Pipe.
- .11 ANSI/AWWA C151/A21.51, Ductile-Iron Pipe, Centrifugally Cast, for Water.
- .12 ANSI/AWWA C900, Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. through 12 in., for Water Distribution.
- .13 ASTM A53/A53M, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- .14 ASTM C136, Method for Sieve Analysis of Fine and Coarse Aggregates.
- .15 ASTM C117, Test Method for Materials Finer than 75- μ m (No. 200) Sieve in Mineral Aggregates by Washing.
- .16 ASTM D1557, Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
- .17 ASTM D3139, Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
- .18 ASTM F477, Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- .19 AWWA C605, Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water.
- .20 AWWA M23, PVC Pipe – Design and Installation.
- .21 CAN/CGSB-8.1, Sieves Testing, Woven Wire.
- .22 CAN/CGSB-8.2, Sieves Testing, Woven Wire, Metric.
- .23 CGSB 1-GP-12c, Standard Paint Colours.
- .24 CSA 137.3, Rigid Polyvinyl Chloride (PVC) Pipe for Pressure Applications.
- .25 CGSB 1-GP-59M, Enamel, Exterior Gloss Alkyd Type.

1.5 Definitions – Not Used

1.6 Shop Drawings

- .1 Submit shop drawings and product data in accordance with Section 01 33 00 (Submittal Procedures).

1.7 Material Certification

- .1 At least twenty-eight (28) days prior to commencing work, submit manufacturer's test data and certification that pipe materials meet the requirements of this

Section. Include manufacturer's drawings, information and shop drawings where pertinent.

1.8 Site Conditions

- .1 The existing fire water main located in the under-deck catwalk (all designated to be removed during timber jetty demolition works), is in serviceable but contaminated condition. Contamination is primarily faeces from wildlife. Contractor is to be aware of this condition and take all necessary precautions and care during the work. All contaminated portions of services removed from the under-deck catwalk are to be cleaned to remove the aforementioned contamination before re-use in the work (where stipulated) or disposal off-site. Decontamination / cleaning shall only occur in designated areas with appropriate containment and all wastewater shall be contained and disposed of at an authorized Wastewater Treatment and Disposal Facility.

1.9 Scheduling of Work

- .1 Schedule work to minimize interruptions to existing services.
- .2 The EGD fire water main and fire hydrants are to remain in service throughout construction, except as allowed in this Section.
- .3 Shut down of the fire water main serving the South Jetty shall be coordinated with Departmental Representative, and shall be performed in a manner to minimize impact on EGD operations. Out-of-service periods for the EGD fire water main and fire hydrants (excluding South Jetty components to be demolished under this Contract) shall be limited to six (6) hours duration and shall be scheduled to take place at night between 6:00 pm and 6:00 am, unless authorized in writing by Department Representative.
- .4 Notify fire department and Departmental Representative a minimum of fourteen (14) days prior to any planned interruption of water supply to hydrants. Notify fire department and Departmental Representative immediately of any accidental interruption of water supply to hydrants.
- .5 Schedule work to minimize variations in sub-grade quality. All fire water mains, valves and hydrants are to be installed and backfilled prior to placing granular sub-base for pavement reinstatement.
- .6 Provide "Out of Service" sign on hydrant not in use.

1.10 Closeout Submittals

- .1 Provide record drawings, including directions for operation valves, details of pipe material, location of air and vacuum release valves, hydrant details, maintenance and operating instructions in accordance with Section 01 78 30 (Closeout Submittals).

- .2 Include on the record drawings top of pipe, horizontal location of fittings and type, valves, valve boxes, valve chambers and hydrants.

2. PART 2 – PRODUCTS

2.1 Pipe, Joints and Fittings

- .1 Buried pipe to be polyvinyl chloride (PVC) pressure class 225, DR14 PVC, 1 MPa pipe to ANSI/AWWA C900. Pipe shall be certified by the Canadian Standards Association to CSA B137.3.
- .2 Joints for PVC pipe to be push-on integrally thickened bell and spigot type to ASTM D3139 with single elastomeric gasket to ASTM F477. Flanged joints shall be Class 125 in accordance with AWWA C207.
- .3 All internal surfaces of the gasket ring (wetted parts) shall be lined with a minimum of 15 mils of fusion bonded epoxy conforming to the applicable requirements of ANSI/AWWA C213. Sealing gaskets shall be constructed of EPDM. The coating and gaskets shall meet ANSI/NSF-61. Exterior surfaces of the gasket ring shall be coated with a minimum of 6 mils of fusion bonded epoxy conforming to the applicable requirements of ANSI/AWWA C116/A21.16.
- .4 PVC fittings to ANSI/AWWA C907.
- .5 Surface run pipe shall be galvanized steel water pipe to ASTM A53/A53M Grade A, Schedule 40, unless noted otherwise on the Drawings.
- .6 Steel pipe joints to be grooved end mechanical pipe couplings.

2.2 Pipe-to-Flange Joints

- .1 Mechanical joints between pipe and flanges shall be restrained flange adapters made of ductile iron conforming to ASTM A536 and have flange bolt circles that are compatible with mating flange design.
- .2 Restraint for flange adapter shall consist of a plurality of individual actuated gripping wedges to maximize restraint capability. Torque limiting actuating screws shall be used to achieve proper initial set of gripping wedges.
- .3 The flange adapters shall be capable of deflection during assembly or permit lengths of pipe to be field cut to allow a minimum 0.6 inch gap between the end of the pipe and the mating flange without affecting the integrity of the seal.
- .4 Flanges to ANSI/AWWA C207, class B hub type.

2.3 Push-On Pipe Joint Restraints

- .1 All push-on-pipe joints will have pipe joint restraints.
- .2 Push-on pipe joints for PVC pipe supplied to ANSI/AWWA C900 shall consist of a spilt-ring joint restraint system designed for PVC C900 pipe and PVC C907 fittings.

- .3 A split ring shall be utilized on the PVC fitting bell. A serrated ring shall be used to grip the pipe, and a sufficient number of bolts shall be used to connect the bell ring and the gripping ring. The combination shall have a minimum working pressure rating equivalent to the pipe.
- .4 Ductile iron used for split-ring joint restraints shall conform to ASTM A536.
- .5 Coating for pipe joint restraints shall consist of a minimum of two coats of liquid thermoset epoxy coating with heat cure to follow each coat.

2.4 Valves and Valve Boxes

- .1 Gate valves: to ANSI/AWWA C509, standard iron Class 125 body, resilient wedge valves with non-rising stems, minimum 1,040 kPa working pressure with flanged joints to ANSI/AWWA C110/A21.10. Valves to open counter clockwise.
- .2 Ball valves: Class 150, stainless steel body, three piece.
- .3 Valve Boxes: three piece sliding type adjustable over minimum of 450 mm complete with valve operating key of such length that when set on valve operating nut top of rod will not be more than 150 mm below cover.
 - .1 Base to be large round type with minimum diameter of 300 mm.
 - .2 Top of box to be marked "WATER."

2.5 Hydrants

- .1 Post type hydrants shall be cast iron body, full bronze mounted, compression type, suitable for a working pressure of 1,700 kPa conforming to AWWA C502 and CAN/ULC-S520.
- .2 Connections: two 65 mm threaded hose outlets, one 100 mm threaded pumper connection, minimum 150 mm riser barrel, and minimum 125 mm bottom valve. Nozzle configurations shall conform to British Columbia Standards for Fire Hydrant.
- .3 The hydrant inlet connection shall be 150 mm diameter. The joint shall have a preformed rubber gasket suitable for connection to the pipe being used. The bell shall have harnessing lugs for tie-rod anchorage.
- .4 Hydrants to open counter clockwise, threads to local standard, fittings to be internal lug quick-connect to CAN4-S543. Provide metal caps and chains.
- .5 Provide key operated gate valve located 1 m from hydrant.
- .6 Depth of bury 1 m.
- .7 Hydrant paint: exterior enamel to CAN/CGSB-1.88. Finished paints above ground shall be red. The hose and pumper nozzle caps shall be painted white.

2.6 Hangers and Supports

- .1 Pipe hangers and supports as shown on the Drawings.
- .2 Pipe hangers and supports: hot dipped galvanized after manufacture.
- .3 Pipe hanger and support to manufacturer's standard production components, parts, and assemblies.

2.7 Pipe Bedding and Surround Material

- .1 Granular material shall be crushed or screened stone, gravel or sand consisting of hard, durable particles, free from clay lumps, cementation, organic material, frozen material and other deleterious materials with gradation within the limits given in Table 33 11 16-1, when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1.

Table 33 11 16-1

Pipe Bedding and Surround

Sieve Size (U.S. Standard)	Gradation Limits (% Passing by Dry Weight)
19 mm (3/4 in.)	100
12.5 mm (1/2 in.)	70 – 100
9.5 mm (3/8 in.)	50 – 85
4.75 mm (# 4)	30 – 60
2.0 mm (# 10)	15 – 40
0.40 mm (# 40)	10 – 30
0.075 mm (# 200)	0 – 5

- .2 Concrete mixes and materials required for bedding cradles, encasement, supports, thrust blocks: to Section 03 30 00 (Cast-in-Place Concrete).
- .3 At least twenty-eight (28) days prior to commencing pipe bedding/surround placement, the Contractor shall notify Departmental Representative of the proposed material source(s) and placement procedures and provide, at Contractor's cost, qualification test results confirming that the proposed material from each source meets or exceeds the requirements of this specification.
- .4 Departmental Representative will, within fourteen (14) days of receiving the above submission, advise the Contractor of the acceptability of the proposed materials and procedures.
- .5 During pipe bedding/surround production, the Contractor shall conduct ongoing quality control sampling and testing at the loading conveyor to confirm that the gradation of the fill materials conform to the specification. The material gradation testing rate for pipe bedding/surround shall be at least two (2) tests over

the course of the work. The testing rate for in-situ compacted density of pipe bedding/surround shall be not less than one test for every 20 m length of trench; the testing rate for reference dry density (ASTM D1557) shall be not less than two (2) tests over the course of the work. All quality control test reports shall be submitted to Departmental Representative for review and approval prior to placement of that material in the Work.

- .6 During placement, Departmental Representative may, at its discretion, inspect the pipe bedding/surround material for conformance to the specification. This quality assurance inspection may include sampling and testing at no cost to the Contractor, unless material does not conform, whereon the testing shall be at the Contractor's expense.
- .7 Failure of a sample to meet any one of the specified gradation and physical properties constitutes an unacceptable material and such material may be subject to rejection by Departmental Representative. Subject to Departmental Representative's agreement, rejected pipe bedding/surround material may be used instead as General Fill material.

2.8 Backfill Material

- .1 General Fill in accordance with Section 31 23 10 (Excavating, Trenching and Backfilling).

3. PART 3 – EXECUTION

3.1 Preparation

- .1 All existing utilities are shown according to available record drawings. The Contractor shall locate all existing utilities prior to construction, and shall notify the Departmental Representative of any conflicts a minimum of seventy-two (72) hours prior to construction. Any additional work required as a result of failing to pre-locate known or potential conflicts will be completed at the Contractor's expense.
- .2 Clean pipes, fittings, valves, and appurtenances of accumulated debris and water before installation. Carefully inspect materials for defects. Remove defective materials from site.

3.2 Trenching

- .1 Do trenching work in accordance with Section 31 23 10 (Excavating, Trenching and Backfilling).
- .2 Trench depth to provide cover over pipe of not less than 1,000 mm from finished grade.
- .3 Trench alignment to be uniform and free of dips, bends, or deviations in grade.

- .4 Trench alignment and depth require Departmental Representative's approval prior to placing bedding material and pipe.

3.3 Granular Bedding

- .1 Place granular bedding material in uniform layers not exceeding 150 mm compacted thickness to depth as indicated.
- .2 Shape bed true to grade to provide continuous uniform bearing surface for pipe.
- .3 Shape transverse depressions in bedding as required to suit joints.
- .4 Compact each layer full width of bed to at least 95% modified Proctor maximum dry density to ASTM D1557.
- .5 Fill excavation below design elevation of bottom of specified bedding with compacted general fill in accordance with Section 31 23 10 (Excavating, Trenching and Backfilling).

3.4 Pipe Installation

- .1 Lay and join pipes to manufacturer's standard instructions and specifications except as noted otherwise herein: PVC pipe to AWWA M23 and C605.
- .2 Handle pipe by methods approved by Departmental Representative. Do not use chains or cables passed through pipe bore so that weight of pipe bears on pipe ends.
- .3 Lay pipes on prepared bed, true to line and grade. Ensure barrel of each pipe is in contact with shaped bed throughout its full length. Remove and replace defective pipe. Correct pipe which is not in true alignment or grade, or pipe which shows undue settlement after installation.
- .4 Face socket ends of pipe in direction of laying. For mains on a grade of 2% or greater, face socket ends up-grade.
- .5 Do not exceed permissible deflection at joints as recommended by pipe manufacturer.
- .6 Keep jointing materials and installed pipe free of dirt and water and other foreign materials. Whenever work is stopped, install a removable watertight bulkhead at open end of last pipe laid to prevent entry of foreign materials.
- .7 Position and join pipes with equipment and methods approved by Departmental Representative.
- .8 Cut pipes in an approved manner as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.
- .9 Align pipes carefully before jointing.

- .10 Install gaskets to manufacturer's recommendations. Support pipes with hand slings or crane as required to minimize lateral pressure on gasket and maintain concentricity until gasket is properly positioned.
- .11 Avoid displacing gasket or contaminating with dirt or other foreign material. Gaskets so disturbed or contaminated shall be removed, cleaned, lubricated, and replaced before jointing is attempted again.
- .12 Install pipe joint restraints in accordance with manufacturer's written instructions.
- .13 Complete each joint before laying next length of pipe.
- .14 Minimize deflection after joint has been made.
- .15 Apply sufficient pressure in making joints to ensure that joint is completed to manufacturer's recommendations.
- .16 Ensure completed joints are restrained by compacting bedding material alongside and over installed pipes or as otherwise approved by Departmental Representative.
- .17 When stoppage of work occurs, block pipes in an approved manner to prevent creep during down time.
- .18 Do not lay pipe on frozen bedding.
- .19 Do hydrostatic and leakage test and have results approved by Departmental Representative before surrounding and covering joints and fittings with granular material. Backfill remainder of trench.

3.5 Valve Installation

- .1 Install valves to manufacturer's recommendations at locations as indicated on the Drawings.
- .2 Install underground post-type indicator valves as indicated.

3.6 Hanger and Support Installation

- .1 Install hangers and supports to manufacturer's recommendations.
- .2 Install hanger so that rod is vertical under operating conditions.
- .3 Adjust hangers to equalize load.

3.7 Thrust Blocks

- .1 Do concrete work in accordance with Section 03 30 00 (Cast-in-place Concrete).
- .2 Place concrete thrust blocks at valves, tees, plugs, caps, bends, changes in pipe diameter, reducers, hydrants and fittings on undisturbed ground or compacted fill as indicated.
- .3 Keep joints and couplings free of concrete.

- .4 Do not backfill over concrete within twenty-four (24) hours after placing.

3.8 Installation of Vehicle Protection Bollards

- .1 Install vehicle protection bollards as shown on the Drawings.
- .2 Fill bollards with concrete as shown on the Drawings and as specified.

3.9 Hydrostatic and Leakage Testing

- .1 Provide labour, equipment and materials required to perform hydrostatic and leakage tests hereinafter described.
- .2 Notify Departmental Representative at least twenty-four (24) hours in advance of all proposed tests. Perform tests in presence of Departmental Representative.
- .3 Where any section of system is provided with concrete thrust blocks, do not conduct tests until at least five (5) days after placing concrete, or at least two (2) days if high early strength concrete is used.
- .4 Leave valves, joints, and fittings exposed.
- .5 When testing is done during freezing weather, protect valves, joints, and fittings from freezing.
- .6 Strut and brace caps, bends, tees, and valves, to prevent movement when test pressure is applied.
- .7 Open valves.
- .8 Expel air from main by slowly filling main with potable water. Install corporation stops at high points in main where no air-vacuum release valves are installed. Remove stops after satisfactory completion of test and seal holes with plugs.
- .9 Thoroughly examine exposed parts and correct for leakage as necessary.
- .10 Apply hydrostatic test pressure of 1,040 kPa based on elevation of lowest point in main and corrected to elevation of test gauge, for a period of one (1) hour.
- .11 Examine exposed pipe, joints, fittings, and appurtenances while system is under pressure.
- .12 Remove joints, fittings, and appurtenances found defective and replace with new sound material and make watertight.
- .13 Repeat hydrostatic test until all defects have been corrected.
- .14 Apply a leakage test pressure of 1,040 kPa after complete backfilling of trench, based on elevation of lowest point in main and corrected to elevation of gauge, for period of two (2) hours.
- .15 Define leakage as amount of water supplied from water storage tank in order to maintain test pressure for two (2) hours.

- .16 Do not exceed allowable leakage of 0.03 litres/mm diameter per 300 m of pipe, including lateral connections, per hour.
- .17 Locate and repair defects if leakage is greater than amount specified.
- .18 Repeat test until leakage is within specified allowance for full length of water main.

3.10 Flow Testing

- .1 Provide labour, equipment, and materials required to perform flow testing hereinafter described.
- .2 Notify Departmental Representative at least twenty-four (24) hours in advance of all proposed tests. Perform tests in presence of Departmental Representative.
- .3 Measure and record flow and pressure at the nearest existing fire connection to the new hydrant being installed before work commences, and after work is complete. This information will be used by Departmental Representative to confirm that the work performed has not had a detrimental effect on the existing fire system.
- .4 Perform a flow test at the new hydrant to verify that the minimum fire flow of 31.5 l/s (500 gpm) at a residual pressure of 138 kPa (20 psi) can be delivered for a minimum of two (2) hours.

3.11 Pipe Surround

- .1 Upon completion of pipe laying and after Departmental Representative has inspected work in place, surround and cover pipes as indicated.
- .2 Hand place surround material in uniform layers not exceeding 150 mm compacted thickness as indicated. Do not dump material within 3 m of exposed pipe.
- .3 Place layers uniformly and simultaneously on each side of pipe.
- .4 Compact each layer from pipe invert up to underside of backfill to at least 95% modified Proctor maximum dry density to ASTM D1557.

3.12 Backfill

- .1 Place backfill material, above pipe surround, in uniform layers not exceeding 150 mm compacted thickness up to subgrade level.
- .2 Compact backfill to at least 95% modified Proctor maximum dry density to ASTM D1557.

3.13 Flushing

- .1 Flushing operations to be witnessed by Departmental Representative. Disinfection of installed fire main is not required.

- .2 Flush water mains through available outlets with a sufficient flow to produce a velocity of 2 m/s, within pipe for ten (10) minutes, or until foreign materials have been removed and flushed water is clear.
- .3 Provide connections and pumps for flushing as required.
- .4 Open and close valves, hydrants, and service connections to ensure thorough flushing. Complete flushing to Departmental Representative's approval.

3.14 Operation and Maintenance Manuals

- .1 Provide operation and maintenance manuals, as stipulated in Section 01 78 30 (Closeout Submittals), for new valves or other equipment items installed in the work, if any required.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 This Section describes details regarding all dredging, debris removal, slope re-grading activities, on-site barge passive dewatering activities, and in-water transportation of dredge material from the EGD Work Site to the Contractor's Off-Site Offload Facility. Dredging includes completion of Required Dredging work to remove contaminated sediments from the EGD Work Site and to establish the base surface for Engineered Capping (Capping) of the South Jetty under-pier areas. For this work, dredging also refers to land-based excavation for sediment remediation purposes (e.g., under-pier foreshore excavation) and as otherwise required for the project (e.g., upland overburden excavations).
- .2 Upland overburden excavation work is covered under Section 31 23 10 (Excavating, Trenching and Backfilling), but is measured and paid under this Section.
- .3 The Contractor is responsible for reviewing the information provided in the Specifications, Environmental Management Plan (EMP), and other Contract Documents regarding nature of material to be encountered at the EGD Work Site, and selecting appropriate dredge and excavation equipment that will allow for removal of this material. The design assumes that till or bedrock material will not be encountered within the Dredge Prism; however, the Contractor is responsible for removal of all contaminated sediment within the Dredge Prism. If a till or bedrock surface is encountered during Required Dredging or Contingency Re-Dredging, the Contractor is not required to remove the till or bedrock material to the Required Dredge Elevation or Contingency Re-Dredging thickness. The intent of dredging is to remove contaminated sediment and not to remove till or bedrock material, which is not contaminated sediment. The Dredge Pay Volume will not include volume of till or bedrock material left un-dredged.
- .4 The work includes removal of contaminated sediment and debris from the EGD Work Site as part of Required Dredging. In addition, Hazardous Waste Quality Sediment material has been identified for removal in the Hazardous Waste Area as shown on the Drawings.
- .5 The Contractor shall provide to the Departmental Representative, as part of the Construction Work Plan, a proposed Test Dredging location to be conducted prior to conducting Required Dredging elsewhere at the EGD Work Site. The Test Dredging location shall not be within the Hazardous Waste Area. The Test Dredging is intended to demonstrate that the Contractor's means and methods are adequate to meet the requirements of the Specifications and permit requirements (i.e., positioning control and water quality criteria). Test Dredging shall not be initiated until acceptance of the proposed area by the Departmental Representative. If results of Test Dredging indicate that the Contractor's means and methods are inadequate to meet requirements, the Contractor shall modify its

means and methods at no additional cost to PWGSC, prior to conducting Required Dredging elsewhere at the EGD Work Site.

- .6 The Hazardous Waste Quality Sediment material located within the Hazardous Waste Area shall be dredged per Section 01 11 55 (General Instructions). The Contractor shall prevent recontamination of previously-dredged areas when dredging the Hazardous Waste Area. Dredging activities shall be completed according to the sequencing and access requirements described in the Specifications, and the approach described in the Contractor's Construction Work Plan.
- .7 The Hazardous Waste Quality Sediment material located within the Hazardous Waste Area shown on the Drawings requires a specific removal sequence to be performed by the Contractor, and confirmatory sampling and testing to be performed by the Departmental Representative to confirm all Hazardous Waste Quality Sediment has been removed.
- .8 Specialized dredging techniques may be required to protect existing structures adjacent to the work. Existing structures include steel pile-supported piers, the timber crib, sheet pile walls (both the temporary sheet pile perimeter wall at the face of the existing South Jetty, and the permanent sheet pile wall at the top of the under-pier slope), and the high mast light structure identified on the Drawings.
- .9 Dredging activities shall be performed within the Temporary Re-suspension Barrier Containment Area (TRBCA), as shown on the Drawings, in areas enclosed by the re-driven sheet pile perimeter wall and the Contractor-constructed Temporary Re-suspension Barrier (TRB) system. The sheet pile perimeter wall shall remain in place, after being re-driven as described in Section 31 62 17 (Steel Sheet Piling), during all dredging activities in order to contain contaminated sediment, hazardous waste, and debris within the area enclosed by the re-driven sheet pile perimeter wall and the Contractor-constructed TRB system.
- .10 During Required Dredging and Contingency Re-Dredging activities, the Contractor shall implement best management practices (BMPs) to minimize potential for recontamination to other Contractor Subareas where Required Dredging, Contingency Re-Dredging or Engineering Capping activities have been completed or are being performed. BMPs may include use of additional TRBs, at the Contractor's own cost, to isolate the Contractor Subarea(s) where dredging is being performed to prevent such recontamination. The Contractor shall include details and descriptions of the BMPs (including use of additional TRBs) that will be implemented to prevent recontamination in Contractor Subareas during dredging and capping activities as part of the Construction Work Plan and Aquatic Water Quality Control Plan (AWQCP).
- .11 The Contractor is allowed to load dredged sediment onto sealed (watertight) barges located outside and adjacent to the TRBCA, provided that spill aprons, or other spill prevention measures, are used to prevent spillage into the marine environment outside of the TRBCA. Any spillage on the spill apron shall be removed as soon as practicable and properly disposed.

- .12 Descriptions of material to be dredged (including contaminated sediment and debris) are provided in the Appendices and Reference Documents attached to the Specifications. The Contractor shall review this information and use it to inform the Contractor's work.
- .13 Missed Inventory Contingency Re-Dredging for removal of missed inventory and Residuals Contingency Re-Dredging for removal of residuals may be required within the TRBCA. Limits of Contingency Re-Dredging for removal of Missed Inventory or residuals may be restricted in areas adjacent to existing structures and/or on slopes.
- .14 Residuals Contingency Re-Dredging for removal of residuals contamination may be required outside the TRBCA, as shown on the Drawings, but within the EGD Work Site boundary (pending results of confirmational sampling). Residuals Contingency Re-dredging outside the TRBCA will not be a payable item, as the prevention of recontamination of this area is the Contractor's responsibility.
- .15 The Contractor becomes the owner of, and is responsible for, any soil, sediment, excavated material, debris, waste, timber jetty components designated for demolition, or other material (including materials identified for recycling and/or re-use) once it is removed, dredged, or excavated to be loaded on a vehicle, barge, or other vessel for transport to a Contractor Off-Site Offload Facility, Disposal Facility, Treatment Facility, Hazardous Waste Management Facility, or Recycling/Re-use facility.
- .16 The Contractor is allowed to passively dewater dredged sediment from barges within the TRBCA provided:
 - .1 The sediment originates from locations within the EGD Work Site where passive barge dewatering of those dredge sediments is allowed, as defined on the Drawings and described in the Specifications, and;
 - .2 The method for passive barge dewatering is implemented in a manner that is compliant with the water quality requirements presented in the Specifications and EMP/Water Quality Monitoring Plan (WQMP). The Contractor shall be responsible for reviewing and understanding these water quality requirements.
- .17 For Contingency Re-Dredging occurring outside of the TRBCA, the Contractor is allowed to passively dewater dredged sediment from barges located within the EGD Work Site, either inside or outside of the TRBCA, if water quality guidelines per the EMP/WQMP are met.
- .18 Passive barge dewatering is not allowed when dredging within the Hazardous Waste Area as shown on the Drawings and described in the Specifications. The Contractor is required to use a sealed (watertight) barge when dredging within the Hazardous Waste Area. Collect, store, treat as necessary, and discharge or dispose of effluent from dredging activities in such a manner that meets the water quality criteria described in Section 01 35 13.43 (Special Procedures for Contaminated Sites) and Section 01 35 43 (Environmental Procedures and Sustainability), and all requirements of the EMP/WQMP.

- .19 Passive barge dewatering is not allowed during in-water barge transportation of dredged sediment and debris from the EGD Work Site to the Contractor Off-Site Offload Facility. Collect, store, treat as necessary, and discharge or dispose of effluent from barge in such a manner that meets the water quality criteria described in Section 01 35 13.43 (Special Procedures for Contaminated Sites) and Section 01 35 43 (Environmental Procedures and Sustainability), and all requirements of the EMP/WQMP.
- .20 All Contractor floating equipment shall be marked with lights, lighted buoys, or Departmental Representative-accepted or Queen’s Harbour Master-accepted equivalent, whenever operations and/or floating equipment laydown will occur during non-daylight hours.
- .21 The Contractor shall clearly mark all anchor lines and set anchor lines in such a manner so as to not interfere with active navigation operations in the EGD Work Site or in Esquimalt Harbour.
- .22 The Contractor is responsible for selecting the appropriate dredging equipment that considers the site conditions, character of materials, facility usage, and existing structures adjacent to the dredge areas that may be encountered during dredging operations. By submitting its Tender, the Contractor acknowledges that it has carefully considered these conditions and other project considerations and included appropriate means and methods for dredging activities.
- .23 Table 35 20 23-1 provides the estimated surface area and anticipated Dredge Pay Volume associated with Required Dredging, and is presented for Contractor convenience only.

Table 35 20 23-1

Anticipated Dredge Pay Volume Summary by Area

Area / Subarea	Surface Area (m²)	Dredge Pay Volume (m³) ⁽³⁾⁽⁴⁾	Passive Barge Dewatering Permitted? ⁽¹⁾⁽²⁾
TRBCA – Underpier ⁵	3,200	7,900	Yes, excluding Hazardous Waste Area
TRBCA – Open Water ⁶	9,200	29,800	Yes, excluding Hazardous Waste Area
Hazardous Waste Area	300	200	No
TOTAL	12,700	37,900	

Notes:

(1) Passive barge dewatering is permitted within the TRBCA during dredging outside of the Hazardous Waste Area. For Contingency Re-Dredging occurring outside of the TRBCA, the Contractor is allowed to passively dewater dredged sediment from barges located within the

EGD Work Site, either inside or outside of the TRBCA, if water quality guidelines per the EMP/WQMP are met.

(2) Passive barge dewatering is not permitted during dredging activities occurring in the Hazardous Waste Area.

(3) Surface areas and volumes presented in this table are estimated only and shall not be used for basis of measurement and payment. Refer to the Unit Price Table for tender volumes associated with this work.

(4) Dredge Pay Volume is for Required Dredging (including Payable Overdredge Allowance).

(5) "Underpier" refers to Required Dredging areas beneath the steel-pile supported concrete deck, as shown on the Drawings.

(6) "Open Water" refers to Required Dredging areas not beneath the steel-pile supported concrete deck, as shown on the Drawings, following demolition of the other structure elements of the existing South Jetty.

- .24 It is also anticipated that a Contingency Re-Dredge Pay Volume of approximately 2,100 cubic metres (m³) of sediment may be removed as Contingency Re-Dredging to remove dredge residuals or missed inventory. This additional volume is not included in the quantities listed in Table 35 20 23-1.

1.2 Measurement and Payment Procedures

- .1 Measurement for dredging, passive barge dewatering activities, and in-water transportation shall be by the in-situ cubic metre (m³), based on the Contractor's pre-and post-construction surveys and dredging plan, used to compute the Dredge Pay Volume.
- .2 The actual in-situ volume of dredge material the Contractor removes to achieve the Required Dredge Elevations and grades is dependent upon the Contractor's dredging means and methods. The Payable Overdredge Allowance is the maximum extent of dredging below the Required Dredge Elevation that has been accounted for in the Unit Price Table. The Contractor shall select its means and methods to conduct its dredging work to stay within the Payable Overdredge Allowance limits to the extent practicable. Material dredged beyond the Payable Overdredge Allowance will not qualify for separate payment. Should the Contractor's dredging means and methods result in Excessive Dredging, the Contractor shall account for potential excessive dredge volume in its bid prices. The Dredge Pay Volume will be determined by calculating the total amount of in-situ cubic metres of material dredged (based on Pre-Construction and Post-Construction Surveys), minus Excessive Dredging.
- .3 Payment for Required Dredging shall be made by the in-situ cubic metre (m³) of Dredge Pay Volume at the unit price tendered for REQUIRED DREDGING.
- .4 The Contractor shall account for any potential difficulties of dredging under the steel-pile supported deck within the unit price for Required Dredging. Delays due to the presence of cut off or buried timber piles under the steel-pile supported deck shall not be cause for additional compensation to the Contractor.

- .5 Payment for Contingency Re-Dredging inside the TRBCA shall be made by the in-situ cubic metre (m³) of Contingency Re-Dredge Volume at the unit price tendered for CONTINGENCY RE-DREDGING. All costs associated with Contingency Re-dredging outside of the TRBCA shall not be payable unless otherwise accepted by the Departmental Representative.
- .6 Test Dredging shall be measured and paid for as part of Required Dredging. All costs associated with Test Dredging shall be included in the tendered price for Required Dredging.
- .7 Payment for in-water transportation and passive barge dewatering of dredged and excavated materials from inside the TRBCA shall be made by the cubic metre (m³) of Dredge Pay Volumes at the unit prices tendered for REQUIRED DREDGING IN-WATER TRANSPORTATION or CONTINGENCY RE-DREDGING IN-WATER TRANSPORTATION, as appropriate to the type of dredging. All costs associated with Contingency Re-dredging outside of the TRBCA shall not be payable unless otherwise accepted by the Departmental Representative.
- .8 Final payment will be based on the final measurement of Dredge Pay Volumes, and final payment shall be reconciled with monthly progress payments for Contractor Subareas to determine the amount of final payment. The Contractor shall propose dredging Contractor Subareas for progress payments in the Construction Work Plan.
- .9 For Tendering purposes, the Contractor shall assume that all non-hazardous waste dredged sediment is classified for disposal as industrial IL+ waste material under the current regulations for classification and disposal of contaminated sediment in British Columbia. The IL+ material is to be transported in accordance with Laws and Regulations by a hauler licensed for such waste.
- .10 Hazardous Waste Quality Sediment materials shall be handled in accordance with Laws and Regulations, including but not limited to, the Hazardous Waste Regulation (HWR), B.C. Reg. 63/88 and the British Columbia Environmental Management Act (SBC 2003, Chapter 53), and shall be treated, destroyed and disposed of at a facility authorized to treat, destroy and dispose of Class 9 Solid Waste, as defined by HWR, B.C. Reg. 63/88, and shall be transported by a licensed hauler in accordance with the B.C. Transport of Dangerous Goods Act (TDG) and in accordance with Laws and Regulations for disposal and transport inside or outside of the Province of British Columbia, including but not limited to, the Canadian Transportation of Hazardous Goods Act.
- .11 All costs associated with removal, handling and disposal of Dredge Debris shall be considered incidental to the work and shall be included in the tender price for Required Dredging.
- .12 All costs associated with installation, maintenance, and removal of temporary timber wedges to be installed as dredging proceeds as a precautionary measure (in the existing joint gap between the steel-piled concrete deck and the anchored

bulkhead wall cap beam) shall be considered incidental to the work and shall be included in the tender price for Required Dredging.

- .13 The Tender Items (as shown on the Unit Price Table) for all dredging and in-water transportation, offloading, upland transportation and disposal of contaminated dredged sediment, Hazardous Waste Quality Sediment material, and debris, and placement of Engineered Cap, include payable over-dredge and over-placement allowances, as described in the Specifications, and as shown on the Drawings.
- .14 Excavation, trenching, and backfilling necessary for disconnection, re-routing, reconnection, and/or capping of mechanical and electrical services at their termination points (after demolition of timber jetties) will not be measured separately, but considered incidental to the work. All costs in connection with such excavations, trenches, and backfill shall be included in the relevant unit price tendered under Section 22 15 00 (Compressed Air Systems), Section 22 33 18 (Drainage Waste Piping – Plastic), Section 26 05 00 (Common Work Results for Electrical), and Section 33 11 16 (Water Utility Distribution Piping), respectively.
- .15 Offloading, upland transportation, and disposal of excavated materials necessary for disconnection, re-routing, reconnection, and/or capping of mechanical and electrical services at their termination points (after demolition of timber jetties) will not be measured or paid for separately, and shall be considered as incidental to the work.

1.3 Related Sections

- .1 Section 01 11 55 (General Instructions)
- .2 Section 01 31 19 (Project Meetings)
- .3 Section 01 33 00 (Submittal Procedures)
- .4 Section 01 35 13.43 (Special Procedures for Contaminated Sites)
- .5 Section 01 35 43 (Environmental Procedures and Sustainability)
- .6 Section 01 45 00 (Quality Control)
- .7 Section 02 21 13 (Surveying and Positioning Control)
- .8 Section 31 23 10 (Excavating, Trenching and Backfilling)
- .9 Section 35 20 23.01 (Offloading, Upland Transportation and Disposal)
- .10 Section 35 37 10 (Engineered Capping)

1.4 Definitions

- .1 Refer to Section 01 11 55 (General Instructions) for all definitions related to the Contract documents.

1.5 Submittals

- .1 Submit a detailed Construction Work Plan in accordance with Section 01 33 00 (Submittal Procedures) within twenty one (21) calendar days following Notice of Award for review and acceptance by the Departmental Representative.
- .2 As part of the detailed Construction Work Plan, in accordance with Section 01 33 00 (Submittal Procedures), the Contractor shall prepare a section that describes the approach that will be implemented for dredging, passive barge dewatering activities, and in-water transportation. Dredging, passive barge dewatering activities, and in-water transportation activities shall not begin until:
 - 1) the Construction Work Plan has been reviewed and accepted by the Departmental Representative; and
 - 2) authority-required notifications and review have been completed.At a minimum, the dredging, passive barge dewatering activities, and in-water transportation approach description shall contain the following information:
 - .1 Equipment Layout, including:
 - .1 Position of dredge, passive dewatering, or water treatment barge if used, and in-water transport barges for work to be completed in the TRBCA and Hazardous Waste Area.
 - .2 Reference to the construction work schedule that identifies timing and sequencing for completion of dredging, passive barge dewatering, and in-water transportation activities, as they relate to other major elements of the work.
 - .3 Number, types, and capacity of equipment to be used, including names of dredge(s) and other marine vessels.
 - .4 In-water transportation route to the Contractor Off-Site Offload Facility.
 - .5 Means and methods for completion of dredging, passive barge dewatering, and in-water transportation activities:
 - .1 Methods, procedures, and equipment to be used for Required Dredging activities in Elevation Dredging areas.
 - .2 Methods, procedures, and equipment to be used for Required Dredging activities in Under-Pier Dredging areas and in Slope Dredging areas.
 - .3 Methods, procedures, and equipment to be used for Hazardous Waste Quality Sediment material removal.
 - .4 Methods, procedures, and equipment to be used for anchoring floating equipment.
 - .5 Methods, procedures, and equipment to be used to provide lights, lighted buoys, or other required markings to warn other vessels of presence of floating equipment and anchoring lines.

- .6 Methods, procedures, and equipment to be used for all passive barge dewatering activities (including addition of amendments if applicable) of dredge material and debris as necessary.
 - .7 Methods, procedures, and equipment to be used for in-water transportation of contaminated dredged sediment, hazardous waste material, and debris to the Contractor Off-Site Offload Facility, including procedures for preventing release of sediment, hazardous waste, and water during transportation.
 - .8 Methods, procedures, and controls to protect existing EGD facilities against damage.
- .6 BMPs proposed by the Contractor and/or as required the EGD Facility, and by the EMP during dredging, passive barge dewatering activities, and in-water transportation of dredged sediment and debris to the Contractor Off-Site Offload Facility.
- .7 Debris Removal:
- .1 Procedures and equipment for collecting and disposing of submerged and floating debris encountered during dredging operations.
 - .2 Procedures and equipment for offloading, stockpiling (if necessary), transport, and disposal of debris. This information shall include methods to prevent spillage of debris back into the water during offloading and cleanup of the barge.
 - .8 Notification process and procedures to be used for moving floating equipment to accommodate vessel traffic in the surrounding waterway and at the EGD Facility.
- .3 Daily Reporting: As part of the Daily Construction Report, as described in Section 01 33 00 (Submittal Procedures), the Contractor shall keep a daily record of the area(s) dredged, the estimated Dredge Pay Volume removed including Payable Overdredge Allowance volume, estimated Excessive Dredging volume removed, number of haul barge trips to the Contractor Off-Site Offload Facility, estimated volume and tonnage of dredged materials, hazardous waste material, and debris transported to the Contractor Off-Site Offload Facility, Progress Surveys, and a summary of other details of the work. The Contractor shall also provide a copy of the Marine Surveyor Report with the Daily Construction Report. This daily record shall be submitted to the Departmental Representative the morning following completion of the work for that day as part of the Daily Construction Report. The Daily Construction Report shall be signed by the Contractor's site superintendent and quality control manager.
- .4 Weekly Reporting: As part of the Weekly Construction Report, as described in Section 01 33 00 (Submittal Procedures), the Contractor shall summarize the week's dredging activities in its Weekly Construction Report to be submitted to the Departmental Representative the following Monday morning. The Weekly

Construction Report shall identify work completed to date, anticipated work to be completed in the present week (including specific areas identified for dredging), and present the latest Progress Survey and Post-Construction Survey information. The Weekly Construction Report shall be signed by the Contractor's site superintendent and quality control manager.

- .5 Monthly progress claims: the Contractor shall submit to the Departmental Representative all barge displacement sheets, truck scale tickets and manifests, and Certificates of Disposal, as part of the Contractor monthly progress claim.

1.6 References

- .1 Hazardous Waste Regulation (HWR), B.C. Reg. 63/88.
- .2 Canadian Transportation of Hazardous Goods Act – Transportation of Hazardous Goods Regulation.
- .3 British Columbia Environmental Management Act (SBC 2003, Chapter 53).
- .4 Esquimalt Harbour – Practices and Procedures, Section 7: Towing of Ships.

1.7 Quality Control

- .1 The Contractor is responsible for providing all necessary quality controls to successfully complete the work.
- .2 The Departmental Representative may, at the Departmental Representative's sole discretion, inspect the dredging, passive barge dewatering activities, and in-water transportation for quality assurance purposes. Departmental Representative inspection shall in no way release the Contractor from its obligation to comply with the Specifications and all permit requirements, and shall in no way be construed as acceptance of work.

1.8 Environmental Protection

- .1 Dredging, passive barge dewatering, and in-water transportation activities shall be performed in accordance with environmental protection requirements, as stated in Section 01 35 13.43 (Special Procedures for Contaminated Sites), Section 01 35 43 (Environmental Procedures and Sustainability), the EMP, the Environmental Protection Plan (EPP), and in accordance with Laws and Regulations and Project Permits.
- .2 The Contractor shall protect all components of the TRB system including the re-driven sheet pile wall and TRBs from abrasion, propeller wash, impact damage, or displacement during the work as described in Section 31 62 17 (Steel Sheet Piling).

1.9 Regulatory Requirements

- .1 See Section 01 11 55 (General Instructions) for regulatory requirements pertaining to this Contract.

1.10 Floating Plant

- .1 Dredges and other floating equipment to be employed on this work shall be of Canadian registry, make, or manufacture, or must receive certificate of qualification from Industry Canada, Marine Directorate, and this certificate of qualification must be provided to the Departmental Representative within ten (10) calendar days following Notice of Award.
- .2 The Coasting Trade Act shall apply to all vessels utilized by the Contractor for the work.

1.11 Site Information

- .1 Character of Materials:
 - .1 Subsurface investigations were performed to characterize the physical and chemical quality of the dredge material. Detailed results from geotechnical and chemical testing of the sediments are provided in the attached Appendices and Reference Documents.
 - .2 Hazardous Waste Quality Material will be dredged in the Hazardous Waste Area shown on the Drawings. Extents of Hazardous Waste Quality Material will be confirmed by the Departmental Representative in the field after removal of initial anticipated layer of Hazardous Waste Quality Material. This will be conducted with both a surface sediment grab sample and subsurface sediment cores to define the vertical extent of hazardous waste material.
 - .3 Surveys of seabed, debris, and structures adjacent to the dredging areas were conducted to assist the Contractor in evaluating the potential nature and extent of debris and structural condition of infrastructure adjacent to locations where dredging will be performed. Results of surveys and other additional relevant site information are provided in the attached Appendices and reference drawings.
 - .4 The Contractor shall satisfy itself regarding the nature of materials present at the site prior to Tender. The type of materials encountered at the EGD Work Site may vary from the conditions described in the attached Appendices and reference drawings. Variations in the type of materials encountered may occur that do not differ materially from those indicated in the Specifications, and if encountered, will not be considered as basis for claims due to differing EGD Work Site conditions.
 - .5 Hard material in its natural state is defined as material requiring blasting, and includes boulders or fragments too large to be removed in one piece

by the dredging equipment, as well as till-like material that may be present within the Dredge Prism. The Contractor shall anticipate that within the Required Dredging Dredge Prism, that there will be significant quantities of existing riprap, many types of debris, and broken and embedded timber piling, which can be removed in one piece by appropriately sized dredging equipment.

.2 Dredge Debris:

- .1 Dredge Debris, such as anchors, rebar, steel scaffolding, shed, beams, walkway, steel boxes, cables, chains, straps, wood, and other man-made items, may be encountered during dredging operations. Some of this debris material may not be suitable for disposal at the authorized Disposal Facility(ies) with dredged sediment, as the authorized Disposal Facility(ies) may require that waste slated for disposal as daily cover be free of rebar, cables, and other debris. The Contractor shall coordinate with the Disposal Facility(ies) to determine whether Dredge Debris needs to be screened out of the dredged sediment prior to upland transport and disposal. The Contractor shall provide all necessary debris removal screening, transport, and disposal, and the costs for this work shall be considered incidental to the work and included in the bid price for Required Dredging.
- .2 Dredge debris shall be disposed of at an authorized Disposal Facility and in accordance with Laws and Regulations.
- .3 The Contractor shall immediately notify the Departmental Representative if any dredge debris is encountered that is considered Hazardous Waste Quality Sediment and the Departmental Representative will determine its disposition.

1.12 Misplaced Material

- .1 Should the Contractor, during the execution of the work, lose, dump, throw overboard, sink, or misplace any material, dredge, barge, machinery, or appliance (collectively termed as misplaced materials), the Contractor shall promptly recover and remove the misplaced materials. The Contractor shall give immediate verbal notice, followed by written confirmation, of the description and location of such misplaced materials to the Departmental Representative and shall mark and buoy such misplaced materials until they are removed.
- .2 Should the Contractor refuse, neglect, or delay compliance with this requirement, such misplaced materials may be removed by the Departmental Representative, in which case the cost of such removal operations shall be paid by the Contractor.
- .3 The Contractor shall be responsible for any fees, fines, penalties, or other costs resulting from misplaced materials, and shall not pass costs to the Departmental Representative.

2. PART 2 – PRODUCTS – NOT USED

3. PART 3 – EXECUTION

3.1 Sequencing

- .1 Dredging, passive barge dewatering, and in-water transportation sequencing requirements are described in Section 01 11 55 (General Instructions). This Section describes more detailed sequencing considerations associated with dredging, passive barge dewatering, and in-water transportation activities.
- .2 Dredging, passive barge dewatering, and in-water transportation activities shall not begin until the Departmental Representative has completed its review and accepted the Construction Work Plan.
- .3 The Contractor shall select its means and methods to conduct its dredging work to stay within the Payable Overdredge Allowance limits to the extent practicable.
- .4 Conduct Required Dredging in areas according to the sequencing requirements stated in Section 01 11 55 (General Instructions).
- .5 The Contractor shall provide to the Departmental Representative, as part of the Construction Work Plan, a proposed Test Dredging location to be conducted prior to conducting Required Dredging elsewhere at the EGD Work Site. The Test Dredging location shall not be within the Hazardous Waste Area. Test Dredging is intended to demonstrate that the Contractor's means and methods are adequate to meet the requirements of the Specifications and permit requirements (i.e., positioning control and water quality criteria). Test Dredging shall not be initiated until acceptance of the proposed area by the Departmental Representative. If results of Test Dredging indicate that the Contractor's means and methods are inadequate to meet requirements, the Contractor shall modify its means and methods at no additional cost to PWGSC, prior to conducting Required Dredging elsewhere at the EGD Work Site.
- .6 Following acceptance of Test Dredging, the Contractor shall continue with completion of Required Dredging activities. Dredging of the Hazardous Waste Area shall be sequenced and completed such that no recontamination of other previously dredged areas occurs. Therefore, the Contractor may choose to complete dredging of the Hazardous Waste Area prior to dredging of non-hazardous waste areas, or implement appropriate BMPs to prevent recontamination of previously dredged areas. The Contractor is responsible for all additional remediation activities (including all dredging, transportation, treatment, disposal, or other activities) if Hazardous Waste Quality Material recontamination occurs in areas where Required Dredging activities have been completed. These additional remediation activities will be completed by the Contractor at no additional cost to PWGSC. The Contractor shall conduct dredging in the Hazardous Waste Area in accordance with the following sequencing requirements:

- .1 The Contractor will dredge 0.5 metres of material in the Hazardous Waste Area and dispose of the material as Hazardous Waste Quality Material. The Departmental Representative will perform confirmational sampling testing of remaining sediment and will, within ten (10) working days, provide confirmation that all Hazardous Waste Quality Material has been removed or not removed. The Contractor shall repeat this sequencing if the Departmental Representative indicates that all Hazardous Waste Quality Material has not been removed. The Contractor may propose to remove all material in the Hazardous Waste Area to Required Dredge Elevations or required grades and transport and dispose of the material as Hazardous Waste Quality Material; however, the payable amount of Hazardous Waste Quality Material for transport and disposal will be restricted to the amount shown on the Unit Price Table.
- .2 When the Departmental Representative confirms that all Hazardous Waste Quality Material has been removed, the Contractor shall perform dredging to achieve the Required Dredge Elevation or required grades, and the material will be disposed of as IL+ waste material.
- .7 At the sole discretion of the Departmental Representative, the Required Dredging (outside of the Hazardous Waste Area) may be performed simultaneously with the Hazardous Waste Area dredging, if all other prior required precursor construction activities have been completed (e.g., timber pile extraction).
- .8 Once Required Dredging activities are considered by the Contractor to be completed or complete in a Contractor Subarea, the Contractor shall conduct the Post-Construction Survey (for Required Dredging) to verify that Required Dredge Elevations and grades have been met. If high spots remain above the required dredge elevations and grades, the Contractor shall remove such high spots to the satisfaction of the Departmental Representative and re-do the Post-Construction Survey, at the Contractor's own cost.
- .9 Once any remaining high spots are removed, the Departmental Representative will review the Contractor's Post-Construction Survey for acceptance as complete for Required Dredging. The Departmental Representative-accepted Post-Construction Survey shall be used to compare against the Pre-Construction Survey for measurement and payment purposes for Required Dredging.
- .10 If the Departmental Representative determines that Contingency Re-Dredging is required according to the sequencing requirements stated in Section 01 11 55 (General Instructions), the Contractor shall perform the Contingency Re-Dredging and allow for two (2) working days for the Departmental Representative to perform Contingency Re-Dredging confirmation sampling.

3.2 Dredging

- .1 The Contractor shall dredge the Required Dredging area to the lines, grades, slopes, and elevations shown on the Drawings.

- .2 The Contractor shall remove all material above the Required Dredge Elevation within the Dredge Prism. The Contractor shall not directly remove material from outside of the Dredge Prism. The Contractor shall remove Slough Material that falls into the Dredge Prism.
- .3 The Contractor shall conduct dredging activities in slope areas starting from the top of slope and working toward the toe of slope. The Contractor shall take care to conduct dredging activities according to the requirements of the Drawings and Specifications, and in a manner that does not result in adverse impacts to the stability of the slopes.
- .4 The Contractor shall take care to prevent Excessive Dredging in slope Dredge Units to avoid potentially adversely impacting slope and/or structural stability; Excessive Dredging is not allowed in slope Dredge Units. The Contractor shall repair any damage caused by Excessive Dredging at no additional cost to PWGSC.
- .5 The Contractor shall remove the Hazardous Waste Quality Material (i.e., perform the dredging of existing sediments) within the Hazardous Waste Area as shown on the Drawings. Hazardous Waste Quality Materials shall be handled in accordance with Laws and Regulations, including but not limited to, the Hazardous Waste Regulation (HWR), B.C. Reg. 63/88 and the British Columbia Environmental Management Act (SBC 2003, Chapter 53), including all amendments, and shall be treated, destroyed and disposed of as Hazardous Waste Quality Material. Contractor shall take particular care when performing dredging activities in the Hazardous Waste Area. If slough material falls into the Hazardous Waste Area, it shall be considered Hazardous Waste Quality Material for removal, transport and disposal. No separate payment will be made for removal, transport, and disposal of slough material that falls into the Hazardous Waste Area.
- .6 The Contractor shall take particular care when performing dredging activities adjacent to the following existing structures, and shall also adhere to the specified set-back requirements and restricted dredge elevations shown in detail on the Drawings:
 - .1 Steel sheet pile perimeter wall (along outer perimeter of South Jetty).
 - .2 Steel pipe pile-supported concrete deck structure including the steel pipe piles.
 - .3 The anchored steel sheet pile bulkhead wall (inboard face under the steel pile concrete deck structure).
 - .4 Concrete "L-wall" at east end of steel pipe pile-supported concrete pier.
 - .5 Timber crib (concrete faced).
- .7 Install, maintain, and remove temporary timber wedges as dredging proceeds, as a precautionary measure (in the existing joint gap between the steel-piled concrete deck and the anchored bulkhead wall cap beam), as indicated on the Drawings.

- .8 The Contractor shall exercise care when dredging the toe of slopes and slope grades to avoid overdredging below the Payable Overdredge Allowance, which may result in potential damage to existing structures. Undercutting the toe of slopes may result in excessive slope sloughing and damage to structures.
- .9 The Contractor may conduct mechanical dredging activities using a bucket type and size of the Contractor's choice, provided that water quality requirements of the EMP/WQMP and permit requirements are satisfied.
- .10 Portions of the Required Dredging are located under and adjacent to an existing steel pile-supported concrete deck structure as shown on the Drawings. Dredging under and adjacent to the existing concrete deck structure will require use of specialized equipment and methods in order to complete the Required Dredging as shown on the Drawings.
- .11 The Contractor shall determine its means and methods for effectively removing Required Dredging material from the under-pier area. In addition, clean up man-made debris off the surface, and in particular debris that forms high spots higher than 0.5 m above the post-dredge surface that can interfere with construction of the in situ slope stabilization or cap. The Contractor shall remove by cutting off or extracting old non-functional vertical structures including broken timber piling or broken structural elements (including the remnants of an old sheet pile wall) as shown on the Drawings or as identified in the field during construction).
- .12 The Contractor shall use all practical means to extract the cut off timber piles intact as they are encountered during dredging activities in accordance with Section 02 42 16.01 (Structure Demolition). Where existing timber piles for extraction are located underneath concrete deck structures, and all practicable means to extract those timber piles intact have been used, then the Departmental Representative will accept controlled cutoff of those timber piles with extraction and removal of the cut off portion. All pile remnants left in place are to be documented and location shown on the Record Drawings.
- .13 All dredging activities shall be performed in accordance with the requirements of the Specifications and using the BMPs presented in the Specifications and EMP/WQMP to protect water quality during completion of the work, and the EGD Environmental Best Management Practices (EBMPs) as referenced in the Specifications. If water quality criteria exceedances are observed during dredging, passive barge dewatering, and in-water transportation activities, the Contractor may be required to modify the construction methods at the Contractor's own cost.
- .14 Dredging shall be undertaken in a manner to minimize disruption, disturbance, and resuspension of seabed sediments. The Contractor shall remove debris from the seabed in a slow and steady manner to minimize resuspension of sediments.
- .15 Dredging activities shall be undertaken in a manner to protect the existing structures including the re-driven sheet pile wall and TRB, facilities, and services from damage during the Required Dredging, and the Contractor shall monitor the re-driven sheet pile wall as described in Section 31 62 17 (Steel Sheet Piling).

- .16 The Contractor shall place dredge material and debris into the transport barge in such a manner that prevents loss of sediment over the side rails or as a result of barge listing.
- .17 The Contractor shall ensure that any grounding of barges required for dredging or transport of dredged material will occur only in areas where Required Dredging is planned. The Contractor shall not ground barges in areas where Engineered Cap materials have already been placed.
- .18 Barge spudding may be used within the TRBCA in areas where Engineered Cap materials have not yet been placed, and outside of the Hazardous Waste Area, to facilitate Required Dredging. The Contractor is responsible for protecting the existing armour slope located outside of and adjacent to the TRBCA, finished or partially completed Engineered Caps, and to protect structures such as the re-driven sheet pile wall, TRB system, existing steel-piled concrete deck structure, existing timber crib, and existing sheet pile bulkhead wall. The Contractor is responsible for repair of these structures to pre-existing condition, and restoration of Engineered Caps to the required completed condition, if any damage occurs due to spudding or other dredging activities.
- .19 Leveling of the completed dredging surface by dragging a beam or the clamshell bucket over the completed area is not permitted.
- .20 If daily Progress Survey results indicate that the Contractor is dredging excessively, or is dredging outside of the Dredge Prism, the Contractor shall modify its dredging operations and/or positioning control immediately to avoid additional Excessive Dredging. Excessive Dredging, if performed, will be paid for by the Contractor at the Contractor's own cost.
- .21 Upon completion of the work, and after acceptance by the Departmental Representative, the Contractor shall promptly remove the dredging plant and associated equipment, including ranges, buoys, piles, and other markers or obstructions placed by the Contractor in the water or on shore.

3.3 Passive Barge Dewatering

- .1 The Contractor shall provide detailed description, photographs, and drawings as necessary describing the means and methods for dredge material passive barge dewatering activities as part of the Construction Work Plan.
- .2 Passive barge dewatering shall be permitted inside the TRBCA, as shown on the Drawings. For Contingency Re-Dredging occurring outside of the TRBCA, the Contractor is allowed to passively dewater dredged sediment from barges located within the EGD Work Site, either inside or outside of the TRBCA, if water quality guidelines per the EMP/WQMP are met.
- .3 The Contractor shall be responsible for ensuring that all scuppers, sideboards, or other passageways for effluent to discharge back to EGD Work Site waters have the proper filtration material in place prior to discharge of effluent.

- .4 EGD Work Site passive barge dewatering activities shall be completed using the procedures described in the Specifications, and the requirements and BMPs presented in the Specifications, the EMP/WQMP, and EGD Facility EBMPs. If water quality criteria exceedances are observed during completion of passive dewatering activities, the Contractor shall be required to modify the passive barge dewatering process or cease passive barge dewatering activities at the Contractor's own cost.
- .5 In the Hazardous Waste Area where passive barge dewatering is not permitted, the Contractor shall design a suitable dewatering and treatment system that is compatible with the dredging process and allows for safe access for the Environmental Monitor to sample the treated effluent water. Water or effluent generated from dredging activities shall meet the water quality requirements provided in the Specifications and the EMP/WQMP prior to discharge. If water quality guidelines cannot be met, effluent must be disposed of at the designated Wastewater Treatment and Disposal Facility.
- .6 The Contractor may elect to construct a water treatment system at the EGD Work Site and shall demonstrate in the Construction Work Plan compliance with water quality requirements to discharge treated effluent back to the receiving waters.
- .7 Where watertight haul barges are to be used, the Contractor shall demonstrate, in the Construction Work Plan, the location, method of treatment, and point of discharge for all effluent that will be generated as part of this work. The Contractor shall also detail the methods to be used to monitor haul barges for leakage during transport of dredged material to the Contractor's Off-Site Offload Facility. No discharge of sediment or associated water is permitted during transportation of dredge material. If leakage is observed, however minor, the barge transport operations shall be halted and not restarted until repairs, satisfactory to the Departmental Representative, are made. Such delays and works shall be at the Contractor's expense.
- .8 No overtopping of the barge sideboards will be allowed.
- .9 It is the Contractor's responsibility to understand the passive dewatering requirements and costs to provide sufficient dewatering for the Contractor's identified Treatment Facility or Disposal Facility and include that work in the price for the applicable Tender Item.

3.4 In-Water Transportation

- .1 All contaminated materials shall be transported from the EGD Work Site using waterborne equipment (i.e., barges). The Contractor shall use principal and trailing tugboats whenever towing barges or other vessels to the EGD Work Site in accordance with the Esquimalt Harbour Practices and Procedures for towing of ships.
 - .1 The current Esquimalt Harbour Practices and Procedures can be viewed and downloaded from:

<http://www.navy-marine.forces.gc.ca/en/about/structure-marpac-poesb-practices-procedures.page>.

- .2 The Contractor shall transport contaminated sediment, hazardous waste, and debris, including structure demolition debris, to the Contractor's Off-Site Offload Facility according to the means and methods described in the Contractor's Construction Work Plan. Deviations from the Construction Work Plan must be submitted to the Departmental Representative for review (and re-submission and further review as required), and no haul barges shall leave the EGD Work Site until the Departmental Representative has accepted such deviations.
- .3 The Contractor shall have a certified marine surveyor inspect each barge load of dredged material and debris prior to transport from the EGD Work Site and to the Contractor's Off-Site Offload Facility.
 - .1 The certified marine surveyor shall obtain barge displacement measurements prior to in-water transportation and establish an estimated tonnage of material associated with that barge load. Estimated tonnages for each barge load of material removed from the EGD Work Site shall be recorded in the Contractor's Daily and Weekly Construction Reports as part of the Marine Surveyor Report.
 - .2 The Marine Surveyor Report shall also document seaworthiness of each barge used for transport of dredged sediment and debris from the EGD Work Site to the Contractor's Off-Site Offload Facility. Documentation of the seaworthiness of each transport barge shall be submitted to the Departmental Representative prior to that barge leaving the EGD Work Site.
- .4 Dredged sediment and debris shall be transported to the Contractor's Off-Site Offload Facility using watertight barges or other forms of sealed waterborne transport.
- .5 Dredged sediment and debris shall be transported directly from the EGD Work Site to the Contractor's Off-Site Offload Facility identified in the Construction Work Plan, and as accepted by the Departmental Representative.
- .6 Transportation of sediment and debris to the Contractor's Off-Site Offload Facility shall comply with Laws and Regulations, and all requirements of the Specifications and the EMP regarding these activities.
- .7 Water management on haul barges, or other forms of waterborne transport, may be done with the addition of drying amendment if necessary. The Contractor shall select the type of amendment and appropriate dosage to facilitate dewatering. Use of amendments is at the sole discretion of the Contractor, and the Contractor is responsible for ensuring that use of amendments is acceptable by the Disposal Facility, and meets requirements of Laws and Regulations, Project Permit requirements, and the EMP.

3.5 Water Quality Criteria Compliance

- .1 The water quality monitoring requirements are described in the Specifications and the EMP/WQMP and are provided in Section 01 35 13.43 (Special Procedures for Contaminated Sites).
- .2 In accordance with the EMP/WQMP, the Departmental Representative or Environmental Monitor will conduct water quality monitoring, for quality assurance, during completion of dredging and passive barge dewatering activities. The Contractor is responsible for complying with all water quality criteria as defined in the Specifications and the EMP/WQMP, and shall conduct its own water quality monitoring as needed to provide quality control of the Contractor's work.
- .3 The Contractor shall describe in its Construction Work Plan what means, methods, and procedures will be used to prevent water quality criteria exceedances, and what contingency actions will be taken to restore compliance with water quality criteria should water quality exceedances occur during completion of dredging, passive barge dewatering, and in-water transportation activities.
- .4 Delays caused by complying with water quality criteria shall not be cause for additional compensation to the Contractor.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 The Contractor shall provide a Contractor Off-Site Offload Facility to be used to transfer materials between the Contractor's floating equipment and land, including offloading the Contractor's haul barges of dredged sediment, excavated materials, and debris, including Hazardous Waste Quality Material. The Contractor's Off-Site Offload Facility shall be operated in compliance with the Laws and Regulations and have in place all necessary Project Permits and approvals for work activities anticipated to occur at the Contractor's Off-Site Offload Facility including permissions for offloading, handling, and transport of Hazardous Waste Quality Material to a Hazardous Waste Management Facility. The Contractor shall have in place ownership or lease documentation to demonstrate that the activities to be conducted at the Contractor's Off-Site Offload Facility are allowed or accepted by the property owner.
- .2 Work under this Section includes furnishing of all labour, equipment, materials, and other incidentals required for haul barge offloading of dredged sediment, Hazardous Waste Quality Materials, excavated materials and debris at the Contractor's Off-Site Offload Facility to the Contractor's Off-Site Staging and Stockpile Area (as necessary), Off-Site Staging and Stockpile Area management (as necessary), additional off-site sediment dewatering and water management activities (if applicable), re-handling of contaminated sediment, excavated materials and Hazardous Waste Quality Material, upland transportation, (off-site treatment if used), and disposal of material.
- .3 For the purposes of Tender, the Contractor shall assume that all non-Hazardous Waste Quality Material and non-salvageable debris will require disposal at a Disposal Facility according to the British Columbia Contaminated Sites Regulation (CSR) industrial land use standards (i.e., waste quality or IL+ waste). IL+ material is to be transported by a hauler licensed for such waste in accordance with Laws and Regulations. Hazardous Waste Quality Materials shall be handled in accordance with Laws and Regulations, including but not limited to, the Hazardous Waste Regulation (HWR), B.C. Reg. 63/88 and the British Columbia Environmental Management Act (SBC 2003, Chapter 53), including amendments, and shall be disposed of at a Hazardous Waste Management Facility authorized to dispose of Class 9 Solid Waste, as defined by HWR, B.C. Reg. 63/88, including amendments and shall be transported by a licensed hauler in accordance with the B.C. Transport of Dangerous Goods Act (TDG) and in accordance with Laws and Regulations for disposal and transport inside or outside of the Province of British Columbia, including but not limited to, the Canadian Transportation of Hazardous Goods Act.
- .4 Treatment of non-Hazardous Waste Quality Material to reduce the level of contamination is allowed, but is not required as part of this Contract. Treatment of Hazardous Waste materials prior to final disposal is preferred, but it shall not

be treated to lower its classification for disposal purposes. If treatment activities are to be completed as part of this Contract, the Contractor shall provide to the Departmental Representative (as part of the Construction Work Plan) a proposal describing the means and methods by which treatment activities will be completed. This proposal must be reviewed by the Departmental Representative prior to conducting treatment activities as part of this Contract.

- .1 Notwithstanding treatment, all dredged material must be disposed of at a Disposal Facility or Hazardous Waste Management Facility.
- .5 The Contractor may choose to conduct additional testing or treatment, at the Contractor's own cost, to re-classify the non-Hazardous Waste Quality Material and obtain acceptance from the Disposal Facility to dispose of contaminated sediment at a lower disposal threshold than CSR industrial IL+ waste. The Contractor shall conduct any proposed re-classification in accordance with Laws and Regulations, including British Columbia Ministry of Environment Technical Guidance No. 1 and 2, and shall still be required to dispose of material at a Disposal Facility.
- .6 Treatment activities (for treatment of non-Hazardous Waste Quality Materials) shall be performed at a Treatment Facility. The Contractor shall not conduct treatment activities at the Contractor's Off-Site Offload Facility unless documentation can be provided that the facility is a Treatment Facility.
- .7 The Departmental Representative reserves the right to inspect all off-site Contractor facilities, including collection of sediment samples for characterization and assessment purposes.
- .8 The Contractor becomes the owner of, and is responsible for, any soil, sediment, excavated material debris, waste, timber jetty components designated for demolition or other material (including materials identified for recycling and/or re-use) once it is loaded on a vehicle, barge, or other vessel for transport to a final Disposal Facility, Treatment Facility, Hazardous Waste Management Facility, or Recycling/Re-use facility.
- .9 The Contractor shall complete final disposal of all dredged material, upland excavation material, and debris, and shall submit its Certificate of Disposal to the Departmental Representative on a monthly basis and after the Departmental Representative has accepted that all dredging, upland excavation and debris removal work is complete. The Contractor shall not move waste from one Disposal Facility or Hazardous Waste Management Facility to another Disposal Facility or Hazardous Waste Management Facility once the Contractor submits the Certificate of Disposal.

1.2 Measurement and Payment Procedures

- .1 Final measurement for offloading, upland transportation, and disposal shall be by the payable in-situ cubic metre (m³), based on comparison of the Contractor's pre-construction and post-construction (for dredging and upland excavation) surveys.

- .2 Payment for offloading, stockpiling, off-site dewatering (if applicable), and upland re-handling of dredged sediment, Hazardous Waste Quality Material, excavated materials and debris, and loading into trucks or railcars in preparation for upland transportation to the Disposal Facility or Hazardous Waste Management Facility will be made by the payable in-situ cubic metre (m³), based on comparison of pre-construction and post-construction (for dredging and upland excavation) surveys, under the unit price tendered for OFFLOADING.
- .3 Payment for upland transportation to the Disposal Facility will be made by the payable in-situ cubic metre (m³), based on comparison of pre-construction and post-construction (for dredging and upland excavation) surveys, under the unit price tendered for UPLAND TRANSPORTATION.
- .4 Payment for upland transportation to the Hazardous Waste Management Facility will be made by the payable in-situ cubic metre (m³), based on comparison of pre-construction and post-construction (for dredging and upland excavation) surveys, under the unit price tendered for HAZARDOUS WASTE UPLAND TRANSPORTATION.
- .5 Payment for disposal of material at the Disposal Facility will be made by the payable in-situ cubic metre (m³), based on comparison of pre-construction and post-construction (for dredging and upland excavation) surveys, under the unit price tendered for NON-HAZARDOUS WASTE DISPOSAL. Payment for the work will be made when the Contractor provides the Certificate of Disposal from the Disposal Facility.
- .6 Payment for disposal of material at the Hazardous Waste Management Facility will be made by the payable in-situ cubic metre (m³), based on comparison of pre-construction and post-construction (for dredging and upland excavation) surveys, under the unit price tendered for HAZARDOUS WASTE DISPOSAL. Payment for the work will be made when the Contractor provides the Certificate of Disposal from the Hazardous Waste Management Facility.
- .7 Final payment will be based on the final measurement of dredged volumes and upland excavation volumes, and final payment shall be reconciled with previous monthly progress payments to determine the amount of final payment.

1.3 Related Sections

- .1 Section 01 11 55 (General Instructions)
- .2 Section 01 33 00 (Submittal Procedures)
- .3 Section 01 35 13.43 (Special Procedures for Contaminated Sites)
- .4 Section 01 35 43 (Environmental Procedures and Sustainability)
- .5 Section 01 45 00 (Quality Control)
- .6 Section 02 41 16.01 (Structure Demolition)
- .7 Section 35 20 23 (Dredging, Barge Dewatering and In-Water Transportation)

1.4 Definitions

- .1 See Section 01 11 55 (General Instructions) for all definitions related to the Contract documents.

1.5 Submittals

- .1 Submit detailed Construction Work Plan in accordance with Section 01 33 00 (Submittal Procedures) within twenty-one (21) calendar days following Notice of Award for review and acceptance by the Departmental Representative.
- .2 As part of the Construction Work Plan, the Contractor shall prepare a section that describes the approach that will be implemented for offloading, upland transportation, and disposal activities. Offloading, upland transportation, and disposal activities shall not begin until: 1) the Construction Work Plan has been reviewed and accepted by the Departmental Representative; and 2) authority-required notifications and review have been completed. At a minimum, the offloading, upland transportation, and disposal approach description shall contain the following information:
 - .1 Contractor Off-Site Offload Facility location, and copies of the Project Permits for the Contractor's Off-Site Offload Facility, and ownership or lease documentation to demonstrate that the activities to be conducted at the Contractor's Off-Site Offload Facility are allowed or accepted by the property owner.
 - .2 Contractor Off-Site Offload Facility layout, including:
 - .1 Existing conditions and facilities, construction facilities, and temporary controls provided by the Contractor.
 - .2 Surface water management features including ditches, catch basins, spill aprons, or other spill prevention and water management measures.
 - .3 Barge landing and offload areas, environmental protection zones, equipment and personnel decontamination areas, wastewater treatment and storage areas, Off-Site Staging and Stockpile Area locations, and other environmental protection areas specified in the Contractor's site-specific Health and Safety Plan, and as described in Section 01 35 13.43 (Special Procedures for Contaminated Sites), Section 01 35 33 (Health and Safety Requirements), and Section 01 35 43 (Environmental Procedures and Sustainability).
 - .3 Reference to the construction work schedule that identifies timing and sequencing for completion of offloading, upland transportation, and disposal activities, as they relate to other major elements of the work.
 - .4 Order and sequence in which the work is to be performed, including a description of equipment to be used and methods of operation.

- .5 Proposed hours of operation for the Contractor Off-Site Offload Facility and associated activities.
- .6 Methods and procedures for completion of offloading, upland transportation, and disposal activities, including means and methods for providing environmental protection as described in Section 01 35 13.43 (Special Procedures for Contaminated Sites) and Section 01 35 43 (Environmental Procedures and Sustainability). Specifically, the Contractor shall provide the following information as part of the Construction Work Plan:
 - .1 Methods, procedures, and equipment to be used for all sediment, hazardous waste, excavated materials, debris, and dredge water offloading from the in-water transportation barge.
 - .2 Spill prevention measures during barge offloading.
 - .3 Water management methods and intended passive barge dewatering, effluent treatment, and sampling methods as applicable for compliance with the Laws and Regulations and EMP/WQMP. Passive barge dewatering is not allowed outside of the TRBCA. Refer to Section 35 20 23 (Dredging, Barge Dewatering and In-Water Transportation) for passive barge dewatering requirements.
 - .4 Methods, procedures, and controls to be used to segregate, handle, store, transport, and dispose of debris, IL+ waste, and Hazardous Waste Quality Material to an appropriate Disposal Facility(ies), in accordance with Laws and Regulations.
 - .5 Location of Treatment Facility and copies of permits, certificates, and approvals for operation of the facility.
 - .6 Methods, procedures, and controls to be used to sample, assess, treat, and potentially reclassify non-hazardous level contaminated sediment at a Treatment Facility. Methods must specifically address how proposed treatment activities meet the requirements of Laws and Regulations, and how dilution of contaminants will be avoided.
 - .7 Methods, procedures, and equipment to be used for loading and upland transport of debris, IL+ waste, and Hazardous Waste Quality Materials to the Treatment and/or Disposal Facility(ies) and Hazardous Waste Management Facility, including procedures for meeting requirements of Laws and Regulations including preventing release of water, dust, and sediment during transportation.
 - .8 Methods of transportation to be used, shipping times, and methods employed to provide safe transportation of the materials from the Contractor Off-Site Offload Facility to the Treatment Facility (as

- necessary) and the Disposal Facility(ies) and Hazardous Waste Management Facility.
- .9 Documentation including traffic management plans, maps showing all routes, and Project Permits of approved trucking routes to and from the Contractor's Off-site Offload Facility and the Wastewater Treatment and Disposal Facility, Treatment Facility(ies) (if treatment is proposed), Disposal Facility(ies), Hazardous Waste Management Facility(ies), recycling or re-use facility, or any other authorized facility where materials are transported.
 - .10 Methods, procedures, and controls to protect existing facilities against damage.
 - .7 Best Management Practices (BMPs) proposed by the Contractor and/or as required by the Environmental Management Plan (EMP) and as described in Section 01 35 13.43 (Special Procedures for Contaminated Sites) and Section 01 35 43 (Environmental Procedures and Sustainability) during completion of offloading, upland transportation, and disposal activities.
 - .3 Within the Construction Work Plan, provide specific information (including end-use) for any materials that are to be recycled and/or re-used by others, in lieu of off-site disposal, for Departmental Representative review and acceptance.
 - .4 As part of the Daily Construction Report, as described in Section 01 33 00 (Submittal Procedures), the Contractor shall keep a daily record of offloading, upland transportation, and disposal activities, including the estimated quantity of contaminated sediment, Hazardous Waste Quality Materials, excavated materials and debris offloaded at the Contractor's Off-Site Offload Facility (including barge displacement measurements off full and empty barges), truck or rail car weight measurements for material sent off site for disposal at the Disposal Facility and Hazardous Waste Management Facility or treatment at the Treatment Facility, certified weight tickets from the Disposal Facility or Hazardous Waste Management Facility, and a summary of other details of the work. The Daily Construction Report shall be submitted to the Departmental Representative the morning following completion of the work for that day. The Daily Construction Report shall be signed by the Contractor's site superintendent and quality control manager.
 - .5 Weekly Reporting: As part of the Contractor's Weekly Construction Report, as described in Section 01 33 00 (Submittal Procedures), the Contractor shall summarize the week's work for offloading, upland transportation, and disposal activities. The Weekly Construction Report shall also identify anticipated work to be completed in the present week, and present the latest barge displacement measurements and estimated weight tonnages for material sent off site for disposal at the Disposal Facility and Hazardous Waste Management Facility or treatment at the Treatment Facility. The Weekly Construction Report shall be signed by the Contractor's site superintendent and quality control manager.

- .6 The Contractor shall submit to the Departmental Representative copies of all Certificates of Treatment supported by laboratory analytical data for the contaminants of potential environmental concern as necessary to account for and demonstrate the treatment and/or Re-classification of non-Hazardous Waste Quality Material. The Contractor shall submit Certificates of Treatment for all material that is treated on a monthly basis and after the Departmental Representative has accepted that all dredging and debris removal work has been completed.
- .7 The Contractor shall submit to the Departmental Representative copies of all Certificates of Disposal to account for and demonstrate the disposal of all material dredged in relation to Section 35 20 23 (Dredging, Barge Dewatering and In-Water Transportation) and debris in relation to Section 02 41 16.01 (Structure Demolition). The Certificates of Disposal must be from the final resting place of the material and must be provided for all material disposed offsite. Certificates of Disposal shall be submitted on a monthly basis and after the Departmental Representative has accepted that all dredging and debris removal work has been completed.
- .8 The Contractor shall submit to the Departmental Representative copies of all manifests, weight tickets, and other documentation to demonstrate and track the transport and final disposition of the sediment, excavated materials, and debris at a Disposal Facility(ies) and Hazardous Waste Management Facility. The documentation shall track the material from the point of leaving the EGD Work Site to final disposal at the Disposal Facility(ies) and Hazardous Waste Management Facility.
- .9 The Contractor shall submit empty barge displacement measurements following offload of each barge of sediment, excavated material, and debris, and corresponding tonnage of material removed at the Contractor's Off-Site Offload Facility.

1.6 References

- .1 British Columbia Ministry of Environment Technical Guidance No. 1 and 2.
- .2 Canadian Transportation of Hazardous Goods Act – Transportation of Hazardous Goods Regulation.
- .3 British Columbia Environmental Management Act – Hazardous Waste Regulation, BC Reg 63/88.
- .4 British Columbia Environmental Management Act – Contaminated Sites Regulation, BC Reg. 375/96.

1.7 Contractor Quality Control

- .1 The Contractor is responsible for providing all necessary quality controls to successfully complete the work.

- .2 The Departmental Representative, may at the Departmental Representative's sole discretion, periodically inspect the offloading, upland transportation, and disposal operations (and treatment operations as applicable) to verify compliance with the Contract documents, Laws and Regulations, and all permit requirements.
- .3 The Contractor shall provide Daily and Weekly Construction Reports that include description of offloading, upland transportation, and disposal activities, and photo-documentation of these activities.

1.8 Environmental Protection

- .1 Offloading, upland transportation, and disposal activities shall be performed in accordance with environmental protection requirements, as stated in Section 01 35 13.43 (Special Procedures for Contaminated Sites) and Section 01 35 43 (Environmental Procedures and Sustainability), the EMP, the Environmental Protection Plan, and in accordance with the Project Permits and the Laws and Regulations.

1.9 Regulatory Requirements

- .1 Material transported by barge requires that the Contractor obtain an authorization from the Queen's Harbour Master (QHM) or other harbour authority pursuant to the Canada Marine Act and the Laws and Regulations.
- .2 The Contractor shall verify that sediment, Hazardous Waste, excavated materials, and debris offloading, handling, dewatering, segregation, upland transport, treatment (as applicable), and disposal is performed in compliance with Laws and Regulations including, but not limited to the references cited within the Specifications, including the Canadian Transportation of Hazardous Goods Act for transport of materials inside and outside of the Province of British Columbia.

1.10 Location, Permitting, and Tracking

- .1 The Contractor shall provide, as part of the Construction Work Plan, the locations of all proposed Treatment and Disposal Facilities.
- .2 A Disposal Facility, Treatment Facility, and Hazardous Waste Management Facility are all defined in Section 01 11 55 (General Instructions). The Contractor shall provide documentation acceptable to the Departmental Representative that the materials can be accepted at the Disposal Facility, Hazardous Waste Management Facility, and Treatment Facility. Copies of all valid and subsisting permits, certificates, approvals, or other form of authorization issued by a province or territory for the facility must be submitted to the Departmental Representative within ten (10) working days of award of the Contract.
- .3 For all Disposal Facilities, Hazardous Waste Management Facilities, and Treatment Facilities proposed by the Contractor, the Contractor shall provide the following information:

- .1 Location and owner of proposed Disposal Facility, Hazardous Waste Management Facility, and Treatment Facility.
 - .2 Documentation that proposed Disposal Facility, Hazardous Waste Management Facility, and Treatment Facility is authorized in accordance with the Laws and Regulations and suitable for acceptance, treatment, and disposal of the waste.
 - .3 Methodology of treatment, as appropriate.
 - .4 Elimination of liability and acceptance of ownership at the Disposal Facility and Hazardous Waste Management Facility.
 - .5 Type of disposal and/or treatment to be provided by the Disposal Facility, Hazardous Waste Management Facility, and Treatment Facility.
- .4 All contaminated waste and Dredge Debris must be disposed of at the off-site Disposal Facility and Hazardous Waste Management Facility identified by the Contractor and accepted by the Departmental Representative. If the proposed Disposal Facility or Hazardous Waste Management Facility is not acceptable to the Departmental Representative, the Contractor must identify an alternate off-site Disposal Facility or Hazardous Waste Management Facility that is acceptable to the Departmental Representative, and must use the accepted alternate Disposal Facility or Hazardous Waste Management Facility for disposal at no additional cost to PWGSC.
 - .5 All contaminated waste may be treated at the off-site Treatment Facility identified by the Contractor and accepted by the Departmental Representative. If the proposed Treatment Facility is not acceptable to the Departmental Representative, the Contractor must identify an alternate off-site Treatment Facility that is acceptable.
 - .6 No Disposal Facility or Hazardous Waste Management Facility shall be created for the specific use of this Contract.
 - .7 Except where salvage and re-use in the work is specified, the Contractor becomes the owner of, and is responsible for, any soil, sediment, debris, waste, timber jetty components designated for demolition or other material (including material that the Contractor identifies for recycling and/or re-use in lieu of off-site disposal) once it is removed, dredged, or excavated to be loaded onto a vehicle, barge, or other vessel for transport to a Contractor Off-Site Offload Facility, Disposal Facility, Treatment Facility, Hazardous Waste Management Facility, or Recycling/Re-use facility.

1.11 Inspection of Facilities

- .1 The Departmental Representative, at the Departmental Representative's sole discretion, may inspect the Contractor Off-Site Offload Facility (including Off-Site Staging and Stockpile Areas), Treatment Facility, Hazardous Waste Management Facility and Disposal Facility(ies) proposed by the Contractor prior to the start of construction, and at any time during completion of offloading,

upland transportation, and disposal activities to check that the Contractor's Off-Site Offload Facility, Treatment Facility, Hazardous Waste Management Facility, and Disposal Facility meet the requirements of the Specifications.

- .2 The Contractor shall provide access to the Departmental Representative or designee to inspect the facility(ies), including providing health and safety orientation and access to machinery to facilitate sampling, assessment, and documentation.

1.12 Misplaced Material

- .1 The Contractor shall take ownership and assume liability for misplacement of all waste and debris material generated as part of this Contract at the point of loading the material into the Contractor's barge(s) at the EGD Work Site. As such, the Contractor shall assume liability for misplacement of all waste and debris material, and will be required to notify and coordinate with appropriate authorities if material is misplaced during transport to the Contractor's Off-Site Offload Facility or during completion of offloading, transport, and disposal activities.
- .2 The Contractor shall promptly recover and remove misplaced materials. The Contractor shall give immediate verbal notice, followed by written confirmation, of the description and location of such misplaced materials to the Departmental Representative and shall mark and buoy such misplaced materials until they are removed.
- .3 Should the Contractor refuse, neglect, or delay compliance with this requirement, such misplaced materials may be removed by the Departmental Representative, in which case the cost of such removal operations shall be paid by the Contractor.
- .4 The Contractor shall be responsible for any fees, fines, penalties, or other costs resulting from misplaced materials and shall not pass costs to the Departmental Representative.

2. PART 2 – PRODUCTS – NOT USED

3. PART 3 – EXECUTION

3.1 Sequencing

- .1 Offloading, upland transportation, and disposal sequencing requirements are discussed in Section 01 11 55 (General Instructions). This Section describes more detailed sequencing considerations associated with offloading, upland transportation, and disposal activities.
- .2 Offloading, upland transportation, and disposal activities shall not begin until the Departmental Representative has reviewed and accepted the Contractor's Construction Work Plan.

3.2 Waste Offloading

- .1 The Contractor shall employ all BMPs as described in Section 01 35 13.43 (Special Procedures for Contaminated Sites), Section 01 35 43 (Environmental Procedures and Sustainability), the EMP, and included in the Project Permits when performing waste offloading activities.
- .2 The Contractor shall check to verify that in-water transportation barges are watertight at all times.
- .3 The Contractor shall offload in-water transportation barges at the Contractor's Off-Site Offload Facility in a manner that prevents spillage of waste to the water. A spill apron (or equivalent spill prevention measure) shall be used during all offloading activities.
- .4 No sediment, Hazardous Waste Quality Material, excavated materials, debris, or water transfer can begin at the Contractor's Off-Site Offload Facility until the spill prevention measures are reviewed by the Departmental Representative and determined to be in place.
- .5 Any spillage on the spill apron shall be removed as soon as practicable and properly disposed. Any such spillage outside of the Off-Site Staging and Stockpile Area shall be promptly cleaned up.
- .6 It is the Contractor's responsibility to determine the structural capacity of the Contractor's Off-Site Offload Facility that is proposed for offloading, staging, and stockpile use. The maximum structural capacity of these facilities shall not be exceeded by the Contractor.

3.3 Off-Site Staging and Stockpile Area

- .1 The Contractor shall employ all BMPs as described in Section 01 35 13.43 (Special Procedures for Contaminated Sites), Section 01 35 43 (Environmental Procedures and Sustainability), the EMP, and included in the Project Permits when doing work at the Off-Site Staging and Stockpile Area.
- .2 The Contractor shall treat, if applicable, and dispose of all contaminated waste and Dredge Debris as soon as practical. Materials may not be stockpiled for extended periods of time unless otherwise approved by the Departmental Representative.
- .3 The Contractor shall construct, operate, and maintain the Off-Site Staging and Stockpile Area such that all effluent drainage water, stormwater, or other form of discharges from stockpiled sediment, Hazardous Waste Quality Material, excavated materials, and debris are collected for treatment and proper disposal.
 - .1 No direct discharge of untreated effluent from the Off-Site Staging and Stockpile Area to the receiving waters is allowed.
 - .2 All effluent from the Off-Site Staging and Stockpile Area shall be collected, treated, and discharged in accordance with the EMP/Water

Quality Monitoring Plan (WQMP), the Laws and Regulations, and conditions of the Project Permits. If the water quality criteria cannot be met, effluent may not be discharged must be transported to the designated Treatment and Disposal Facility.

- .3 The Contractor may elect to construct a water treatment system at the EGD Work Site and shall demonstrate in the Construction Work Plan compliance with water quality requirements to discharge treated effluent back to the receiving waters.
- .4 The Contractor is allowed to segregate Dredge Debris from contaminated sediment or excavated materials, in order to dispose of the Dredge Debris at a Disposal Facility that will accept Dredge Debris as non-Industrial Land Use (IL+ waste) quality material (i.e., demolition debris Disposal Facility). Dredge Debris is not allowed to be segregated from material removed within the Hazardous Waste Area as shown on the Drawings.
- .5 The Contractor may propose to mix additives with the waste to bind available water during offloading, stockpiling, or additional off-site dewatering activities. However, the Contractor is solely responsible for determining whether the Disposal Facility or Hazardous Waste Management Facility will accept the contaminated sediment or excavated materials with additives for disposal. The Contractor has sole responsibility for proper storage, handling, and containment of additives. The Contractor also has sole responsibility for cleanup and damage costs related to the use of additives.
- .6 Upon completion of the work, the Contractor shall remove all vestiges of waste, liner, pump, discharge pipe, and other materials and clean up the Off-Site Staging and Stockpile Area to the pre-project condition.

3.4 Transportation to Treatment Facility, Hazardous Waste Management Facility, and Disposal Facility

- .1 The Contractor shall employ all BMPs as described in Section 01 35 13 43 (Special Procedures for Contaminated Sites), Section 01 35 43 (Environmental Procedures and Sustainability), the EMP, and included in the Project Permits when transporting waste to the Treatment Facility, Hazardous Waste Management Facility, and Disposal Facility.
- .2 Once offloaded at the Contractor Off-Site Offload Facility, the material may be barged, trucked, or taken by rail to the appropriate Treatment Facility, Hazardous Waste Management Facility, or Disposal Facility.
- .3 The Contractor shall be responsible for the safe transport of all waste materials (including all dredged sediment, excavated materials, and debris) in accordance with Laws and Regulations and requirements of the Project Permits.
- .4 Waste transported from the Contractor's Off-Site Offload Facility shall be tarped and adequately secured in watertight containers or trucks with watertight sealed

endgates, to minimize release of odors and dust and prevent any spillage, to the satisfaction of the Departmental Representative.

- .5 Both IL+ waste and Hazardous Waste Quality Materials are to be transported by licensed haulers for such waste classes.
- .6 The Contractor is responsible for preparing and signing all manifests and obtaining all approvals and Project Permits for the transportation of all materials. Waste manifests shall be provided to the Departmental Representative. The Contractor must provide sufficient documentation to track all material from the EGD Work Site, to the Treatment Facility (as necessary), Hazardous Waste Management Facility, and Disposal Facility.

3.5 Treatment, Destruction, and Disposal

- .1 Treatment methods include bioremediation, thermal desorption, and incineration. Treatment does not include blending, mixing, or dilution.
- .2 Treatment, Re-classification, and Destruction of contaminated sediment, excavated materials, or Hazardous Waste Quality Materials is permitted under this Contract, and treatment and/or destruction activities must be completed in accordance with the Specifications and Laws and Regulations. The Departmental Representative reserves the right to inspect treatment and destruction activities that are being completed at the Treatment Facility at any time, including independent sampling and testing of waste. The Contractor shall provide all Certificates of Treatment and Certificates of Disposal prior to final disposal of waste at the Disposal Facility and issuance of final Certificates of Disposal.
- .3 Treatment of waste must be performed at a Treatment Facility. Completion of treatment activities at the Contractor's Off-Site Offload Facility is not allowed unless the Contractor can provide permit and approval documentation indicating that the Contractor's Off-Site Offload Facility is a Treatment Facility.
- .4 The Contractor shall not change the location of its Treatment Facility, Hazardous Waste Management Facility, or Disposal Facility without prior notification to, and review and acceptance by, the Departmental Representative.
- .5 Soil or other material sent to a Treatment Facility must be disposed of at a Disposal Facility, regardless of the waste classification of the material following treatment. All Hazardous Waste quality material removed from the EGD Work Site must be disposed of at a Hazardous Waste Management Facility, regardless of whether the material has been treated or not.
- .6 Soil or other material sent to a Disposal Facility or Hazardous Waste Management Facility must be permanently stored at that facility.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 The Contractor shall construct engineered caps (including areas of sand, filter, rock armour, and impermeable geosynthetic materials) at the EGD Work Site, as shown on the Drawings, following completion of Required Dredging and Contingency Re-Dredging (as necessary) activities in order to isolate potential remaining contamination and to construct stable surfaces and slopes that are capable of resisting erosive forces associated with propeller scour, vessel wakes, and wind waves.
 - .1 The Contractor shall be responsible for re-design of engineered cap layers if Required Dredging and/or Contingency Re-Dredging activities are not completed to the Required Dredge Elevations and grades or Contingency Re-Dredge thicknesses due to potential sub-grade variability (i.e., encountering hard material such as glacial till or bedrock within the Dredge Prism). Re-design of cap layers shall be completed to meet the minimum thickness requirements as shown on the Drawings. The Contractor shall account for this potential re-design within the unit price for tender items included in this Section of the Specifications.
 - .2 If re-design of capping layers is required following completion of Required Dredging and/or Contingency Re-Dredging activities, the Contractor shall complete and submit the proposed re-design of the engineered cap layers to the Departmental Representative for review and acceptance prior to completion of engineered cap material placement activities in the re-design areas.
- .2 The primary purpose of performing Engineered Capping activities is to contain and isolate underlying contaminated materials. The final surface elevations and grades of the engineered cap have also been designed to align with the existing rock armour surface located outside of the Temporary Re-suspension Barrier Containment Area (TRBCA). Therefore, the final slope elevations and grades as shown on the Drawings must be achieved (within the specified tolerances), and under-placement or excessive over-placement of engineered cap material is not acceptable.
- .3 The Contractor shall construct several Engineered Cap Types, as shown and described on the Drawings, and as composed of the cap material types described in the Specifications.
- .4 Salvaged on-site rock material may be used as rock armour material provided it is approved for use by the Departmental Representative, meets the requirements of the Specifications including the gradation requirements, and if the salvaged rock is cleaned of all contaminated sediment.

- .5 This work includes furnishing all labour, materials, tools, equipment, and incidentals required for Engineering Capping in support of the overall project as described in the Drawings and in the Specifications.
- .6 The Contractor shall obtain approval from the Departmental Representative for the potential re-use of salvaged armor stone materials at the EGD Work Site or potential re-use at an off-site location. All materials not approved for re-use on-site or off-site shall be disposed of at the approved Disposal Facility as part of this project. The quantity of salvageable material, as approved by the Departmental Representative, is expected to be minimal due to the contaminated nature of the sediment within the EGD Work Site. For bid pricing purposes, the Contractor shall assume no re-use of salvaged armor stone materials.
- .7 Table 35 37 10-1 provides the estimated engineered cap placement pay volumes, and is presented for Contractor convenience only. The Contractor is responsible for identifying the need for, and for all costs associated with, supply and placement of supplemental volumes of Capping Materials to address loss of material, settlement and consolidation, and/or risk of material placement outside the designated areas as shown on the Drawings.

Table 35 37 10-1

Cap Material Surface Area and Volume

Area / Subarea	Surface Area (m²)	Sand Material Type 1 (m³)	Sand Material Type 2 (m³)	Sand Material Type 3 (m³)	Filter Material (m³)	Armour Material, 0.3 m Rock (m³)	Armour Material, 0.15 m Rock (m³)	Impermeable Geosynthetic Material (m²)
TRBCA	12,500	8,300	14,500	600	6,300	6,700	2,000	400
Hazardous Waste Area	300	0	400	0	200	300	0	0
TOTAL	12,800	8,300	14,900	600	6,500	7,000	2,000	400

Notes:

- (1) Cap placement volumes presented in this table are estimated only and shall not be used for basis of measurement and payment. Refer to the Unit Price Table for tender volumes associated with this work.
- (2) Cap placement volumes include Payable Over-Placement Allowances, as described in the Specifications and as shown on the Drawings.
- (3) The Hazardous Waste Area is a subarea within the TRBCA. The TRBCA cap material surface area and volume quantities exclude the Hazardous Waste Area quantities. Refer to Section 01 11 55 (General Instructions) for scheduling constraints.

1.2 Measurement and Payment Procedures

- .1 Measurement and payment for Engineered Capping shall be by the in-situ cubic metre (m³) price tendered for SAND MATERIAL TYPE 1, SAND MATERIAL

TYPE 2, SAND MATERIAL TYPE 3, FILTER MATERIAL, ARMOUR MATERIAL (0.3 m ROCK), and ARMOUR MATERIAL (0.15 m ROCK) as calculated by comparison of the Contractor's pre- and post-placement surveys (for Engineered Capping activities). Payment shall include all costs in connection with supply and placement of Engineered Capping materials including all equipment, labour, materials, and all work and material not covered in other payment items.

- .2 Measurement and payment for impermeable geosynthetic material shall be by the in-situ square metre (m²) price tendered for IMPERMEABLE GEOSYNTHETIC MATERIAL. Payment shall include all costs in connection with supply and placement of impermeable geosynthetic materials including all equipment, labour, materials, and all work and material not covered in other payment items.
- .3 The actual in-situ volume of Engineered Capping material that the Contractor places to achieve the required Minimum Required Thicknesses or required elevations and grades is dependent upon the Contractor's placement means and methods. The Payable Over-Placement Allowance is the maximum extent of placement above the Minimum Required Thickness (or required elevations and grades) that has been accounted for in the Unit Price Table. The Contractor shall select its means and methods to conduct its placement work to stay within the Payable Over-Placement Allowance limits to the extent practicable. Should the Contractor's placement means and methods result in Excessive Overplacement, the Contractor shall account for potential Excessive Overplacement volume in its bid prices. If the Contractor's placement operations result in Excessive Overplacement, the Departmental Representative may direct the Contractor to remove Excessive Overplacement at the Contractor's own cost.
- .4 Final payment will be based on the final measurement of volume of material placed, and final payment shall be reconciled with previous monthly progress payments for Contractor Subareas to determine the amount of final payment. The Contractor shall propose Contractor Subareas for Engineered Capping progress payments in the Construction Work Plan.
- .5 Excessive overlap of impermeable geosynthetic material will not be paid for separately. If the Contractor's means and methods require excessive overlap, the Contractor shall account for this unpaid area within the unit price tendered for this item.

1.3 Related Sections

- .1 Section 01 11 55 (General Instructions)
- .2 Section 01 33 00 (Submittal Procedures)
- .3 Section 01 35 13.43 (Special Procedures for Contaminated Sites)
- .4 Section 01 35 43 (Environmental Procedures and Sustainability)
- .5 Section 01 45 00 (Quality Control)

- .6 Section 02 21 13 (Surveying and Positioning Control)
- .7 Section 35 20 23 (Dredging, Barge Dewatering and In-Water Transportation)
- .8 Section 35 37 10.01 (Residuals Management Cover Placement)

1.4 Definitions

- .1 See Section 01 11 55 (General Instructions) for all definitions related to the Contract documents.

1.5 Submittals

- .1 Submit a detailed Construction Work Plan in accordance with Section 01 33 00 (Submittal Procedures) within twenty-one (21) calendar days following Notice of Award for review and acceptance by the Departmental Representative.
- .2 As part of the detailed Construction Work Plan, in accordance with Section 01 33 00 (Submittal Procedures), the Contractor shall prepare a section that describes the approach that will be implemented for Engineered Capping activities. Engineered Capping activities shall not begin until: 1) the Construction Work Plan has been reviewed and accepted by the Departmental Representative; and 2) authority-required notifications and review have been completed. At a minimum, the Engineered Capping approach description shall contain the following information:
 - .1 Order and sequence in which the work is to be performed, including a description of equipment to be used and methods of operation.
 - .2 Reference to the construction work schedule that identifies timing and sequencing for completion of Engineered Capping activities, as they relate to other major elements of the work.
 - .3 Methods and procedures for placement of Engineered Cap Types, including impermeable geosynthetic material placement, and spillage control measures.
 - .4 The Contractor shall provide documentation of the origin (e.g., supplier, location, environmental quality) of the imported sand, filter, rock armour, and impermeable geosynthetic materials and testing certificates, as described in this Specification, provided by the supplier for Departmental Representative review prior to the start of work.
 - .5 The Contractor shall provide identification and certification documents for the independent, certified analytical laboratory that will conduct required testing for all Engineered Capping materials that will be used in the work, as described in this Specification.
 - .6 Methods and procedures for completion of Engineered Capping activities shall include means and methods for providing Environmental Protection, as described in Section 01 35 13.43 (Special Procedures for Contaminated

- Sites) and Section 01 35 43 (Environmental Procedures and Sustainability).
- .3 Samples of sand materials (types 1, 2, and 3), filter material, and impermeable geosynthetic material to be used for the work shall be provided to the Departmental Representative a minimum of two (2) weeks in advance of use at the EGD Work Site. Samples shall consist of approximately 20 kilograms (kg) of each type of sand material and a representative sample of the impermeable geosynthetic material. Each sample of sand material should be composited from no less than five subsamples taken throughout any one source. The Contractor shall verify that the samples are representative of all materials to be imported and used for placement at the EGD Work Site.
 - .4 The Contractor shall present specific details indicating compliance with the requirements in this Section, regarding impermeable geosynthetic materials proposed for use at the EGD Work Site as part of the Construction Work Plan for Departmental Representative acceptance.
 - .5 The Contractor shall obtain laboratory test reports, as described in these Specifications. All laboratory test results shall be submitted to the Departmental Representative no less than two (2) weeks prior to the start of Engineered Capping activities.
 - .6 Daily Reporting: As part of the Contractor's Daily Construction Report, as described in Section 01 33 00 (Submittal Procedures), the Contractor shall keep a daily record of the area(s) where Engineered Capping materials have been placed, the estimated quantity of material placed (including barge displacement measurements), daily Progress Surveys, certified weight tickets from the supplier, and a summary of other details of the work. This daily record shall be submitted to the Departmental Representative on the morning following completion of the work for that day. The Daily Construction Report shall be signed by the Contractor's site superintendent and quality control manager.
 - .7 Weekly Reporting: As part of the Contractor's Weekly Construction Report, as described in Section 01 33 00 (Submittal Procedures), the Contractor shall summarize the week's work in Engineered Capping activities. The Weekly Construction Report shall also identify anticipated work to be completed in the present week, and present the latest Post-Construction (i.e., post-placement) Survey and Progress Surveys. The Weekly Construction Report shall be signed by the Contractor's site superintendent and quality control manager.

1.6 References

- .1 American Society for Testing and Materials International (ASTM):
 - .1 ASTM D5994, Standard Test Method for Measuring Core Thickness of Textured Geomembrane.
 - .2 ASTM D5199, Standard Test Method for Measuring the Nominal Thickness of Geosynthetics.

- .3 ASTM D6693, Standard Test Method for Determining Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polypropylene Geomembranes.
- .4 ASTM D1004, Standard Test Method for Tear Resistance (Graves Tear) of Plastic Film and Sheeting.
- .5 ASTM D4833, Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products.
- .6 ASTM D5397, Standard Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test.

1.7 Quality Control

- .1 The Contractor is responsible for providing all necessary quality controls to successfully complete the work.
- .2 The Departmental Representative may, at the Departmental Representative's sole discretion, inspect the Engineered Capping activities for quality assurance purposes. Departmental Representative inspection shall in no way release the Contractor from its obligation to comply with the Specifications and all permit requirements, and shall in no way be construed as acceptance of work.

1.8 Environmental Protection

- .1 Engineered Capping activities shall be performed in accordance with environmental protection requirements, as stated in Section 01 35 13.43 (Special Procedures for Contaminated Sites), and Section 01 35 43 (Environmental Procedures and Sustainability), the Environmental Management Plan (EMP), the Environmental Protection Plan, and in accordance with the Laws and Regulations and Project Permits.

1.9 Inspection of Materials

- .1 Barges of imported sand materials (types 1, 2, and 3), filter, and rock armour materials shall be visually inspected by the Contractor upon delivery. Materials shall be inspected for the presence of foreign, recycled, or reprocessed material or debris, to verify that imported materials are natural, native, virgin materials and free of contaminants. The presence of such materials is to be reported to the Departmental Representative, who will determine if the import materials are acceptable. The Contractor will inspect the impermeable geosynthetic material for quality before installation. Any degradation or damage to the impermeable geosynthetic material is to be reported to the Departmental Representative, who will determine if the import materials are acceptable. In the event of rejections, it shall be the responsibility of the Contractor to remove all rejected material from the EGD Work Site at the Contractor's own cost. Acceptance or rejection of import materials brought to the EGD Work Site will be provided by the

Departmental Representative within 24 hours of material being brought to the EGD Work Site.

- .2 The Departmental Representative may, at any and all times, perform an independent inspection of sand, filter, rock armour, and impermeable geosynthetic materials. Materials may be rejected if identified as substandard or if test results show it to be substandard, based on the sole discretion of the Departmental Representative. All sand, filter material, and rock armour materials may be segregated for testing based on appearance or odor. Segregated materials may be tested according to designated procedures at the Departmental Representative's discretion. The impermeable geosynthetic material may be inspected at any time and may be rejected for use at the EGD Work Site if damage is observed by the Departmental Representative.
- .3 Inspection of Source: The borrow source(s) for all Capping Materials shall be inspected by the Contractor. During such inspection, the Contractor shall verify that the materials to be delivered to the EGD Work Site will meet the appropriate requirements of the Specifications. The Contractor shall provide notice to the Departmental representative within five (5) calendar days of such inspections. At the discretion of the Departmental Representative, the Departmental Representative may accompany the Contractor to witness such inspections. This witnessing shall in no way release the Contractor from complying with the Specifications, and shall in no way be construed as approval of any particular source of material.

1.10 Regulatory Requirements

- .1 See Section 01 11 55 (General Instructions) for regulatory requirements pertaining to this Contract.

1.11 Misplaced Material

- .1 Should the Contractor, during the execution of the work, lose, dump, throw overboard, sink, or misplace any material, dredge, barge, machinery, or appliance (collectively termed as misplaced materials), the Contractor shall promptly recover and remove the misplaced materials. The Contractor shall give immediate verbal notice, followed by written confirmation, of the description and location of such misplaced materials to the Departmental Representative and shall mark and buoy such misplaced materials until they are removed.
- .2 Should the Contractor refuse, neglect, or delay compliance with this requirement, such misplaced materials may be removed by the Departmental Representative, in which case the cost of such removal operations shall be paid by the Contractor.
- .3 The Contractor shall be responsible for any fees, fines, penalties, or other costs resulting from misplaced materials, and shall not pass costs to the Departmental Representative.

2. PART 2 – PRODUCTS

2.1 Sand Material Type 1

- .1 Sand material type 1 shall meet the testing requirements as described in the Specifications.
- .2 Sand material type 1 shall not contain any synthetic or recycled material or debris.
- .3 Sand material type 1 shall be granular material, free of organic material, that conforms to the gradation stipulated in Table 35 37 10-2. It is anticipated that dredged Fraser River sand will not meet the sand material type 1 gradation requirements.

Table 35 37 10-2

Sieve Designation (mm)	Percent Passing
37.5	100
19	90 – 100
4.75	60 – 85
1.18	20 – 70
0.42	10 – 55
0.15	0 – 35
0.075	0 – 5

2.2 Sand Material Type 2

- .1 Sand material type 2 shall meet the testing requirements as described in the Specifications.
- .2 Sand material type 2 shall not contain any synthetic or recycled material or debris.
- .3 Sand material type 2 shall be a mixture of sand and gravelly material, free of organic material, and shall be composed of crushed granular materials that conform to the gradation as provided in Table 35 37 10-3.
- .4 Fractured faces to be greater than or equal to 50% in accordance with MoTI test method SS 202 Fractured Faces Method A (note: Method A only applies for portion of material greater than 4.75 millimetres [mm] in size).

Table 35 37 10-3

Sieve Designation (mm)	Percent Passing
75	100
50	80 – 100
37.5	70 – 100
19	50 – 95
9.5	30 – 85
4.75	20 – 65
2.36	15 – 50
1.18	10 – 40
0.3	5 – 20
0.075	0 – 5

2.3 Sand Material Type 3

- .1 Sand material type 3 shall meet the testing requirements as described in the Specifications.
- .2 Sand material type 3 shall not contain any synthetic or recycled material or debris.
- .3 Sand material type 3 shall be a mixture of sand and gravelly material, free of organic material, and shall be composed of a mixture of crushed granular materials that conform to the gradation as provided in Table 35 37 10-4.
- .4 Fractured faces to be greater than or equal to 50% in accordance with MoTI test method SS 202 Fractured Faces Method A (note: Method A only applies for portion of material greater than 4.75 mm in size).

Table 35 37 10-4

Sieve Designation (mm)	Percent Passing
75	100
50	80 – 100
37.5	70 – 90
19	50 – 75
9.5	30 – 65
4.75	20 – 50
2.36	15 – 40
1.18	10 – 30
0.3	5 – 15
0.075	0 – 5

2.4 Filter Material

- .1 Filter material shall meet the testing requirements as described in the Specifications.
- .2 Filter material shall not contain any synthetic or recycled material or debris.
- .3 Filter material shall be a gravelly material, free of organic material, and shall be composed of crushed granular materials. Filter material shall conform to the British Columbia Ministry of Transportation and Infrastructure specifications for Open Graded Base OGB 75 millimetres (OGB 75 mm), gradation as shown in Table 35 37 10-5 for convenience.
- .4 Fractured faces to be greater than or equal to 50% in accordance with MoTI test method SS 202 Fractured Faces Method A (note: Method A only applies for portion of material greater than 4.75 mm in size).

Table 35 37 10-5

Sieve Designation (mm)	Percent Passing
75	100
50	70 – 100
37.5	50 – 85
19	15 – 55
6.3	0 – 20
2.36	0 – 10
0.3	0 – 8
0.075	0 – 5

2.5 Armour Material: 0.15 m Rock

- .1 Armour material: 0.15 m rock must meet the testing requirements as described in these Specifications.
- .2 Armour material: 0.15 m rock shall not contain any synthetic or recycled material or debris.
- .3 Armour material: 0.15 m rock shall consist of average diameter (D₅₀) material of approximately 0.15 metres (m).
- .4 Armour material: 0.15 m rock shall conform to the British Columbia Ministry of Transportation and Infrastructure specifications (Standard Specification for Highway Construction, Table 205-B) for Class 10 kilogram riprap.

2.6 Armour Material: 0.3 m Rock

- .1 Armour material: 0.3 m rock must meet the testing requirements as described in these Specifications.
- .2 Armour material: 0.3 m rock shall not contain any synthetic or recycled material or debris.
- .3 Armour material: 0.3 m rock shall consist of D₅₀ material of approximately 0.3 metres (m).
- .4 Armour material: 0.3 m rock shall conform to the British Columbia Ministry of Transportation and Infrastructure specifications (Standard Specification for Highway Construction, Table 205-B) for Class 25 kilogram riprap.

2.7 Impermeable Geosynthetic Material

- .1 Impermeable geosynthetic material must be of satisfactory physical and compositional integrity to support the capping materials that will be placed above and beneath the geosynthetic material, and shall be newly manufactured. Impermeable geosynthetic material refers to geomembrane material or a combination of geotextile material and geomembrane material that meets the requirements of the Specifications. The Contractor shall submit material specifications (from geosynthetic material manufacturer) for proposed impermeable geosynthetic material, and evidence of successful previous use of a similar product for similar applications, as part of the Construction Work Plan for Departmental Representative review and acceptance.
- .2 An impermeable geosynthetic material such as a textured geomembrane liner, or a dual layer combination of impermeable geosynthetic material and geotextile, as accepted by the Departmental Representative, may be used.
- .3 The impermeable geosynthetic material must be impermeable and strong enough to act as a barrier and filter layer between the underlying sediment and the sand material (all types), filter material, armour rock, as shown on the Drawings. The impermeable geosynthetic material must conform to or exceed the following ASTM standards:
 - .1 Minimum thickness of 2 mm or greater to ASTM D5994/D5199.
 - .2 Minimum tensile strength at break of 21 N/mm to ASTM D6693.
 - .3 Minimum tear resistance of 249 N to ASTM D1004.
 - .4 Minimum puncture resistance of 534 N to ASTM D4833.
 - .5 Minimum stress crack resistance of 300 hours to ASTM D5397.
- .4 The impermeable geosynthetic material shall be flexible such that it can be temporarily attached to the existing sheet pile bulkhead wall during material placement and wrap around the top and bottom of the material layers, as shown on the Drawings.

- .5 The impermeable geosynthetic material must have sufficient frictional capabilities, such as a textured surface that is capable of standing on up to a 2 horizontal to 1 vertical (2H:1V) slope, and supporting placement of capping materials at 2H:1V slopes, as shown in the Drawings. Anchoring to the post-dredge sediment surface may be used to assist with slope stability, but the impermeable geosynthetic material shall not be fastened to the existing sheet pile bulkhead wall, except for temporary fastening during sand material placement as required. Geotextile or geogrid materials may be used in conjunction with an impermeable geosynthetic material to provide additional slope stability.
- .6 The impermeable geosynthetic material shall be resistant to chemical degradation in a marine environment.

2.8 Sand Material Type 1, Sand Material Type 2, Sand Material Type 3, Filter Material, and Rock Armour Material Testing

- .1 Sand material chemical concentrations must be lower than the Canadian Council for Ministers of the Environment (CCME) Sediment Quality Guidelines “Probable Effects Levels” (PEL) and British Columbia Contaminated Sites Regulation (BC CSR) Generic Numerical Sediment Criteria for typical sites. For Light Extractable Petroleum Hydrocarbons (LEPH) and Heavy Extractable Petroleum Hydrocarbons (HEPH), concentrations must be lower than the CSR numerical soil standards for residential land use.
- .2 Based on material sources and results of the testing, the Departmental Representative may request that additional parameters be analyzed for the sand materials (types 1, 2, and 3). The frequency of the testing may also be increased or decreased by the Departmental Representative if considered appropriate based on the results of the testing or visual assessment of the imported material.
- .3 The Contractor shall provide information regarding the source of the sand material to the Departmental Representative. The Contractor shall also collect one sample for every one thousand (1,000) m³ of sand material imported to the EGD Work Site and analyze the samples for metals, LEPH, and HEPH. The frequency of testing may be increased or decreased by the Departmental Representative if considered appropriate based on the results of testing or visual assessment of imported material.
- .4 The laboratory selected to undertake analysis must have the appropriate accreditation with ISO/IEC Standard 17025. The Contractor shall submit documentation demonstrating that the laboratory is accredited for the specific parameters to be analysed and the analytical methods.
- .5 The Contractor shall provide the sand material testing data and reports to the Departmental Representative for review prior to import of the material to the EGD Work Site, in accordance with the timeline described in the Specifications.
- .6 Sand materials (types 1, 2, and 3) will be rejected by the Departmental Representative, at the Contractor’s sole cost and responsibility, if the Specification is not met.

- .7 Chemical testing of filter material and rock armour materials is required to assess the acid rock drainage (ARD) and metal leaching (ML) potential of the materials as this can negatively impact water quality. The following laboratory tests shall be performed an independent, certified testing laboratory, hired by the Contractor:
 - .1 ARD Potential: Acid Base Accounting (ABA) testing.
 - .2 ML Potential: Multi-Element Analysis (ICP-MS).
 - .3 Shake Flask Extraction (SFE) testing.
- .8 Guidelines for ARD/ML have been developed for mine sites in Canada and shall be used as general guidance in assessing ARD and ML potential for non-mining projects.
- .9 Results of laboratory testing of metal leaching shall be compared, as a screening benchmark, with the British Columbia Water Guidelines (BCWG) criteria and the CCME guidelines for freshwater (maximum and 30-day) and marine aquatic life. If tests results do not meet requirements for acceptance by these guidelines, then the Contractor shall submit a letter of professional opinion regarding suitability recommendation for use of material at the EGD Work Site. Acceptance will be at the discretion of the Departmental Representative. If the cap material is not accepted, the Contractor will be required to provide the cap material from an alternate source that is acceptable and conforms to the requirements in this Section, at the Contractor's own cost.
- .10 The following additional tests are required to assess durability of filter material and rock armour materials:
 - .1 Specific gravity per ASTM D6437; a bulk density of the material shall be determined using results of this specific gravity analysis.
 - .2 Aggregate soundness per ASTM D5240.
- .11 One sample for every one thousand (1,000) m³ of filter material, and rock armour material imported to the EGD Work Site will be collected and analyzed per the above tests. The frequency of testing may be increased or decreased by the Departmental Representative if considered appropriate based on the results of testing or visual assessment of imported material.
- .12 The Contractor shall provide the testing data to the Departmental Representative for review prior to transport of material from the source site to the EGD Work Site, in accordance with the timeline described in the Specifications. If the material does not meet the requirements in this Section and is not accepted by the Departmental Representative, the Contractor will be required to provide the cap material from an alternate source that is acceptable and conforms to the requirements in this Section, at the Contractor's own cost.
- .13 Rock armour materials shall have less than one (1) percent fines content upon arrival at the EGD Work Site. The Departmental Representative reserves the right to reject rock armour materials that are identified to have fines content greater than one (1) percent.

3. PART 3 – EXECUTION

3.1 Sequencing

- .1 This Section supplements the general sequence of work as described in Section 01 11 55 (General Instructions) and provides more specific requirements related to Engineered Capping.
- .2 The Contractor shall begin Engineered Capping activities within the TRBCA or Contractor Subarea of the TRBCA within three (3) working days following Departmental Representative acceptance of all Required Dredging in the TRBCA or Contractor Subarea.
- .3 The Hazardous Waste Area does not need to have the Engineered Cap placed immediately after the Required Dredging and Contingency Re-Dredging (as necessary) activities are completed.
- .4 When placing the Engineered Cap materials on slopes, sand materials (types 1, 2, and 3), filter material, and rock armour materials shall be placed continuously from the bottom (toe) of the slope upward, such that placed cap materials are supporting of cap materials placed further up the slope. The impermeable geosynthetic material shall be placed according to this Section of the Specifications.
- .5 When placing the Engineered Cap, first place the base sand material layer as required to meet the Minimum Required Thickness, elevations, or grades as shown on the Drawings. In areas requiring placement of the impermeable geosynthetic material, place the impermeable geosynthetic material prior to or in conjunction with placement of the sand material, as shown on the Drawings and described in this Section of the Specifications. Verify compliance using Progress Surveys and Post-Construction Surveys.
- .6 Once the Departmental Representative accepts completion of sand material layer placement, the Contractor may commence with placement of the filter material layer as required to meet the Minimum Required Thickness, elevations, or grades as shown on the Drawings. Verify compliance using Progress Surveys and Post-Construction Surveys.
- .7 Once the Departmental Representative accepts completion of filter material layer placement, the Contractor may commence with placement of rock armour materials to meet the Minimum Required Thickness, elevations, or grades as shown on the Drawings.
- .8 The Contractor shall conduct Progress Surveys and Post-Construction Surveys (and other field verification as the Contractor determines necessary to assess compliance with Minimum Required Thicknesses and Payable Over-Placement Allowances) in accordance with Section 02 21 13 (Surveying and Positioning Control). The Departmental Representative will review Post-Construction (for placement activities) Survey data and, if satisfactorily completed, will accept the Engineered Capping activities as complete.

- .9 If the Minimum Required Thickness is not achieved at all specified placement locations as shown on the Drawings, or Excessive Overplacement occurred, the Contractor shall correct placement deficiencies to the satisfaction of the Departmental Representative and at the Contractor's own cost.

3.2 Engineered Cap Material Placement

- .1 The Contractor shall provide barge displacement measurements for all loaded material barges as they arrive at the EGD Work Site. Barge displacement measurements shall also be collected, and provided as part of the Daily Construction Report, at the end of each work shift, and following placement of all Engineered Capping material stockpiled on the Contractor's material barges.
- .2 Engineered Capping material placement shall consist of placing several differing engineered Cap Types as shown on the Drawings. The Drawings depict the Minimum Required Thickness and Payable Over-Placement Allowances for each of these engineered Cap Types.
- .3 Place the sand materials (types 1, 2, and 3), filter material, and rock armour materials to meet the Minimum Required Thicknesses shown on the Drawings; no compaction is required. Place each layer in such a manner as to construct a discrete layer and avoid mixing the underlying and overlying layers to the extent practicable.
- .4 The Payable Over-Placement Allowances for sand, filter material, and rock armour materials, if required by the Contractor's means and methods to achieve the Minimum Required Thickness, will be paid for.
- .5 Excessive Over-Placement will not be paid for separately. If the Contractor's means and methods require Excessive Over-Placement to meet the Minimum Required Thicknesses, the Contractor shall account for this unpaid volume in the Contractor's Tender price for the work.
- .6 Engineered Capping materials shall be placed such that the surface of the placed rock armour material matches the elevations of the existing armour slopes located immediately outside of the TRBCA as shown on the Drawings. The elevation of the existing armour material immediately outside of the TRBCA is a Restricted Elevation and rock armour material placed above the Restricted Elevations, as shown on the Drawings, shall be removed by the Contractor at the Contractor's own cost. The result of the rock armour placement up to the boundary of the TRBCA shall be a smooth transition between the surrounding existing rock armour material and the placed Engineered Cap after extraction of the re-driven sheet pile perimeter wall.
- .7 If the Contractor's operations result in Excessive Overplacement, the Departmental Representative reserves the right to require the Contractor to remove the Excessive Overplacement materials and, if necessary, other corrective actions (including repair or rebuilding the Engineered Cap) to meet Specification requirements, all at the Contractor's own cost.

- .8 When placing materials on slopes, sand materials (types 1, 2, and 3), filter material, and rock armour materials shall be placed from the bottom (toe) of the slope upward. Materials shall be placed in lifts that allow for complete coverage of the designated area and minimize disturbance to the existing post-dredged sediment surface. Each discrete Engineered Capping layer shall be completed by the Contractor, and then accepted by the Departmental Representative, prior to Contractor placement of the next layer.
- .9 The Contractor is required to place cap materials on the steep slope (2H:1V) areas (Engineered Cap Type 4 locations as shown on the Drawings) in accordance with the following special requirements:
 - .1 The Contractor shall use extra caution during placement of cap materials on 2H:1V dredge grades such that cap materials do not become unstable. This may require a slower and more controlled rate of placement than for other Cap Types. Detailed methods specific to placement of cap materials on steep slopes (2H:1V) should be included in the Construction Work Plan for review and acceptance by the Departmental Representative.
 - .2 The Contractor shall place filter and rock armour materials as soon as possible following placement of the sand material types 2 and 3 to minimize potential movement of the sand material types 2 and 3 placed on the 2H:1V dredge slopes.
 - .3 The Contractor shall place the impermeable geosynthetic material according to the details shown on the Drawings such that it provides protection of the sand material types 2 and 3 in the upper elevations of the dredge slope area.
- .10 The Contractor shall employ means and methods to construct the Engineered Caps in a careful manner, taking extra care to place each Cap layer in a discrete layer, avoiding mixing with the underlying material, such that the final Engineered Cap as-built section will have discrete individual layers.
- .11 The Contractor shall employ placement means and methods that will minimize the potential for re-suspending sea bed sediment during placement activities, and prevent excessive mixing of the placed materials with the sea bed sediment. The Contractor shall place sand materials (types 1, 2, and 3), filter material, and rock armour materials by one or more of the following acceptable placement methods, unless the Contractor proposes, and the Departmental Representative accepts, an alternate placement method:
 - .1 Re-handling sand materials (types 1, 2, and 3), filter material, and rock armour materials from a material barge and placing directly on the bottom using a clamshell or re-handling bucket using limited drop distance from bucket to bottom (i.e., less than approximately 1.0-m drop)
 - .2 Controlled discharge of sand materials (types 1, 2, and 3), filter material, and rock armour materials using high speed conveyor, skip box, clamshell, or re-handling bucket, to lay down material over areas in the dry (i.e., located above the water surface during low tides). Drop distance may

vary and is not restricted as long as method meets other requirements in this Specification.

- .12 The Contractor shall not place sand materials (types 1, 2, and 3), filter material, and rock armour materials by rapid dumping a barge load.
- .13 The Contractor shall not place barge and dredge derrick anchors or spuds or other equipment on the newly constructed Engineered Cap surface.
- .14 The Contractor is responsible for protecting the existing armour slope located outside of and adjacent to the TRBCA, finished or partially completed Engineered Caps, and protected structures such as the re-driven sheet pile perimeter wall, Temporary Re-suspension Barrier (TRB) system, steel-piled concrete deck, timber crib, and existing sheet pile bulkhead wall. The Contractor is responsible for repair and restoration of these structures and Engineered Caps to existing conditions if any damage occurs due to spudding or other dredging activities.

3.3 Impermeable Geosynthetic Material Placement

- .1 The impermeable geosynthetic material is intended to provide physical isolation in combination with sand material types 2 and 3 at the upper portion of the steep slope (2H:1V) dredge cut areas, as shown on the Drawings, due to dredging restrictions and cap thickness requirements. The Drawings depict the location for placement of the impermeable geosynthetic material.
- .2 The impermeable geosynthetic material shall line the bottom and top of the sand material type 2 and sand material type 3 at the upper portion of Cap Type 2 and Cap Type 3 near the existing sheet pile bulkhead wall as shown on the Drawings. The impermeable geosynthetic material shall be placed below the sand material and wrap around the top of the sand layer adjacent to the existing sheet pile bulkhead wall as one continuous layer and be placed on top of the sand layer below the filter material, as shown on the Drawings.
- .3 Impermeable geosynthetic material shall be placed near the top of the slope wherever the sand material thickness is less than the Minimum Required Thickness, as shown on the Drawings.
- .4 Individual sections of impermeable geosynthetic material shall be attached with overlap to other sections such that the installed impermeable geosynthetic material is one continuous section. The Contractor shall comply with the manufacturer's requirements for field seaming.
- .5 Proper controls shall be implemented by the Contractor to ensure that none of the impermeable geosynthetic material is placed improperly or damaged during placement activities. The Contractor shall describe these control methods in the Construction Work Plan. The Contractor's control methods shall comply with manufacturer's deployment requirements.
- .6 The Contractor shall employ placement means and methods that will minimize the potential for eroding the newly exposed post-dredge surface. The Contractor

- shall use care to minimize sediments from the newly exposed post-dredge surface from contacting the upper (clean) side of the impermeable geosynthetic material.
- .7 The Contractor shall install the impermeable geosynthetic material in a manner such to provide a final surface that is contiguous without gaps in the impermeable geosynthetic material coverage, without excessive overlap or unnecessary use of material.
 - .8 The Contractor shall immediately repair or replace damaged sections of the impermeable geotextile material and shall comply with manufacturer's requirements for repair.
 - .9 Impermeable geosynthetic material placement locations, including detailed measurements, shall also be collected and provided as part of the Daily Construction Report at the end of each work shift.
 - .10 The Contractor shall take care when placing armour rock materials directly on top of the placed impermeable geotextile materials, such that placement of the rock armour material does not damage the geotextile material.

3.4 Water Quality Criteria Compliance

- .1 The water quality monitoring requirements are described in the Specifications and the EMP/Water Quality Monitoring Plan (WQMP) and are provided in Section 01 35 13.43 (Special Procedures for Contaminated Sites).
- .2 In accordance with the EMP/WQMP, the Departmental Representative or Environmental Monitor will conduct water quality monitoring, for quality assurance, during completion of Engineered Capping activities. The Contractor is responsible for complying with all water quality requirements as defined in the Specifications and the EMP/WQMP, and shall conduct its own water quality monitoring as needed to provide quality control of the Contractor's work.
- .3 The Contractor shall describe in its Construction Work Plan what means, methods, and procedures will be used to prevent water quality criteria exceedances, and what contingency actions will be taken to restore compliance with water quality criteria should water quality exceedances occur during completion of Engineered Capping activities.
- .4 Delays caused by complying with water quality criteria shall not be cause for additional compensation to the Contractor.

END OF SECTION

1. PART 1 – GENERAL

1.1 Description

- .1 Residuals Management Cover Material may need to be placed in areas outside of the Temporary Re-suspension Barrier Containment Area (TRBCA) boundary but within the EGD Work Site, to address potential recontamination due to transport of suspended sediments outside of the TRBCA boundary as described in Section 01 35 13.43 (Special Procedures for Contaminated Sites). PWGSC will not compensate the Contractor for acquisition and placement of Residuals Management Cover Material, as any recontamination of the area located outside the TRBCA will be considered the Contractor's responsibility.
- .2 The Contractor shall place Residuals Management Cover Material in areas outside of the TRBCA boundary but within the EGD Work Site as advised by the Departmental Representative following the Departmental Representative's review of confirmational sediment sample data collected in areas outside of the TRBCA boundary but within the EGD Work Site.
- .3 Once Required Dredging and Engineered Capping activities are completed and accepted as complete by the Departmental Representative, confirmation sampling and analytical testing will be conducted by the Departmental Representative in areas outside of the TRBCA boundary to determine the need to either conduct Residuals Contingency Re-Dredging, as described in Section 35 20 23 (Dredging, Barge Dewatering and In-Water Transportation), and/or place Residuals Management Cover Material.
- .4 Placement of Residuals Management Cover Material shall not begin until all other Required Dredging and Engineered Capping activities have been completed, and the work has been accepted by the Departmental Representative.
- .5 The Contractor shall place Residuals Management Cover Material to the Minimum Required Thickness (and up to the Over-Placement Allowance), as described in the Specifications and as shown on the Drawings.
- .6 The Contractor shall not be compensated for acquisition or placement of Residuals Management Cover Material.

1.2 Measurement and Payment Procedures

- .1 Acquisition and placement of Residuals Management Cover Material will not be a payable item.

1.3 Related Sections

- .1 Section 01 11 55 (General Instructions)
- .2 Section 01 35 13.43 (Special Procedures for Contaminated Sites)

- .3 Section 01 35 43 (Environmental Procedures and Sustainability)
- .4 Section 35 20 23 (Dredging, Barge Dewatering and In-Water Transportation)
- .5 Section 35 37 10 (Engineered Capping)

1.4 Definitions

- .1 Refer to Section 01 11 55 (General Instructions) for all definitions related to the Contract documents.

1.5 Submittals

- .1 Submit a detailed Construction Work Plan in accordance with Section 01 33 00 (Submittal Procedures) within twenty-one (21) calendar days following Notice of Award for review and acceptance by the Departmental Representative.
- .2 As part of the detailed Construction Work Plan, in accordance with Section 01 33 00 (Submittal Procedures), the Contractor shall prepare a section that describes the approach that will be implemented for Residuals Management Cover Material placement activities. Residuals Management Cover Material placement activities shall not begin until: 1) the Construction Work Plan has been reviewed and accepted by the Departmental Representative. At a minimum, the Residuals Management Cover Material placement approach description shall contain the following information:
 - .1 Order and sequence in which the work is to be performed, including a description of equipment to be used and methods of operation.
 - .2 Reference to the construction work schedule that identifies timing and sequencing for completion of Residuals Management Cover Material placement activities, as they relate to other major elements of the work.
 - .3 Methods and procedures for Residuals Management Cover Material placement, including means and methods for providing environmental protection, including use of low-energy placement methods so as to minimize disturbance of the seabed floor.
 - .4 The Contractor shall provide information regarding the source of the imported Residuals Management Cover Material and testing certificates provided by the supplier for Departmental Representative review prior to the start of work.
 - .5 The Contractor shall provide identification and certification documents for the independent, certified analytical laboratory that will conduct required testing for all Residuals Management Cover Material that will be used as part of this Contract, as described in this Specification.
 - .6 Methods and procedures for completion of Residuals Management Cover Material placement activities, including means and methods for providing

environmental protection as described in Section 01 35 13.43 (Special Procedures for Contaminated Sites) and Section 01 35 43 (Environmental Procedures and Sustainability).

- .3 Samples of Residuals Management Cover Material to be used for the work shall be provided to the Departmental Representative a minimum of two (2) weeks in advance of use at the EGD Work Site. Samples shall consist of approximately 20 kilograms (kg) of the Residuals Management Cover Material. Each sample should be composited from no less than five (5) subsamples taken throughout any one (1) source. The Contractor shall verify that the samples are representative of all materials to be imported.
- .4 The Contractor shall provide laboratory test reports as described in these Specifications. All laboratory test results shall be submitted to the Departmental Representative no less than two (2) weeks prior to the start of Residuals Management Cover Material placement activities.
- .5 Daily Reporting: As part of the Daily Construction Report, as described in Section 01 33 00 (Submittal Procedures), the Contractor shall keep a daily record of the area(s) where Residuals Management Cover Material has been placed, the estimated quantity of Residuals Management Cover Material placed (including barge displacement measurements), daily Progress Surveys, certified weight tickets from the Residuals Management Cover Material supplier, and a summary of other details of the work. The Daily Construction Report shall be submitted to the Departmental Representative the morning following completion of the work for that day. The Daily Construction Report shall be signed by the Contractor's site superintendent and quality control manager.
- .6 Weekly Reporting: As part of the Contractor's Weekly Construction Report, as described in Section 01 33 00 (Submittal Procedures), the Contractor shall summarize the week's work for Residuals Management Cover Material placement activities. The Weekly Construction Report shall also identify anticipated work to be completed in the present week, and present the latest Post-Construction (i.e., post-placement) Survey and Progress Surveys. The Weekly Construction Report shall be signed by the Contractor's site superintendent and quality control manager.

1.6 References – Not Used

1.7 Quality Control

- .1 The Contractor is responsible for providing all necessary quality controls to successfully complete the work.
- .2 The Departmental Representative will inspect the Residuals Management Cover Material placement activities to verify compliance with these Specifications, the Drawings, and all permit requirements.

1.8 Environmental Protection

- .1 Residuals Management Cover Material placement activities shall be performed in accordance with environmental protection requirements, as stated in Section 01 35 13.43 (Special Procedures for Contaminated Sites), Section 01 35 43 (Environmental Procedures and Sustainability), the Environmental Management Plan (EMP), the Environmental Protection Plan, and in accordance with the Project Permits and Laws and Regulations.

1.9 Inspection of Materials

- .1 Barges of imported Residuals Management Cover Material shall be visually inspected by the Contractor upon delivery. Materials shall be inspected for the presence of foreign, recycled, or reprocessed material or debris, to verify that imported materials are natural, native, virgin materials and free of contaminants. The presence of foreign, recycled, or reprocessed materials or debris is to be reported to the Departmental Representative, who will determine if the import materials are acceptable. In the event of rejections, it shall be the responsibility of the Contractor to remove all rejected material from the EGD Work Site at no additional cost to PWGSC. Acceptance or rejection of import materials brought to the EGD Work Site shall be provided within twenty-four (24) hours of the Contractor reporting to the Departmental Representative.
- .2 The Departmental Representative may, at any and all times, perform an independent inspection or conduct sampling of Residuals Management Cover Material. Residuals Management Cover Material may be rejected if identified as substandard or if test results show it to be substandard, based on the sole discretion of the Departmental Representative. The Departmental Representative may request the Contractor to segregate material for testing purposes at no additional cost to PWGSC. Segregated materials may be tested according to designated procedures at the Departmental Representative's discretion. Inspection and testing by the Departmental Representative shall not be used by the Contractor as a delay claim.
- .3 Inspection of Source: The borrow source(s) shall be inspected by the Contractor. During such inspection, the Contractor shall verify that the materials to be delivered to the EGD Work Site will meet the appropriate requirements of the Specifications. The Contractor shall provide notice to the Departmental Representative within five (5) working days of such inspections. At the discretion of the Departmental Representative, the Departmental Representative may accompany the Contractor to witness such inspections. This witnessing shall in no way release the Contractor from complying with the Specifications, and shall in no way be construed as approval of any particular source of material.

1.10 Regulatory Requirements

- .1 See Section 01 11 55 (General Instructions) for regulatory requirements pertaining to this Contract.

1.11 Misplaced Material

- .1 Should the Contractor, during completion of the work, lose, dump, throw overboard, sink, or misplace any material, dredge, barge, machinery, or appliance, the Contractor shall promptly recover and remove the misplaced material or item. The Contractor shall give immediate verbal notice, followed by written confirmation, of the description and location of such obstructions to the Departmental Representative and shall mark and buoy such obstructions until they are removed.
- .2 Should the Contractor refuse, neglect, or delay compliance with this requirement, such obstructions may be removed by PWGSC or its agents, and the cost of such operations may be deducted from any money due to the Contractor.
- .3 The Contractor shall be responsible for any fees, fines, penalties, or other costs resulting from misplaced materials.

2. PART 2 – PRODUCTS

2.1 Residuals Management Cover Material

- .1 Residuals Management Cover Material chemical concentrations must be lower than the Canadian Council for Ministers of the Environment (CCME) Sediment Quality Guidelines “Probable Effects Levels” (PEL) and British Columbia Contaminated Sites Regulation (CSR) Generic Numerical Sediment Criteria for typical sites. For Light Extractable Petroleum Hydrocarbons (LEPH), and Heavy Extractable Petroleum Hydrocarbons (HEPH), concentrations must be lower than the CSR numerical soil standards for residential land use.
- .2 Residuals Management Cover Material shall be a mixture of sand and gravelly material, free of organic material, and shall be composed of a mixture of crushed granular materials that conform to the gradation as provided in Table 35 37 10.01-1. It is anticipated that dredged Fraser River sand will not meet the Residuals Management Cover Material gradation requirements.

Table 35 37 10.01-1

Sieve Designation (mm)	Percent Passing
37.5	100
19	90 – 100
4.75	60 – 85
1.18	20 – 70
0.42	10 – 55
0.15	0 – 35
0.075	0 – 5

- .3 Residuals Management Cover Material shall not contain any man-made products or debris, and odorous substances shall not be present.
- .4 Based on material sources and results of the testing, the Departmental Representative may request that additional parameters be analyzed. The frequency of the testing may also be increased or decreased by the Departmental Representative if considered appropriate based on the results of the testing or visual assessment of the imported material.
- .5 The Contractor shall provide information regarding the source of the Residuals Management Cover Material to the Departmental Representative. The Contractor shall also collect one sample for every one thousand (1,000) cubic metres (m³) of Residuals Management Cover Material imported to the EGD Work Site and analyze the samples for metals, LEPH, and HEPH. The frequency of testing may be increased or decreased by the Departmental Representative if considered appropriate based on the results of testing or visual assessment of imported material. The laboratory selected to undertake analysis must have the appropriate accreditation with ISO/IEC Standard 17025. The Contractor shall submit documentation demonstrating that the laboratory is accredited for the specific parameters to be analysed and the analytical methods.
- .6 The Contractor shall provide the testing data to the Departmental Representative for review prior to import of the material to the EGD Work Site, in accordance with the timeline described in these Specifications.
- .7 Residuals Management Cover Material will be rejected by the Departmental Representative, at the Contractor's sole cost and responsibility, if the specifications in the above clauses are not met.

3. PART 3 – EXECUTION

3.1 Sequencing

- .1 This Section describes more detailed sequencing considerations associated with Residuals Management Cover Material placement activities.
- .2 The Contractor shall not conduct Residuals Management Cover Material placement activities until all Required Dredging and Engineered Capping activities and removal of the sheet pile wall and Temporary Re-suspension Barrier (TRB) system have been completed and accepted by the Departmental Representative.
- .3 The Contractor shall conduct Residuals Management Cover Material placement Progress Surveys (and potentially other investigations to assess placement thickness) in accordance with Section 02 21 13 (Surveying and Positioning Control), after the Contractor completes all advised Residuals Management Cover Material placement activities within the EGD Work Site. The Departmental Representative will review post-placement data and, if satisfactorily completed, will accept the Residuals Management Cover Material placement work as complete.
- .4 If the Minimum Required Thickness is not achieved at all advised placement locations, or the maximum over-placement allowance for Residuals Management Cover Material placement has been exceeded, the Contractor shall correct placement deficiencies to the satisfaction of the Departmental Representative at the Contractor's own cost.

3.2 Residuals Management Cover Material Placement

- .1 Residuals Management Cover Material placement activities shall consist of carefully placing a layer of clean sandy material as described in this Section and as advised by the Departmental Representative. The Drawings depict typical sections of the Required Minimum Placement Thickness and maximum over-placement allowance for Residuals Management Cover Material placement.
- .2 Residuals Management Cover Material placed outside of the advised placement areas or above the maximum over-placement allowance for Residuals Management Cover Material will be considered Excessive Overplacement, and the Departmental Representative may advise the Contractor to remove this material at the Contractor's own cost.
- .3 The Residuals Management Cover Material shall be placed within the areas as advised by the Departmental Representative and to the Minimum Required Thickness shown on the Drawings; no compaction is required.
- .4 Residuals Management Cover Material shall be placed in a manner that minimizes disturbance to the seabed surface and minimizes the potential for re-suspension of seabed sediments. The Contractor shall describe its means and

methods in the Construction Work Plan for placement of Residuals Management Cover Material in a manner that will meet the requirements of Section 01 35 13.43 (Special Procedures for Contaminated Sites) and Section 01 35 43 (Environmental Procedures and Sustainability).

- .5 Place Residuals Management Cover Material according to the applicable cap placement methods specified in Section 35 37 10 (Engineered Capping).
- .6 Barge spudding may be used in areas outside of the TRBCA to facilitate placement of the Residuals Management Cover. The Contractor is responsible for protecting the existing armour slope located outside of the TRBCA. The Contractor shall repair and restore the existing armour slope to pre-existing conditions if any damage occurs.

3.3 Water Quality Requirement Compliance

- .1 The water quality monitoring requirements are described in the Specifications and the EMP/Water Quality Monitoring Plan (WQMP) and are provided in Section 01 35 13.43 (Special Procedures for Contaminated Sites).
- .2 In accordance with the EMP/WQMP, the Departmental Representative or Environmental Monitor will conduct water quality monitoring, for quality assurance, during completion of Residuals Management Cover Material placement activities. The Contractor is responsible for complying with all water quality requirements as defined in the Specifications and the EMP/WQMP, and shall conduct its own water quality monitoring as needed to provide quality control of the Contractor's work. The Contractor shall provide all results of water quality monitoring efforts to the Departmental Representative as part of the Weekly Construction Reports.
- .3 The Contractor shall describe in its Construction Work Plan what means, methods, and procedures will be used to prevent water quality requirement exceedances, and what contingency actions will be taken to restore compliance with water quality requirements should water quality exceedances occur during completion of Residuals Management Cover Material placement activities.
- .4 Delays caused by complying with water quality requirements shall not be cause for additional compensation to the Contractor.

END OF SECTION