

SPECIFICATIONS
FOR
PORT DALHOUSIE, ON
MARINA RESTORATION

REGION PROJECT
NO. 722878



Department of Fisheries & Oceans
Small Craft Harbours Branch
Burlington, Ontario

2018

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PART 1 - GENERAL

1.1 MINIMUM STANDARDS

- .1 Execute work to meet or exceed:
- .1 National Building Code of Canada 2015, National Fire Code of Canada 2015, Ontario Building Code 2012 and any other code of provincial or local application, including all amendments up to project date, provided that in any case of conflict or discrepancy, the more stringent requirements shall apply.
 - .2 Rules and regulations of authorities having jurisdiction.
 - .3 Fire Commissioner of Canada, No. 301, Standard for Construction Operations, and No. 302, Standard for Welding and Cutting, June 1982 and Fire Protection Standard for Correctional Institutions - Treasury Board Personnel Management Manual, Occupational Safety and Health, Chapter 3-6, Feb. 1992.
 - .4 Occupational Health and Safety Act and Regulations for Construction Projects, Revised Statutes of Ontario 1990, Chapter O.1 as amended, O. Reg. 213/91 as amended by O. Reg. 631/94, R.R.O. 1990, Reg. 834, Diving Operations, O. Reg. 629/94, as amended.
 - .5 Environmental Protection Act, O. Reg. 102/94 and O. Reg. 103/94.

1.2 TAXES

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

1.3 EXAMINATION

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

1.4 EXISTING
CONDITIONS

- .1 The geotechnical investigations are bound in Appendix A - Geotechnical Investigations.
- .2 Contractor shall be familiarized with all available data and scope, and price accordingly.

1.5 SITE

- .1 Confine work, including temporary structures, plants, equipment and materials to established limits of site.

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- .2 Locate temporary buildings, roads, walks, drainage facilities, services as directed and maintain in clean and orderly manner.
- 1.6 CONSTRUCTION AND STORAGE AREA
- .1 One permanent construction staging areas has been identified and illustrated on the Contract Drawings. The Contractor shall take responsibility for the use, maintenance and reinstatement of the staging areas. Other secondary and temporary construction staging areas may be permitted temporarily during various seasons to suit use of the spaces by the public.
- 1.7 DOCUMENTS
- .1 Keep on site one copy of contract documents, reviewed shop drawings and submissions.
- .2 Specifications shall govern over Drawings.
- .3 Post documents on site conforming to local Occupational Health and Safety Regulations.
- 1.8 CONTRACT METHOD
- .1 Construct Work under a combined price contract. All costs for work not specifically identified as a unit price item shall be included in the lump sum arrangement.
- 1.9 MEASUREMENT PROCEDURES
- .1 Within 48 hours of bid acceptance submit a list of subcontractors and a detailed breakdown of costs associated with the lump sum arrangement.
- .2 Items measured for payment are in metric (SI) units.
- .3 Submit requests for payment in metric units corresponding with items on the Unit Price Table.
- .4 Submit supporting documents in metric units. Perform all necessary conversions required.
- 1.10 LAYOUT OF WORK
- .1 Immediately upon entering site for purpose of beginning work on this project, locate all general reference points and take proper action necessary to prevent their disturbance.
- .2 Supply stakes and other survey markers required for this work. Employ competent personnel to lay out work in accordance with lines and grades provided.

- .3 Maintain all reference points and markers for duration of contract.

1.11 CO-OPERATION AND PROTECTION

- .1 Execute work with minimum disturbance to occupants public and normal use of site work area. Make arrangements with Departmental Representative to facilitate execution of work.
- .2 Maintain access and exits.
- .3 Provide necessary barriers, warning lights and signs. Protect work from damage. Replace damaged existing work with material and finish to match original.

1.12 INTERFERENCE TO NAVIGATION

- .1 Do not impede navigation during progress of work in accordance with the Collision Regulation with Canadian Modifications 1983.
- .2 Obtain schedule of vessel movements and fishery activities in area affected by dredging operations including movement of vessels at adjacent wharves. The area is subject to heavy navigational traffic both commercial and recreational.
- .3 Plan and execute work in manner that will not interfere with fishing operations, marina operations, construction activities at pier sites, or access to piers by land or water.
- .4 No claims for delays will be permitted resulting from the above constraints. No claims are permitted for loss of time, equipment, material or any other cost related to interference with moored vessels in harbour or due to other Contractor's operations.
- .5 Keep Operations Centre, Watchkeeper at 1-800-265-0237, Canadian Coast Guard, (CCG) Transport Canada, Sarnia, Ontario informed of dredging operations in order that necessary Notices to Shipping and Notices to Mariners will be issued. Make arrangements with CCG to relocate and replace buoys for execution of work. Advise nearest Coast Guard Base of any requirements to relocate channel markers/buoys within work area.
- .6 Mark floating equipment with lights in accordance with the Collision Regulations with the Canadian Modifications, 1983, and maintain a VHF marine radio watch of board.

1.13 EXISTING
UTILITIES

- .1 Establish location, protect and maintain existing utility lines.
- .2 Connect to existing utilities with minimum disturbance to pedestrian and vehicular traffic.

1.14 MATERIALS AND
EQUIPMENT

- .1 Use new products unless otherwise specified.
- .2 Deliver and store material and equipment to manufacturer's instructions with manufacturer's labels and seals intact.
- .3 When material or equipment is specified by standard or performance specifications, upon request of Departmental Representative, obtain from manufacturer an independent testing laboratory report, stating that material or equipment meets or exceeds specified requirements.

1.15 INSPECTION AND
TESTING

- .1 The Departmental Representative may employ an Inspection and Testing company to ensure work conforms with Contract Documents.
- .2 When initial tests and inspections reveal work not to contract requirements, pay for tests and inspections required by Departmental Representative on corrected work.
- .3 Submit timely inspection and test reports to Departmental Representative.

1.16 MILESTONE DATES

- .1 Docks will be removed along the West Pier (south end) on the third week of October 2018. Reinstallation is tentatively scheduled for May 2019.
- .2 Interim completion milestone targets:
 - .1 March 31, 2019: completion of work on West Pier Station W2+524 to W2+877 and W5+000 to W5+050.
 - .2 March 31, 2020: completion of work on West Pier Station W2+000 to W2+524.
 - .3 The Contractor shall employ sufficient crews in the performance of the work to achieve the milestone target dates.

1.17 SCHEDULING OF
WORK

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

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

1.18 AS-BUILT
RECORD DRAWINGS

- .1 As work progresses, neatly record significant deviations from the Contract drawings using fine, red marker on full size white prints.
- .2 Neatly print lettering and numbers in size to match original. Lines may be drawn free-hand but shall be neat and accurate. Add at each title block note: "AS BUILT RECORD".
- .3 Record following significant deviations:
 - .1 Depths of various elements and foundations.
 - .2 Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvement.
 - .3 Location of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of structure.
 - .4 Field changes of dimension.
 - .5 Other significant deviations which are concealed in construction and cannot be identified by visual inspection.
- .4 Turn one set of As-Built Record Drawings over to Departmental Representative upon completion of work.
- .5 If project is completed without significant deviations from contract drawings declare this in writing and submit to Departmental Representative in lieu of As-Built Record Drawings.

1.19 ADDITIONAL
DRAWINGS

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

1.20 FIRES AND
TEMPORARY HEATERS

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

1.21 DATUM

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

.2 Chart datum for Lake Ontario is 174.2 metres
I.G.L.D (1985).

1.22 OPSS AND OPSD

.1 Ontario Provincial Standard Specifications (OPSS)
and Ontario Provincial Standard Drawings (OPSD)
quoted in these specifications are available online
at
<http://www.raqsa.mto.gov.on.ca/techpubs/ops.nsf/OPS>
Homepage.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

PART 1 - GENERAL

1.1 ADMINISTRATIVE

- .1 Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Do not proceed with Work affected by submittal until review is complete.
- .3 Present shop drawings, product data, samples and mock-ups in SI Metric units.
- .4 Where items or information is not produced in SI Metric units converted values are acceptable.
- .5 Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and coordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
- .6 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .7 Verify field measurements prior to submissions and affected adjacent Work are coordinated.
- .8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.
- .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.
- .10 Keep one reviewed copy of each submission on site.
- .11 Submit number of hard copies specified for each type and format of submittal and also submit in electronic format as pdf files. Forward pdf files on CD or through email.

1.2 SHOP DRAWINGS
AND PRODUCT DATA

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work. Refer to individual specifications sections for submission requirements.
- .2 Where required by specifications, submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
- .3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .4 Allow 10 working days for Departmental Representative's review of each submission.
- .5 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
- .6 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.
- .7 Accompany submissions with transmittal letter, in duplicate, containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data and sample.
 - .5 Other pertinent data.
- .8 Submissions include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:

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

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

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

- .9 After Departmental Representative's review, distribute copies.

- .10 Submit 3 prints and 1 electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.

- .11 Submit 3 hard copies and 1 electronic copy of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.

- .12 Submit 3 hard copies and 1 electronic copy of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
 - .2 Testing must have been within 3 years of date of contract award for project.

- .13 Submit 3 hard copies and 1 electronic copy of certificates for requirements requested in specification Sections and as requested by Departmental Representative.

- .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
- .2 Certificates must be dated after award of project contract complete with project name.
- .14 Submit 3 hard copies and 1 electronic copy of manufacturers instructions for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
- .15 Submit 3 hard copies and 1 electronic copy of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.
- .16 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .17 Delete information not applicable to project.
- .18 Supplement standard information to provide details applicable to project.
- .19 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.
- .20 The review of shop drawings by Departmental Representative is for sole purpose of ascertaining conformance with general concept.
 - .1 This review shall not mean that the Departmental Representative approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract

Documents.

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

1.3 CERTIFICATES
AND TRANSCRIPTS

- .1 Immediately after award of Contract, submit Workers' Safety and Insurance Board Experience Report.
- .2 Submit transcription of insurance immediately after award of Contract.

1.4 FEES, PERMITS
AND CERTIFICATES

- .1 Provide authorities having jurisdiction with information requested.
- .2 Pay fees and obtain certificates and permits required.
- .3 Furnish certificates and permits.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

- .1 Not Used.

PART 1 - GENERAL

1.1 REFERENCES

- .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .3 Province of Ontario
 - .1 Occupational Health and Safety Act, R.S.O. [1990 Updated 2017].

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
 - .1 Results of site specific safety hazard assessment.
 - .2 Results of safety and health risk or hazard analysis for site tasks and operation.
- .3 Submit 3 copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative weekly.
- .4 Submit copies of reports or directions issued by safety inspectors of authority having jurisdiction.
- .5 Submit copies of incident and accident reports.
- .6 Submit WHMIS MSDS - Material Safety Data Sheets.
- .7 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 5 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 5 days after receipt of comments from Departmental Representative.
- .8 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce

the Contractor's overall responsibility for construction Health and Safety.

- .9 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Departmental Representative.
- .10 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

1.3 FILING OF NOTICE

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

1.4 SAFETY ASSESSMENT

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

1.5 MEETINGS

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

1.6 REGULATORY REQUIREMENTS

- .1 Comply with the Acts and regulations of the Province of Ontario.
- .2 Comply with specified standards and regulations to ensure safe operation at site.

1.7 PROJECT/SITE CONDITIONS

- .1 Work at site will involve contact with:
 - .1 Work around water.

1.8 GENERAL REQUIREMENTS

- .1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.
- .2 Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns either accepting or rejecting improvements.
- .3 Relief from or substitution for any portion or

provision of minimum Health and Safety standards specified herein or reviewed site-specific Health and Safety Plan shall be submitted to Departmental Representative in writing.

1.9 RESPONSIBILITY

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

1.10 COMPLIANCE
REQUIREMENTS

- .1 Comply with Ontario Health and Safety Act, R.S.O.
- .2 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.11 UNFORSEEN
HAZARDS

- .1 Should any unforeseen or peculiar safety-related factor, hazard, or condition become evident during performance of Work, immediately stop work and advise Departmental Representative verbally and in writing.
- .2 Follow procedures in place for Employee's Right to Refuse Work as specified in the Occupational Health and Safety Act for the Province of Ontario.

1.12 HEALTH AND
SAFETY CO-ORDINATOR

- .1 Employ and assign to Work, competent and authorized representative as Health and Safety Coordinator. Health and Safety Coordinator must:
 - .1 Have working knowledge of occupational safety and health regulations.
 - .2 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.
 - .3 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.
 - .4 Be on site during execution of Work and

report directly to and be under direction of site supervisor.

1.13 POSTING OF DOCUMENTS

- .1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province of Ontario, and in consultation with Departmental Representative. The following criteria is to be posted on site:
 - .1 Contractor's Safety Policy.
 - .2 Constructor's Name.
 - .3 Notice of Project.
 - .4 Name, trade, and employer of Health and Safety Representative or Joint Health and Safety Committee members (if applicable).
 - .5 Ministry of Labour Orders and reports.
 - .6 Occupational Health and Safety Act and Regulations for Construction Projects for the Province of Ontario.
 - .7 Address and phone number of nearest Ministry of Labour office.
 - .8 Material Safety Data Sheets.
 - .9 Written emergency Response Plan.
 - .10 Site Specific Safety Plan.
 - .11 Valid certificate of first aider on duty.
 - .12 WSIB "In Case of Injury At Work" poster.
 - .13 Location of toilet and cleanup facilities.

1.14 CORRECTION OF NON-COMPLIANCE

- .1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.
- .2 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.
- .3 Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

1.15 BLASTING

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

1.16 WORK STOPPAGE

- .1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.
- .2 Assign responsibility and obligation to health and safety coordinator to stop or start Work when, at health and safety coordinator's discretion, it is

necessary or advisable for reasons of health or safety. Departmental Representative may also stop Work for health and safety considerations.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not used.

PART 1 - GENERAL

1.1 DEFINITIONS

- .1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade environment aesthetically, culturally and/or historically.
- .2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

1.2 ACTION AND
INFORMATIONAL
SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prior to commencing construction activities or delivery of materials to site, provide Environmental Protection Plan for review and approval by Departmental Representative.
- .3 Ensure Environmental Protection Plan includes comprehensive overview of known or potential environmental issues to be addressed during construction.
- .4 Address topics at level of detail commensurate with environmental issue and required construction tasks.
- .5 Include in Environmental Protection Plan:
 - .1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.
 - .2 Names and qualifications of persons responsible for manifesting hazardous waste to be removed from site.
 - .3 Names and qualifications of persons responsible for training site personnel.
 - .4 Descriptions of environmental protection personnel training program.
 - .5 Erosion and sediment control plan identifying type and location of erosion and sediment controls

to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.

.6 Drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.

.7 Traffic Control Plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Ensure plans include measures to clean and minimize amount of mud transported onto paved public and private roads by vehicles or runoff.

.8 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use. Ensure plan includes measures for marking limits of use areas and methods for protection of features to be preserved within authorized work areas.

.9 Spill Control Plan including procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.

.10 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.

.11 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, are contained on project site.

.12 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.

.13 Waste Water Management Plan identifying methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.

.14 Historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands.

.15 Pesticide treatment plan to be included and updated, as required.

1.3 FIRES

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

1.4 DRAINAGE

- .1 Provide Erosion and Sediment Control Plan identifying type and location of erosion and sediment controls provided. Ensure plan includes monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.
- .2 Storm Water Pollution Prevention Plan to be substituted for erosion and sediment control plan.
- .3 Provide temporary drainage and pumping required to keep excavations and site free from water.
- .4 Ensure pumped water into waterways, sewer or drainage systems is free of suspended materials.
- .5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.5 SITE CLEARING
AND PLANT
PROTECTION

- .1 Protect trees and plants on site and adjacent properties.
- .2 Wrap in burlap, trees and shrubs adjacent to construction work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2 m minimum.
- .3 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.
- .4 Minimize stripping of topsoil and vegetation.
- .5 Restrict tree removal to areas indicated or designated by Departmental Representative.

1.6 WORK ADJACENT
TO WATERWAYS

- .1 Construction equipment to be operated on land only unless placed on barges.
- .2 Do not use waterway beds for borrow material without Departmental Representative's approval.
- .3 Waterways shall be free of excavated fill, waste material and debris.
- .4 Design and construct temporary crossings to minimize erosion to waterways.

- .5 Do not skid logs or construction materials across waterways.
- .6 Avoid indicated spawning beds when constructing temporary crossings of waterways.
- .7 Blasting to be above water and 100 m minimum from indicated spawning beds.

1.7 POLLUTION CONTROL

- .1 Maintain temporary erosion and pollution control features installed under this Contract.
- .2 Control emissions from equipment and plant to local authorities' emission requirements.
- .3 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area.
 - .1 Provide temporary enclosures where indicated or directed by Departmental Representative.
- .4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

1.8 NOTIFICATION

- .1 Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.
- .2 Contractor: after receipt of such notice, inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.
 - .1 Do not take action until after receipt of written approval by Departmental Representative.
- .3 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.
- .4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 CLEANING .1 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.2 Ensure public waterways, storm and sanitary sewers remain free of waste and volatile materials disposal.

PART 1 - GENERAL

- 1.1 SECTION INCLUDES .1 Access and Construction aids.
.2 Office Trailers.
.3 Parking.
.4 Project identification.
- 1.2 REFERENCES .1 National Building Code of Canada.
.2 Provincial Legislation.
.1 Ontario Traffic Manual Book 7.
.2 Ontario Building Code.
.3 Occupational Health and Safety Act
- 1.3 SUBMITTALS .1 Provide submittals in accordance with Section 01 33 00.
- 1.4 INSTALLATION AND REMOVAL .1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.
.2 Identify areas to receive a granular base to prevent tracking of mud.
.3 Indicate use of supplemental or other staging areas.
.4 Provide construction facilities in order to execute work expeditiously.
.5 Remove from site all such work after use.
- 1.5 HOISTING .1 Provide, operate and maintain hoists/cranes required for moving of workers, materials and equipment.
- 1.6 SITE STORAGE/LOADINGS .1 Confine work and operations of employees to areas defined by Contract Documents. Do not unreasonably encumber premises with products.
.2 Do not load or permit to load any part of Work with a weight or force that will endanger the Work.

1.7 CONSTRUCTION
STAGING AND PARKING

- .1 One permanent construction staging areas has been identified and illustrated on the Contract Drawings. Other secondary and temporary construction staging areas may be permitted temporarily during various seasons to suit use of the spaces by the public.
- .2 Provide and maintain adequate access to project site.
- .3 Parking will be permitted on site provided it does not disrupt performance of Work.
- .4 Build and maintain temporary roads as required to undertake the Work and provide snow removal during period of Work.
- .5 When using existing public and private roads for access to project site, maintain such roads for duration of Contract and repair damage resulting from Contractors' use of the roads.

1.8 SITE ACCESS

- .1 Provide access to piers via the land side or water side as required. Provide floating plant to install steel sheet piling and installation of aggregate materials for rock berms.
- .2 Minimize disruption to normal public park and marina functions.

1.9 OFFICES

- .1 Provide a climate controlled office with lighting and ventilation, of sufficient size to accommodate site meetings, and furnished with desk, chairs and drawing laydown table.
- .2 Provide a clearly marked and fully stocked first-aid case in a readily available location.
- .3 Subcontractors may provide their own offices as necessary. Direct location of these offices.
- .4 Maintain in clean condition.

1.10 EQUIPMENT, TOOL
AND MATERIALS STORAGE

- .1 Provide and maintain, in a clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.
- .2 Locate materials not required to be stored in weatherproof sheds on site in a manner to cause least interference with work activities.

1.11 SANITARY
FACILITIES

- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
- .2 Post notices and take such precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.12 CONSTRUCTION
SIGNAGE

- .1 Provide and erect, within 3 weeks of signing Contract, two project identification signs in locations designated by Departmental Representative.
 - .1 Indicate on sign, name of Owner, Consultant and Contractor, of a design style approved by Departmental Representative.
 - .2 Provide 1200 x 2400 mm identification site sign comprising of foundations and framing.
- .2 Provide and erect all local construction safety, notice and warning signage around the site.
- .3 Provide and erect construction signage on public and private roads leading to the project site, to provide advance warning of a work zone for long duration operations.
- .4 No other signs or advertisements, other than warning signs, are permitted on site.
- .5 Maintain approved signs and notices in good condition for duration of project, and dispose of off site on completion of project or earlier if directed by Departmental Representative.

1.13 PROTECTION AND
MAINTENANCE OF TRAFFIC

- .1 Provide access to temporary facilities.
- .2 Maintain and protect traffic on affected roads during construction period.
- .3 Provide measures for protection and temporary diversion of traffic, including provision of flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs
- .4 Protect travelling public from damage to person and property.
- .5 Contractor's traffic on roads selected for hauling material to and from site shall interfere as little as possible with public traffic.
- .6 Verify adequacy of existing roads and allowable load limit on these roads. The Contractor shall be

- responsible for repair of damage to roads caused by construction operations.
- .7 Construct access and haul roads necessary with suitable grades and widths.
 - .8 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.
 - .9 Dust control: adequate to ensure safe operation at all times.
 - .10 Provide snow removal where required during period of Work.
 - .11 Remove, upon completion of work, all temporary facilities required to undertake the work.

PART 2 - PRODUCTS

- 2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

- 3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL
- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
 - .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
 - .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed from removal.
- 3.2 CLEAN-UP
- .1 Remove construction debris, waste materials, packaging material from work site daily.
 - .2 Clean dirt or mud tracked onto paved or surfaced roadways.

PART 1 - GENERAL

- 1.1 SECTION INCLUDES .1 Barriers.
.2 Environmental Controls.
.3 Traffic Controls.
.4 Fire Routes.
- 1.2 RELATED SECTIONS .1 Section 01 52 00 - Construction Facilities.
- 1.3 REFERENCES .1 National Building Code of Canada.
.2 Provincial Legislation:
.1 Ontario Building Code.
.2 Occupational Health and Safety Act.
- 1.4 INSTALLATION AND REMOVAL .1 Provide temporary controls in order to execute Work expeditiously.
.2 Remove from site all such work after use.
- 1.5 PROTECTION .1 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.
.2 Maintain barriers in good working order. Daily inspect barriers and repair expeditiously.
- 1.6 SECURITY .1 Provide temporary site enclosure around the Work areas and construction staging area, using modular freestanding fencing.
.1 Galvanized, 1.8 m high chain link or welded steel mesh with pipe rails.
.2 Provide spaced lockable entrances for equipment and workers, with locks and keys.
.2 Maintain barriers in good working order. Daily inspect barriers and repair expeditiously.
- 1.6 GUARD RAILS AND .1 Provide secure, rigid guard rails and barricades

BARRICADES

around deep excavations and open edges as required by governing authorities.

1.7 ACCESS TO SITE

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

1.8 PUBLIC ACCESS
ROUTES AND PROPERTY

- .1 Maintain and safeguard public access to areas outside of the Work area. Temporary utilization or obstruction of public areas are not permitted unless approved by Departmental Representative.
- .2 Protect surrounding private and public property from damage during performance of Work.
- .3 Be responsible for damage incurred.

1.9 FIRE ROUTES

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

1.10 PROTECTION OF
BUILDING FINISHES

- .1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.
- .2 Provide necessary screens, covers, and hoardings.
- .3 Be responsible for damage incurred due to lack of or improper protection.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

- .1 Not Used.

PART 1 - GENERAL

- 1.1 SCOPE .1 This Section covers the requirements for management of construction/demolition materials.
- 1.2 REFERENCES .1 Canadian Environmental Protection Act (CEPA 1999)
- .2 Ontario Regulations
- .1 Ontario Regulation 102/94.
- .2 Ontario Regulation 103/94.
- .3 Ontario Regulation 347 / 558.
- .4 Ontario Regulation 213/91 (Occupational Health and Safety Act, OHSA).
- 1.3 CONSTRUCTION AND DEMOLITION WASTE .1 Carefully remove, deconstruct, source separate materials and divert from waste destined for landfill to maximum extent possible. Reuse, recycle, compose, anaerobic digest or sell material for reuse except where indicated otherwise. On site sales are not permitted.
- .2 Source separate waste and maintain waste audits in accordance with the Environmental Protection Act, Ontario Regulation 102/94 and Ontario Regulation 103/94.
- .1 Provide facilities for collection, handling and storage of source separated wastes.
- .2 Source separate the following waste:
- .1 Concrete
- .2 Wood
- .3 Steel
- .4 Aggregate
- .5 Bituminous Pavement
- .6 Organic vegetation
- .3 Identify opportunities for reduction, reuse, and recycling of materials, where possible.
- .4 Accomplish maximum control of solid construction waste.
- .5 Preserve environment and prevent pollution and environment damage.

1.4 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prior to removing materials, provide written authorization from the third party property owner(s) accepting disposal materials as non-hazardous solid waste.
- .3 Provide a summary report of the disposed material (by quantity or weight) sent to third party property owner(s) versus material that was reused, sold or recycled.
- .4 Submit a Waste Reduction Work Plan indicating the materials and quantities of material that will be recycled and diverted from landfill, where possible.

1.5 WASTE
PROCESSING SITES

- .1 Contact local and Provincial governments for information on area waste management facilities.
- .2 For the Province of Ontario, contact the Ministry of Environment and Climate Change, 135 St. Clair Avenue West, Toronto, ON, M4V 1P5.
- .3 Contact the Recycling Council of Ontario (www.rco.on.ca) for listings of companies and agencies providing services and products related to the waste diversion and recycling.

1.6 STORAGE,
HANDLING AND
PROTECTION

- .1 Store, materials to be reused, recycled and salvaged in locations as directed by Departmental Representative.
- .2 Unless specified otherwise, materials for removal do become Contractor's property. Contractor is responsible for disposing of these materials and choosing authorized landfill site.
- .3 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.
- .4 Protect, stockpile, store and catalogue salvaged items.
- .5 Protect structural components not removed for demolition from movement or damage. In the event of damage, make repairs and replacements to the approval of, and at no additional cost, to the Departmental Representative.
- .6 Support affected structures. If the safety of any component is endangered, cease operations and

immediately notify Departmental Representative.

- .7 Separate and store materials produced during dismantling of structures in designated areas.
- .8 Store treated wood on site in a temporary containment area set up for this purpose to prevent streaming water from reaching aquatic environment.

1.6 DISPOSAL OF WASTES

- .1 Do not bury or burn rubbish or waste materials.
- .2 Do not dispose of waste, volatile materials, mineral spirits, oil or paint thinner into waterways, storm, or sanitary sewers.
- .3 Remove materials from deconstruction as deconstruction/disassembly Work progresses.
- .4 All waste materials should be disposed of in a legal manner at a site approved by Local Authorities.
- .5 Evacuate waste materials out of site along with work progress.
- .6 Prepare project summary to verify destination and quantities on a material-by-material basis as identified.
- .7 Recover, sort and separate waste generated by demolition into categories in preparation for transfer to various licensed sites. Contractor shall recover (reuse and/or recycle) non contaminated materials before disposal:

.1 Rock and other granular materials to be removed from existing structures will be recovered and reused for the construction of new structures, if they meet the specification requirements.

.2 Wood residues from construction must be managed according to the best practices and standards in effect.

1.6 SCHEDULING

- .1 Co-ordinate waste management and source separation with other activities at site to ensure timely and orderly progress
- .2 Do not dispose of waste, volatile materials, mineral spirits, oil or paint thinner into waterways, storm, or sanitary sewers.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 GENERAL .1 Arrange for suitable disposal for waste materials.
.2 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.
.3 Source separate materials to be reused/recycled into specified sort areas.

3.2 CLEANING .1 Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.
.2 Clean-up work area as work progresses.

PART 1 - GENERAL

1.1 SCOPE

- .1 This Section covers all work related to demolition, salvage, removal, and in-place abandonment, either completely or partially, of materials and structures.

1.2 MEASUREMENT PROCEDURES

- .1 All items for removal will be covered under the Lump Sum arrangement, including but not limited to specific items as outlined below.
- .1 Removal of galvanized water supply lines including hose bibs and connections present along the Station W2+770 to W2+972.
- .2 Removal of electrical power pedestal removal including disconnection of feeders from distribution panels, underground conduits, junction boxes.
- .3 Concrete cores (60 - 150 mm diameter) through the full depth of deck slab between Stations W2+000 and W2+100 to facilitate grouting.
- .4 Removal of the top portions of the concrete coping to facilitate the tie rod locations.
- .5 Miscellaneous removals of side portions of the timber crib to facilitate installation of the steel sheet piling and clear stone (anticipated potentially in failed sections of the timber cribs).
- .6 Removal of concrete sidewalk/pathways on grade.
- .7 Removal of concrete curb and gutter in parking lots.
- .8 Removal of materials identified for salvage as described in Section 1.10.
- .2 Measurement of removal of full depth concrete deck shall be by area in square metres.
- .3 Measurement of partial depth removals of concrete barrier curbs shall be by volume in cubic metres.
- .4 Measurement of removal of full depth asphalt pavement shall be by area in square metres. No deductions shall be made from the area for the

space occupied by maintenance holes and catch basins.

- .5 For measurement purposes, a count shall be made of the number of timber piles cut or removed.
- .6 Full depth cores of the deck at various locations are included in Appendix B. The Contractor shall assess the depths and effort associated with complexity.
- .7 Payment at the Contract price of unit rate tender items shall be full compensation for all labour, permits, equipment and material to do the work.
- .8 Expansion joints, joint filler, reinforcing steel, dowels, anchor bolts, nuts and washers and bolt grouting shall be considered included in the removal of concrete and will not be measured separately for payment.

1.3 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.
- .2 National Building Code of Canada
- .3 Occupational Health and Safety Act, OHSA / O. Reg. 213/91

1.4 RELATED REQUIREMENTS

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

1.5 UNDERSTANDING THE SITE

- .1 As part of the tender process, the Contractor shall become familiar with the site. Sufficiently assess all relevant information and constraints of the site to provide a clear understanding of the state and condition of the site.
- .2 Assess access routes those are safe and convenient to use, to / from and around the site.
- .3 Review the structures identified as stability sensitive, and/or where structural problems are known to exist and can lead to particular problems in demolition. Relevant condition reports are included in Appendix C.
- .4 Contractors should be satisfied that they have all the information necessary to undertake the work in a safe and efficient manner, including the

development of a Health and Safety Plan.

1.6 PROTECTION

- .1 Prevent movement, settlement or damage of existing structures during construction. Do not use equipment that will compromise the integrity of the existing structure prior to removal.
- .2 The structural competency of the existing piers is not guaranteed in undertaking any removal or new construction. The Contractor shall undertake his/her own evaluations and plan the work accordingly with or without access on the existing piers.
- .3 Perform removals with methods and equipment as to leave undisturbed and undamaged any portion not designated for removal or salvage. All damaged or disturbed portions shall be corrected and repaired to the satisfaction of the Departmental Representative. Broken edges of components to be left in place shall be squared and neatly trimmed.
- .4 The Contractor shall fully review the scope of work at the existing structure for planning, operational constraints and movement of equipment.
- .5 The Contractor shall be held responsible for damage to adjacent facilities caused through the performance of the work.
- .6 The Contractor may use the existing structure at their own risk to complete removals. The Department will not be held liable for the structural competency of the existing structure during demolition.
- .7 Provide area utility locates prior to removals.

1.7 PERSONAL PROTECTION

- .1 Provide appropriate Personal Protective Equipment (such as gloves, long-sleeve shirt, dust masks and eye protection, etc.) for workers handling designated substances including, but not limited to:
 - .1 chemicals found in treated timbers.
 - .2 quartz silica found in common construction materials.
 - .3 benzene found in equipment fuels.
 - .4 zinc found in galvanized materials.
 - .5 vinyl chloride found in PVC duct work.
 - .6 other hazards and substances which may be present on the site.

- .2 Ensure that sufficient ventilation is provided where sawcutting is occurring.
- .3 Provide suitable hand washing stations for workers to wash hands immediately after handling and prior to eating or drinking.

1.8 FEDERAL
HERITAGE DESIGNATION

- .1 The Front Range Lighthouse, located at the north end of the East Pier, is a recognized Federal Heritage Building due to historical associations and architectural values.
- .2 Provide full protection to the lighthouse to ensure that it is not damaged during the performance of the Work.

1.9 DESIGN AND
SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Design and plan for:
 - .1 The demolition work to occur following the installation of steel sheet pile, for containment of debris, unless otherwise approved by the Departmental Representative.
 - .2 The protection of the public, workers, adjacent properties, existing structures and the environment.
 - .3 The effects of component removals on the remaining / existing structure.
 - .4 The provision of temporary supports as required to resist forces in any direction for structural integrity during construction.
 - .5 The effects of weather on demolition activities.
 - .6 Surveying and monitoring during removal processes to ensure structural competency.
 - .7 Working platforms, as required, to undertake the demolition work.
 - .8 Use of hand-held equipment, as required, to reduce risk in localized areas of the work.
 - .9 Accumulation of debris, efficient materials handling and controlled removals.
- .3 Submit a Removals and Operational Plan sealed by a Professional Engineer licensed in the Province of Ontario. The submission shall be submitted 2 weeks prior to the commencement of removals, shall have sufficient detail and shall including:
 - .1 Work drawings showing the extents of removals.
 - .2 Layout and description of removal sequences and proposed equipment.

.3 The locations, loadings, and detailed descriptions of heavy equipment and vehicles to be supported on existing structure.

.4 Access methodologies, planned vehicle routes and all equipment.

.5 Movement and storage of materials on-site prior to removal off site.

.6 Dust and debris control.

.4 Refer to Section 01 74 21 for additional requirements.

1.10 MATERIALS FOR SALVAGE

.1 Any material designated for salvage in the Contract Documents shall remain the property of the Owner and shall be maintained in a reasonable condition and stockpiled in a manner acceptable to the Department Representative.

.2 All benches are anticipated to be removed prior to the Project.

.3 Materials to be removed and salvaged are identified in the Contract Drawings and include:

.1 Floating dock metal anchor hardware (anchored to existing concrete)

.2 power pedestals

.3 small mooring cleats

.4 Materials to be removed, refinished and reinstated are identified in the Contract Drawings and include:

.1 metal bollards

.2 life ring stations

.3 navigational aids

.4 ornamental railing system

.5 All existing bollards shall be retained in placed or removed/reinstalled. Each location shall be reviewed with the Department Representative to determine which approach will be implemented.

.6 The removal of large armour stone and existing toe berms is noted in several locations of the site on the Contract Drawings. These materials has be temporarily moved, relocated and reinstated following the completion of new construction.

PART 2 - PRODUCTS

2.1 EQUIPMENT

- .1 Utilize appropriate equipment and machinery for the performance of the work. Use alternative equipment and machinery when they product to be insufficient
- .2 Restrict the size of equipment and machinery being used for materials being salvaged, to ensure best condition possible.
- .3 Provide equipment and machinery such as barges for access, as required.

PART 3 - EXECUTION

3.1 PREPARATION

- .1 Do Work in accordance with Section 01 35 29.06 - Health and Safety Requirements and CSA 350.
- .2 Protection:
 - .1 Prevent movement, settlement, or damage to structure prior to removal. Provide bracing and shoring as required.
 - .2 Keep noise, dust, and inconvenience to occupants to minimum.
 - .3 Provide temporary dust screens, covers, railings, supports and other protection as required.

3.2 GENERAL DEMOLITION
AND DISPOSAL

- .1 Remove the existing superstructure and portions of the substructure to permit new construction. Sort materials into piles for reuse and recycling.
- .2 Legally dispose all removed materials off the site, conforming to Section 01 74 21.
- .3 Neatly demolish and remove all components within the limits of removal as indicated on the drawings.
- .4 During and after construction, all remaining scraps, cuttings, wood chips and sawdust must be collected efficiently and in a timely manner. All wood waste must be collected and disposed of in accordance with local and provincial regulations.
- .5 Progressive removals should be employed on sections of the structure, while retaining the stability of the remaining structures to avoid collapse.

- .6 Remove materials from deconstruction as demolition and disassembly Work progresses.

3.3 MATERIALS FOR SALVAGE

- .1 Remove and adequately store identified materials identified for salvage.
- .2 Take all precautions possible to remove components without damage and to suitably store the components on at a designated location on site as determined by the Departmental Representative.

3.4 STRUCTURAL COMPETENCY

- .1 Limit the weight of rig-mounted breakers, concrete crushers, cranes, vehicles and other heavy equipment used for removals.
- .2 The structural competency of the existing piers is not guaranteed in undertaking any removal or new construction. Undertake an assessment and load evaluation to plan the work.
- .3 Utilize barges when possible to minimize loading on the existing piers.

3.5 CLEANING AND RESTORATION

- .1 Keep site clean and organized throughout demolition procedure. Upon completion of project, reinstate areas affected by Work to condition which existed prior to beginning of Work or better subject to the approval of Departmental Representative.

PART 1 - GENERAL

1.1 SCOPE

- .1 This Section covers all work related to Cast-in-Place Concrete (for deck, overlay and sidewalks) including concrete material, accessories, placement, finishing, curing and protection.
- .2 This Section also covers work related to grouting voids and tremie-concrete.

1.2 MEASUREMENT PROCEDURES

- .1 Concrete in Deck will be measured by volume in cubic metres of concrete placed, as calculated from neat dimensions as indicated on drawing. Formed repairs to the raised barrier curb on the east pier will be paid for as part of this tender item.
- .2 Concrete in Overlay will be measured by volume in cubic metres of concrete placed, as calculated from neat dimensions as indicated on drawing.
- .3 Concrete in Sidewalk will be measured by volume in cubic metres of concrete placed.
- .4 Concrete in Barrier Curb will be measured by length in linear metres of barrier curb placed.
- .5 Grout for voids will be measured by volume in cubic metres of grout placed.
- .6 Electrical Conduit will be measured by length in metres of Conduit installed. There will be no separate measurement or payment for end caps.
- .7 Payment at the Contract price of unit rate tender items shall be full compensation for all labour, equipment and material to do the work.
- .8 No deductions will be made for volume of concrete displaced by reinforcing steel, structural steel, or piles.
- .9 Expansion joints, control joints, reinforcing steel, splices, wire ties, bar supports, chairs, spacers, dowels, anchor bolts, nuts and washers and bolt grouting shall be considered included in the placing of concrete and will not be measured separately for payment.
- .10 Hot and cold weather protection will be considered included in the unit rate of concrete and will not

be measured separately for payment.

- .11 Concrete tickets may be submitted for reference only but will not form the basis of calculated volume. Concrete wastage will not be included in the volume for payment.

1.3 PAYMENT

- .1 Concrete work will be valued for payment in accordance with the following schedule, subject to any applicable holdbacks.
 - .1 60 percent at completion of casting (times volume times tender item unit rate)
 - .2 30 percent at completion of curing (times volume times tender item unit rate)
 - .3 10 percent at completion of final finishing after curing (times volume times tender item unit rate)

1.4 REFERENCES

- .1 Reference Standards:
 - .1 Reinforcing Steel Manual of Standard Practice, Reinforcing Steel Institute of Canada
 - .2 ASTM International
 - .1 ASTM A 82/A 82M-07, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
 - .2 ASTM A 185/A 185M-07, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
 - .3 ASTM C 260/C 260M-10, Standard Specification for Air-Entraining Admixtures for Concrete.
 - .4 ASTM C 494/C 494M-10, Standard Specification for Chemical Admixtures for Concrete.
 - .5 ASTM C 1017/C 1017M-07, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
 - .6 ASTM D 1751-04(2008), Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
 - .7 ASTM D 1752-04a(2008), Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

- .3 CSA International
 - .1 CSA A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CSA A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
 - .3 CSA-G30.18-09 (R2014), Carbon Steel Bars for Concrete Reinforcement.
 - .4 CSA-G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .5 CSA W186-M1990(R2016), Welding of Reinforcing Bars in Reinforced Concrete Construction.
 - .6 CSA S269.1-16, Falsework and Formwork.

1.5 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit shop drawings for formwork exceeding 1.0 m in height.
 - .1 Indicate formwork design data: permissible rate of concrete placement, and temperature of concrete, in forms.
- .3 Prepare and submit detailed reinforcement placement drawings in accordance with RSIC Manual of Standard Practice. Shop drawings shall include:
 - .1 Layout of steel reinforcement including sizing, spacing, lap lengths and bar mark.
 - .2 General dimensions of the structure upon which the bar details were based upon.
 - .3 Bar lists including sizes, bends details, and quantities
 - .4 Bar identification, marks, etc. for organizing placement
 - .5 Indicate sizes, spacings and locations of chairs, spacers and hangers
 - .6 Provide type B tension lap splices unless otherwise indicated.
- .4 Concrete Pour Release forms (filled prior to each pour).
- .5 Provide concrete supplier certification that the plant is certified with Concrete Ontario (formerly the Ready-Mix Concrete Association of Ontario).
- .6 Provide concrete mix designs including statement that the admixtures are compatible with each other.

- .7 Provide documentation that the aggregates comply with CSA A23.1 and are from a MTO approved source. Submit gradations of the coarse and fine aggregates.
- .8 Weather Protection Plans (hot and cold temperature weather conditions)
- .1 It shall be the full responsibility of the Contractor to review the schedule, anticipate the impacts of work / concreting, and incorporate the costs for such weather protection schemes and associated works. (For example, this may include incorporating measures such as ice or liquid nitrogen for concrete in hot weather concrete).
- .2 When concrete is to be placed and curing in extreme temperature conditions (less than 5 degrees Celsius and more than 25 degrees Celsius), the Contractor shall submit written descriptions of proposed methods of providing appropriate concreting conditions, and preventing cold weather damage (with drawings or sketches, as required).
- .3 Incorporate modification (from comments provided) for protective measures before placing concrete.
- .9 Provide a concrete finishing plan including procedures for curing and final finishing.
- .10 Provide a concrete repair submission as required to address defects in the poured concrete.

1.6 QUALITY ASSURANCE

- .1 Provide certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, prior to beginning reinforcing work.
- .2 Provide The concrete supplier shall be certified member of the Concrete Ontario (formerly the Ready-Mix Concrete Association of Ontario).
- .3 No water is to be added to the mix following initial batching at the plant without the consent of the Concrete Supplier designated representative and the Departmental Representative.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Concrete Delivery and Acceptance Requirements:
- .1 Concrete hauling time: deliver to site of Work and discharged within 120 minutes maximum after batching.
- .2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

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

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA

- .1 Establish the proportions of cementing materials, aggregates, water, and admixtures required to produce consistent / workable concrete that has the required strength and other properties required for improved durability, reduced shrinkage and reduced cracking.
- .2 Performance Method for specifying concrete: Performance criteria according to this specification as permitted by CSA Standard A23.1.

2.2 QUALITY CONTROL PLAN

- .1 The Contractor and Concrete Supplier shall implement a Quality Control Plan to ensure verification and compliance that the concrete meets performance criteria established in this specification.

2.3 MATERIALS

- .1 Concrete
 - .1 Cementing materials to CSA Standard A3000:
 - .1 Type GU.
 - .2 Slag (as a cement replacement 20% to 35% by mass of the quantity of total cement content) is permitted
 - .2 Compressive strength: 30 MPa at 28 days.
 - .3 Exposure class: F-1 to CSA-A23.1/A23.2.
 - .4 Aggregate conforming to CSA Standard A23.1 with sizes:
 - .1 20 mm for standard mixes.
 - .2 13 mm for overlay mixes.
 - .5 Admixtures:
 - .1 Air entraining.
 - .2 Water reducing agents, as required.
 - .2 Plant added.
 - .2 Calcium chloride not permitted.
 - .6 Water: to CSA-A23.1/A23.2.
 - .7 Slump: 80 mm at time of deposit, ± 20 mm or as amended by the Contractor to suit the work.

- .2 Grout shall be flowable course fill cementitious grout, with a compressive strength of 15 MPa at 28 days and a slump of 120 mm ± 30 mm.
- .3 Tremie-concrete shall be 25 MPa at 28 days and a slump of 190 mm ± 40 mm.
- .4 Reinforcing steel bars: carbon steel, grade 400, deformed bars to CSA-G30.18, unless indicated otherwise.
- .5 Cold-drawn annealed steel wire ties: to ASTM A82/A82M.
- .6 Chairs, bolsters, bar supports, spacers: to CSA Standard A23.1/A23.2.
- .7 Formwork materials: Wood product formwork materials to CSA Standard O86.
- .8 Form ties: To be removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm diameter in concrete surface.
- .9 Form release agent: non-toxic, biodegradable, and low VOC.
- .10 Bituminous impregnated fiber board: to ASTM D 1751.
 - .1 Joint sealant: Cold applied, single component, chemically curing silicone to ASTM D5893
 - .1 low modulus
 - .2 weather and UV resistant
 - .3 unprimed adhesion (primer not required for adhesive to concrete)
- .11 Dowels into Concrete: epoxy adhesive type
- .12 Joint Filler and Sealant:
 - .1 Sheet for joints: Flexible foam expansion joint filler comprised of a closed-cell structure, which is ultraviolet resistant.
 - .2 Caulking for joints: Silicone.
- .13 Electrical conduit and end caps shall be PVC conforming to CSA Standard C22.2 No. 211.2-06 (R2011).
- .1 Fabricate reinforcing steel in accordance with CSA

2.4 FABRICATION

Standard A23.1/A23.2, and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.

- .2 Obtain Departmental Representative's written approval for locations of reinforcement splices other than those shown on placing drawings.
- .3 Do not weld reinforcement unless otherwise approved by the Departmental Representative.
- .4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

2.5 MIXES

- .1 Performance Method for specifying concrete: to meet Departmental Representative performance criteria to CSA A23.1/A23.2.
- .2 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as in Quality Control Plan.

PART 3 - EXECUTION

3.1 GENERAL

- .1 Obtain Departmental Representative's release before ordering and placing concrete.
 - .1 Provide Pour Release Form and notice to pour concrete 24 hours minimum prior to placing concrete.
 - .2 Provide a completed Concrete Pour Release Form (to be provided) prior to each pour and allow the Departmental Representative 2 hours for inspection. Have each trade sign to indicate its work is complete and ready for checking, as well as the General Contractor's representative. The use of the pour release form does not relieve the Contractor of his responsibility to complete the Work accurately.
 - .3 Do not order concrete until the Concrete Pour Release Form has been signed by the Contract Administrator.
- .2 During concreting operations:
 - .1 Development of cold joints not allowed.
 - .2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.

- .3 Ensure reinforcement and inserts are not disturbed during concrete placement.
- .4 Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing in adverse weather.
- .5 Protect previous Work from staining.
- .6 Clean and remove stains prior to application for concrete finishes.
- .7 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .8 In locations where new concrete is dowelled to existing work, drill holes in existing concrete. Place steel dowels of deformed steel reinforcing bars and pack solidly with epoxy adhesive to anchor and hold dowels in positions as indicated.
- .9 Thoroughly clean joints to receive sealant. Place foam backer rod. Do not apply sealant to wet or damp concrete.
- .10 Do not place load upon new concrete until authorized by Departmental Representative.
- .11 Comply with CSA Standard A23.1 'Concrete Materials and Methods of Concrete Construction.'

3.2 PREPARATION

- .1 Verify lines, levels and centres before proceeding with formwork/falsework. Ensure dimensions and elevations agree with drawings.
 - .1 Form 12 mm chamfers at concrete edges, unless shown otherwise on the Drawings.
 - .2 Laterally brace formwork and falsework and prevent displacement during concrete placement. Form chases, openings, projections, recesses, expansion joints and construction joints. Incorporate frames, castings, pipes, sleeves, and similar items into the formwork
- .2 Obtain Departmental Representative's approval for use of earth forms framing openings not indicated on drawings.
- .3 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.
- .4 Fabricate and erect formwork to produce finished concrete conforming to shape, dimensions, locations

and levels indicated within tolerances required by CSA Standard A23.1.

- .5 Verify concrete elevations in advance of the pour. Mark on forms, install screed markers or provide other means establishing final elevations during concrete pours.
- .6 Provide site drainage to prevent washout of soil supporting mud sills and shores.
- .7 Align form joints and make watertight. Keep form joints to minimum
- .8 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.
- .9 Build in anchors, sleeves, and other inserts required to suit Work specified in other sections. Ensure that anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.
- .10 Remove all waste material, cut tie wire and other materials from the pour area. Clean formwork in accordance with CSA Standard A23.1 before placing concrete.
- .11 Coordinate the requirements of all trades and assume responsibility for location, installation and quality of all items which affect the Work of this Section.

3.3 FIELD BENDING OF REINFORCEMENT

- .1 Do not field bend or field weld reinforcement except where indicated or authorized by Departmental Representative.
- .2 When field bending is authorized, bend without heat, applying slow and steady pressure.
- .3 Replace bars, which develop cracks or splits.

3.4 PLACING REINFORCEMENT

- .1 Place reinforcing steel as indicated on placing drawings and in accordance with CSA Standard A23.1/A23.2.
- .2 Prior to placing concrete, allow for sufficient time for the review of reinforcing steel and arrangement of the Departmental Representative.
- .3 Ensure cover to reinforcement is maintained during concrete pour.

3.5 PLACING CONCRETE

- .1 Undertake cast-in-place concrete work conforming to CSA Standard A23.1/A23.2.
- .2 Plan concrete pours to suit the weather conditions. Adjust pour sequences or schedules to avoid adverse weather conditions. Do not cast concrete during rainfalls. Do not cast slabs during high winds. Follow cold weather and hot weather procedures when those temperatures exist or may be expected.
- .3 Do not commence concrete placing until sufficient manpower and equipment is available to complete the placement expeditiously preventing the formation of cold joints, and to produce the specified surface finish.
- .4 Joint fillers:
 - .1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Departmental Representative.
 - .2 When more than one piece is required for joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.
 - .3 Locate and form isolation joints as indicated.
 - .4 Install joint filler.
 - .5 Install joint sealant where indicated on the drawings.
- .5 Verify that accessories, inserts, bollards, and reinforcement are set correctly and are not disturbed during concrete placement.
- .6 Place concrete on dry and clean substrate.
- .7 Place concrete within 1 metre of its final position. In formed sections, provide sufficient elephant trunks to meet this requirement.
- .8 Do not move concrete laterally with the vibrators. Lower the vibrators vertically, and vibrate within 1 m of the point of placement.
- .9 Depositing and consolidation.
 - .1 Deposit concrete in a manner that prevents segregation in accordance with CSA Standard A23.1.
 - .2 Consolidate the concrete during and immediately after depositing, thoroughly and uniformly by means of tamping, hand tools, finishing machines, and vibrators in order to

obtain dense, watertight, homogeneous concrete well bonded to reinforcing bars. Carefully vibrate concrete around appertenances to ensure thorough contact.

- .3 Deposit concrete adjacent to the pile cap member and consolidate adequately to minimize voids below the pile cap.

3.6 SURFACE
TOLERANCE

- .1 Finish unformed surfaces true to grade and free of surface irregularities exceeding 3 mm under a 3 metre straight edge in any direction.

3.7 POUR LIMITS

- .1 To reduce shrinkage induced cracking, the Contractor shall plan for the following limitations in pour lengths.
 - .1 25 m maximum horizontally
 - .2 Pour deck in segments along the piers to increase daily production.
 - .3 Allow 3 days between adjacent segments.

3.8 FINISHING AND
INITIAL CURING

- .1 Finish concrete to CSA Standard A23.1/A23.2.
- .2 In addition to cold weather requirements listed in CSA Standard A23.1, protect concrete against drying shrinkage and plastic shrinkage for slabs. Take special precautions to control and eliminate initial drying shrinkage and plastic shrinkage for slabs. Provide wind breaks, shelters or shades.
- .3 Keep concrete surfaces moist continuously while the concrete is protected.
- .4 Initial finishing shall be by bull floats and darbies, sloped as indicated on drawings. Finish finishing for air entrained concrete shall be using magnesium float for slabs or other means as approved by the Departmental Representative.
- .5 Finish finishing for air entrained concrete shall be using magnesium float for slabs or other means as approved by the Departmental Representative. Use a concrete broom on deck slabs for a non-slip finish.
- .6 During curing period, uncover only such areas as are immediately needed for finish treatment. Recover and continue curing.
- .7 When concrete has set sufficiently, give surface a uniform broom finish free from porous spots, irregularities, depressions, small pockets or rough

spots

- .8 Rub exposed sharp edges of concrete with carborundum to produce 3 mm minimum radius edges unless otherwise indicated.

3.9 FIELD QUALITY CONTROL

- .1 Inspection and testing of concrete and concrete materials may be carried out by testing laboratory designated by Departmental Representative:
 - .1 Slump, air and concrete temperature (each truck or until consistency is established).
 - .2 Two (2) sets of cylinder with compressive strength tests for the deck pour, from different trucks (test 1 cylinder at 7 days and 2 cylinders at 28 days).
- .2 The Contractor shall undertake independent testing for verification and quality control.
- .3 Test results shall shared and distributed for discussion at site meetings.

3.10 CURING

- .1 Immediately after placing fresh concrete and until finishing, maintain 100% humidity in the air at the concrete surface with a spray fogging device (or other means) to prevent plastic shrinkage cracks in the concrete surface. The fresh concrete surface must be kept damp, but with no standing water, until finishing is complete.
- .2 When the finishing is complete immediately cover the concrete with a continuous polyethylene sheet.
- .3 Continuously wet cure concrete for 5 days. Provide the equipment necessary for the proper curing adjacent to the Work before commencing pouring.
- .4 Be responsible for protection of concrete from damage by all trades and the public. Do not pile or store materials on slabs nor wheel nor handle materials over slabs until concrete has been in place for 10 days (under normal conditions).
- .5 Leave formwork in place for 5 days following placing of concrete.
- .6 Remove formwork when concrete has reached 75% of its design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.
- .7 Re-use formwork subject to requirements of CSA Standard A23.1/A23.2.

3.11 HOT WEATHER
WORK

- .1 Take hot weather precautions when the concrete temperature at any time exceeds 25 degrees C and do not place concrete, whose temperature exceeds 30 degrees C. in the mixer.
- .2 Incorporate the cost of these measures between (and including) the months of June and August.
- .3 Concrete, whose temperature in the mixer is between 27 degrees C. and 30 degrees C. must contain a retarder which reduces mixing water requirements and increases strength and must contain high early strength cement.
- .4 Protect forms and equipment, including both mixing and placing equipment, from the rays of the sun and cool by wetting as necessary to maintain a temperature of not more than 5 degrees C. in excess of ambient temperature nor more than 40 degrees C.
- .5 Keep mixing time to the minimum, consistent with the production of the quality of concrete specified and place mixed concrete immediately.
- .6 Provide wind breaks, sun shades, plastic sheeting or other materials as required by CSA Standard A23.1 when the evaporation is expected to exceed the limits shown.
- .7 Commence continuous wet curing as soon as the concrete has hardened sufficiently to prevent surface damage.

3.12 COLD WEATHER
WORK

- .1 take cold weather precautions whenever the ambient temperature is, or is expected to be, at or below 5 degrees C.
- .2 Incorporate the cost of these measures between (and including) the months of October and April.
- .3 Have protective measures in place, or adjacent to the Work, and approved by the Contract Administrator before any concrete is mixed or ordered.
- .4 Maintain concrete temperatures between 10 degrees C. and 20 degrees C. for a minimum of 3 days for unloaded areas, and 6 days for areas receiving partial load.
- .5 At the termination of the protection period, do not drop the concrete temperature more than 20 degrees

Celsius in the first 24 hr.

3.13 REPAIRS

- .1 Upon review of concrete finish, undertake all preventative and correction actions to prevent further concrete defects from occurring.
- .2 Concrete elements having one or more defects and deficiencies shall be repaired according to an acceptable procedure with the Department Representative. Standard finishing shall be completed after such repairs are carried out.
- .3 Concrete defects are defined as
 - .1 Air voids, honeycombing, cavities, spalling, delamination, greater than 5 mm in size in any direction.
 - .2 Bugholes greater than 10 mm in diameter or 5 mm in depth
 - .3 Plastic shrinkage cracking with a width greater than 0.4 mm.
 - .4 General shrinkage cracking with a width greater than 0.7 mm.

3.13 CLEANING

- .1 Promptly as the Work proceeds and upon completion, clean-up and remove from the site, rubbish and surplus material resulting from the Work of this Section.

PART 1 - GENERAL

1.1 SCOPE

- .1 This Section covers Work related to repointing of limestone block walls above the water line.
- .2 Related Section:
 - .1 Section 04 03 08 - Masonry Repair

1.2 MEASUREMENT PROCEDURES

- .1 Masonry Repointing will be measured by area in square metres of stone wall repointed, as measured in the field.
- .2 Payment at the Contract price of unit rate tender items shall be full compensation for all labour, permits, equipment and material to do the work.
- .3 The removal of vegetation and temporary relocation of utilizes is paid under the Lump Sum Arrangement.
- .4 The temporary relocation and support of small diameter conduits and junction boxes are paid under the Lump Sum Arrangement.
- .5 Hot and cold weather protection will be considered included with the repointing and will not be measured separately for payment.

1.3 REFERENCES

- .1 Canadian Standards Association
 - .1 CSA A3000 - Cementitious Materials Compendium.
 - .2 CSA A179 - Mortar and Grout for Unit Masonry.

1.4 SUBMITTALS

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 General submission requirements:
 - .1 Submit a detailed Work Plan outlining the schedule, equipment, noise / dust / debris control, general access, protection measures and the general procedures for the work.
- .3 Submit the materials and mortar mix design.

1.5 WASTE MANAGEMENT AND DISPOSAL .1 Legally dispose all waste materials off the site, according to Section 01 74 21.

1.6 SITE CONDITIONS .1 Ambient air temperatures of 5 degrees celcius are required for work during and 48 hours before and after completion of the work.

1.7 QUALITY ASSURANCE .1 The work in the Section shall be executed by a Contractor specializing in masonry construction with a minimum of 10 years of experience.

PART 2 - PRODUCTS

2.1 MATERIALS .1 All materials using is mortar production shall conform to CSA A179.
.2 Water shall be potable, clean and free from contaminates.
.3 Fine aggregate shall conform to CSA A179.

2.2 MORTAR FOR BEDDING AND POINTING .1 Mortar used bedding and pointing for stonework shall conform to CSA A179, consisting of:
.1 Type N - Portland Cement Type GU and Type SA Hydrated Lime.
.2 Compressive strength of 2.0 MPa 7 days and 3.5 MPa at 28 days.
.2 Use of calcium chloride or chloride based compounds are not permitted in the mix.
.3 Prehydrate mortar by mixing ingredients dry. Mix again adding just enough water to produce damp unworkable mix that will retain its form when pressed into ball. Allow to stand for 30 to 60 minutes, then remix with sufficient water to produce mortar of proper consistency for pointing.
.4 Re-temper mortar as required when water is lost by evaporation.
.5 Use mortar within 2 hours after mixing.

PART 3 - EXECUTION

3.1 GENERAL

- .1 Undertake repointing work on all surfaces above the water line.
- .2 Provide access and install all protective measures to prevent materials from entering the watercourse.
- .3 Repoint fractured stones which are solidly supported from behind.
- .4 Protect adjacent finished work against damage which may be caused by on-going work.

3.2 MIXING

- .1 Prehydrate mortar by mixing ingredients dry. Mix again adding just enough water to produce damp unworkable mix that will retain its form when pressed into ball. Allow to stand for 30 to 60 minutes, then remix with sufficient water to produce mortar of proper consistency for pointing.
- .2 Re-temper mortar as required when water is lost by evaporation.
- .3 Use mortar within 2 hours after mixing.

3.3 REPOINTING

- .1 Rake out all joints as noted on drawings.
- .2 Rake unsound joints free of deteriorated and loose mortar, dirt and other undesirable material.
- .3 Cutting out of joints is to be done with hammer and chisel. Use of power tools is permitted based on the Contractor's ability to comply with conditions noted.
 - .1 Grind the centre of the joint only, to a maximum width of half of the joint width. Mortar must remain on each side of the cut. The grinders must not touch the stone.
 - .2 For vertical joints, and discontinuous horizontal joints, stop sawcut 50 to 75 mm from end of joint. Do not sawcut stone.
 - .3 Remove the remaining mortar with hand tools.
 - .4 Notify the Departmental Representative to inspect the grinding, prior to removing the remaining mortar.
- .4 Removal of all existing excess mortar that may have been applied to stone face due to overpointing. Do

not damage arris or finish on stone face.

- .5 Include removal of all existing high strength cementitious mortar from the joints.
- .6 Clean joints to full depth of deteriorated mortar, but in no case to less than 30 mm. Clean out voids and cavities encountered.
- .7 Clean surfaces of joints by compressed air, without damaging texture of exposed joints or masonry units.
- .8 Flush open joints and voids. Clean open joints and voids with low pressure water and if not free draining blow clean with compressed air.
- .9 Fine joints (less than 4mm) need not be raked out more than 10mm, in order to reduce the danger of chipping the masonry edges. Cut these joints with power - saw, if necessary. When saw cutting vertical joints, stop sawcut 50 to 75 mm from end of joint. Do not saw cut stone. Use flat-bladed quirks and light hammers, hack-saw blades or similar tools to rake out joints.
- .10 Leave no standing water.
- .11 Do not rake joints for more than three courses of stone, prior to backpointing, unless approved by the Departmental Representative..
- .12 If masonry unseats or bond is broken, remove unit and reset.

3.4 BACKPOINTING

- .1 Where cut out joints are deeper than minimum raking out depths specified above, backpoint joints to bring mortar face to specified depth for raked out joints, in preparation for finishpointing. Where voids exist that conventional backpointing cannot fill, consult with Departmental Representative.
- .2 Immediately prior to pointing, thoroughly wet joints in order to control absorption.
- .3 Allow water to soak into masonry and mortar, leaving no standing water, but remaining wet.
- .4 For backpointing, fill all joints full with mortar, compacting firmly into joints to ensure positive adhesion to all inner surfaces. Place mortar in layers, maximum 30 mm thick, minimum 15 mm thick, allowing each layer to set to thumb print hardness before placing next layer. Fill vertical joints to a depth of 400 mm minimum from face of stone. Fill

horizontal joints to full depth of raked out joints. Bring face of mortar in backpointed joint to specified minimum depth for raked out joints, measured from the arris of the masonry unit. Leave ready for final pointing.

- .5 Fill and cover previously grouted cavities with mortar mix.
- .6 Form mortar square to stone face, and leave exposed stone each side of joint clean of mortar prior to mortar setting.
- .7 For deep joints, provide stainless steel packing tools manufactured to permit the mason to compact mortar deep into the joints.
- .8 Prevent mortar from being placed or smeared onto face of stone. Avoid mortar staining of masonry faces during backpointing.

3.5 FINSHPOINTING

- .1 When all required repair and replacement work is complete, carry out finishpointing.
- .2 Before finishpointing, wash walls to be finishpointed and allow to dry to dampdry condition. Ensure that all dust, mortar particles, and other debris is removed from joints and wall surfaces before finishpointing.
- .3 Dampen joints and completely fill with mortar. Avoid feathered edges. Pack mortar solidly into voids and joints, to ensure positive adhesion to all inner surfaces.
- .4 Where stone units have worn rounded edges, keep pointing back from face of stone. If the width of the mortar joint will exceed 35 mm, review conditions with the Departmental Representative.
- .5 Keep masonry damp while pointing is being performed
- .6 Build up pointing in layers not exceeding 30 mm in depth. Allow inner layers to become thumbprint hard before applying subsequent layers. Pack and compress mortar into voids to fit approximately, but no less than 15 mm thick. Maintain joint width.
- .7 Remove excess mortar from masonry face before it sets. Finish jointing neatly as detailed.
- .8 Allow mortar to set so that there is no free water that will cause run off on stone faces, then tool to match approved mock-up joints. Tool head joints, followed by horizontal joints. Do not overwork the

face of the joints. Ensure joints are uniform in appearance. Do not brush joints until they have set to the extent that brushing will not mark the joint surface.

- .9 When mortar is thumbprint hard, tool joints behind masonry face with tools specifically crafted to replicate weathered joints.
- .10 Protect newly laid mortar from frost, rainfall or rapid drying conditions.
- .11 Moist cure freshly pointed joints by spraying at intervals and covering with polyethylene sheeting for minimum of 4 days after finishpointing. Keep wall misted.

3.6 CLEANING

- .1 Clean surfaces of mortar droppings, stains and other blemishes resulting from work of this contract as work progresses.
- .2 Remove droppings and splashings using clean sponge and water.
- .3 Do further cleaning using stiff natural bristle brushes after mortar has attained its initial set and has not fully cured.
- .4 Clean masonry with stiff natural bristle brushes and plain water only if mortar has fully cured.

PART 1 - GENERAL

1.1 SCOPE

- .1 This Section covers Work related to repair of the limestone block wall above the water line including grouting of voids, replacement of face stone and assess to undertake the work.
- .2 Related Section:
 - .1 Section 04 03 07 - Masonry Repointing

1.2 MEASUREMENT PROCEDURES

- .1 Grouting will be measured by volume in cubic metres of cementitious grout placed, as calculated in the field.
- .2 Replacement of stones will be measured by area in square metres (rounded to the nearest decimal) at the wall surface, as calculated in the field.
- .3 Payment at the Contract price of unit rate tender items shall be full compensation for all labour, equipment and material to do the work.

1.3 REFERENCES

- .1 Canadian Standards Association
 - .1 CSA A3000 - Cementitious Materials Compendium.
 - .2 CSA A179 - Mortar and Grout for Unit Masonry.

1.4 SUBMITTALS

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit a grout mix design or proprietary product including mixing procedures.
- .3 Submit a detailed Work Plan outlining the schedule, equipment, noise/dust/debris control, access, protection measures and the general procedures for the work including filling of voids, repair of face stone and experience of the proposed staff.
- .4 Prior to the use of stone, provide a sample of the stone proposed for use.

1.5 SITE CONDITIONS

- .1 Ambient air temperatures of 5 degrees Celsius are required for work during and 48 hours before and after completion of the work.

1.6 WASTE
MANAGEMENT AND
DISPOSAL .1 Legally dispose all waste materials off the site,
according to Section 01 74 21.

1.7 QUALITY ASSURANCE .1 The work in the Section shall be executed by a
Contractor specializing in masonry construction
with a minimum of 10 years of experience.

1.8 DELIVERY/STORAGE .1 Handle and store materials on site according to
Manufacturer's recommendations.
.2 Store materials under cover and on raised skids.

PART 2 - PRODUCTS

2.1 MATERIALS .1 Grout shall be flowable course masonry fill grout,
cementitious with a compressive strength of 10 MPa
at 28 days.
.2 Stone shall be hard, sound and clean, with colour
similar to the existing wall.
.1 Use stone from one source only.
.2 Use a minimum thickness of 0.1 m.
.3 Cut stones to suit the face size required.
.3 Water shall be potable, free from contaminates.
.4 Fine aggregate shall conform to CSA A179.
.5 Formwork materials: Wood product formwork materials
to CSA Standard O86.

PART 3 - EXECUTION

3.1 GENERAL .1 Undertake repair work on all surfaces above the
water line. Review conditions with the
Departmental Representative to identify areas for
grouting.
.2 Provide access and install all protective measures
to prevent materials from entering the watercourse.
.3 Protect adjacent finished work against damage which
may be caused by on-going work.

- .4 Clean out voids and cavities encountered by flushing with low pressure water. Remove debris that will inhibit bond of grout in cavities. Loose stone material may remain in the cavities to be grouted.
- .5 Loose face stones that are unsupported from behind are to be removed and the void behind grouted. Clean surfaces of joints by compressed air, without damaging exposed joints or masonry units.

3.2 GROUTING

- .1 Form and fill voids and cavities with grout to a minimum of 125 mm below the surface of the wall, to suit the face stone.
- .2 For voids, less than 75 mm in one direction, grouting of the void to 25 mm below the wall surface may be permitted at the discretion of the Department Representative. Allow grout to set. Where possible, leave a rough surface finish to permit final pointing according to Section 04 03 07
- .3 Use grout within 2 hours after mixing.
- .4 Remove excess grout which result in poor aesthetics or obstruction with repointing activities.

3.3 STONE WORK

- .1 Cut stone to shape and dimensions.
- .2 Back-check stone contacting grout or mass stone fill behind the wall surface.
- .3 Finish exposed faces and edges of stones to achieve an aesthetic finish similar to existing.
- .4 Remove and/or fix dislodged/loose stone units back into place.
- .5 Move and lift stone units using appropriate and adequate means to prevent damage. Shore and protect stone during movement and placement.
- .6 Utilize pull out wood wedges for support during placement. Remove and fill voids with mortar.

3.3 CLEANING

- .1 Promptly as the Work proceeds and upon completion, clean-up and remove from the site, rubbish and surplus material resulting from the Work of this Section.

PART 1 - GENERAL

1.1 SCOPE

- .1 This Section covers aggregate fill materials for berms and structures.

1.2 MEASUREMENT PROCEDURES

- .1 Clear Stone fill will be measured in tonnes of material placed.
- .2 Armour Stone will be measured in tonnes of material placed.
- .3 Stone for Core Fill will be measured in tonnes of material placed.
- .4 Stone for Under Layer will be measured in tonnes of material placed.
- .5 Stone for Toe Berm will be measured in tonnes of material placed.
- .6 Excavation, stock-piling and reuse of native fill will be considered as part of the Lump Sum arrangement
- .7 Payment at the Contract price of unit rate tender items shall be full compensation for all labour, equipment and material to do the work.
- .8 Aggregate weigh tickets may be submitted in support of material placed, provided that the material is confirmed installed.

1.3 RELATED REQUIREMENTS

- .1 Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .2 Section 31 32 19.01 - Geotextiles
- .3 Section 31 62 16.13 - Steel Sheet Piles.

1.4 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
- .1 ASTM D 4791-[99], Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.
- .2 Ontario Provincial Standard Specifications (OPSS)
- .1 OPSS.MUNI 1004 November 2013, Material

Specification for Aggregate - Miscellaneous.
.2 OPSS.MUNI 1010 November 2013, Material
Specification for Aggregate - Base, Subbase,
Select Subgrade, and Backfill Material.

1.5 SAMPLING

- .1 Allow sampling by Departmental Representative as required.
- .2 Provide Departmental Representative with access to source and processed material for sampling.

1.6 SUBMITTALS

- .1 Provide the source of aggregates and provide access for sampling at least 4 weeks prior to commencing production.
- .2 Four weeks in advance of aggregate delivery, provide an Aggregate Management Plan (AMP) outlining local haul routes, storage locations, schedules and planned movement plans within the site. With the assistance of the Department Representative, the AMP will be review with various area stakeholders. Cooperate and modify the AMP according to the comments returned.
- .3 Provide an Aggregate Placement Procedures for all aggregate installed below water.
- .4 An underwater video and photographs of the final armour stone construction shall be submitted upon completion of the work.

1.7 COORDINATION

- .1 The marina is in operation. Ensure all activities associated with this construction are done in a manner that is compatible with the use and operation of the marina. Protect the public, the marina facilities, the boats, and the boaters from adverse effects from all construction activities.
- .2 Keep the Department Representative advise of the installation activities and schedule. Propose and submit an Access and Procedures Work Program outlining a safety related work area and control of access by facility users for the duration required. Await City and Marina user review, input and acceptance prior to implementation.

1.8 LAYOUT

- .1 The Contractor shall be responsible for all the layout of all new construction.

1.9 DIVERS

- .1 The Contractor shall employ divers during the duration of work to complete the work. The diver

shall be on site for the installation of filter fabric, placement of rock, cutting of timber piles, and verification of work.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, or other substances that would act in deleterious manner for use intended.
- .2 Flat and elongated particles of coarse aggregate: to ASTM D 4791.
 - .1 Greatest dimension to exceed five times least dimension.
- .3 Fine aggregates satisfying requirements of applicable section to be one, or blend of following:
 - .1 Natural sand.
 - .2 Manufactured sand.
 - .3 Screenings produced in crushing of quarried rock, boulders, gravel or slag.
- .4 Coarse aggregates satisfying requirements of applicable section to be one of or blend of following:
 - .1 Crushed rock.
 - .2 Gravel and crushed gravel composed of naturally formed particles of stone.
 - .3 Light weight aggregate, including slag and expanded shale.
- .5 Armour stone: Rough angular quarried stone with a minimum specific gravity of 2.4.
- .6 Stone for core fill.
 - .1 Size range 60 mm to 260 mm, with gradation:

| <u>Sieve Designation</u> | <u>% Passing</u> |
|--------------------------|------------------|
| 260 mm | 100 |
| 150 mm | 80-100 |
| 60 mm | 0-5 |
- .7 Stone for Toe Berm.
 - .1 Size range 100 mm to 300 mm, with gradation:

| <u>Sieve Designation</u> | <u>% Passing</u> |
|--------------------------|------------------|
| 300 mm | 100 |
| 250 mm | 70-90 |
| 150 mm | 5-20 |
| 100 mm | 0-5 |

- .8 Clear stone for sheet pile fill: to Ontario Provincial Standard Specification OPSS.MUNI.1004.

- .1 Size range 19 mm to 75mm, with gradation:

| <u>Sieve Designation</u> | <u>% Passing</u> |
|--------------------------|------------------|
| 75 mm | 100 |
| 40 mm | 20 |
| 19 mm | 0 |

- .9 Granular A: to Ontario Provincial Standard Specification OPSS.MUNI.1010.

2.2 SOURCE QUALITY CONTROL

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

PART 3 - EXECUTION

3.1 PREPARATION

- .1 Processing
- .1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.
- .2 Blend aggregates, if required, to obtain gradation requirements, percentage of crushed particles, or particle shapes, as specified. Use methods and equipment approved by Departmental Representative.
- .3 Wash aggregates, if required to meet specifications. Use only equipment approved by Departmental Representative.
- .4 When operating in stratified deposits use

excavation equipment and methods that produce uniform, homogeneous aggregate.

- .2 Handling
 - .1 Handle and transport aggregates to avoid segregation, contamination and degradation.
- .3 Stockpiling
 - .1 Do not stockpile aggregates on site approved otherwise by Departmental Representative.
- .4 Secure the areas of work from public access.
- .5 Prepare and shape underwater surfaces along the harbour bottom. Clear all obstructions.

3.2 PLACEMENT

- .1 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.
- .2 Where indicated on the drawings, place geotextiles free wrinkles and support until covered with aggregate. Provide a minimum overlap of 1 m.
- .3 Carefully place stone uniformly to the sizes as indicated on the Contract Drawings.
- .4 Do not drop the stone from excessive heights. End dumping of aggregate is not permitted
- .5 Generally work from the lower elevations and working progressively up the slope. Place materials according to the accepted Aggregate Placement Procedures.
- .6 Divers shall coordinate placement of rock, ensure even coverage and protect against displacement of fabric during rock placement.

3.3 CLEANING

- .1 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.
- .2 Promptly as the work proceeds and upon completion, clean-up and remove from the site, rubbish and surplus material resulting from the Work of this Section.

PART 1 - GENERAL

1.1 SCOPE

- .1 This Section covers all work related clearing and grubbing as required to suit new work.
- .2 Clearing involves removal of brush vegetative growth. Grubbing consists of excavation to clear roots, boulders and rock fragments of specified size, to a depth below existing ground surface required to suit new Work.

1.2 MEASUREMENT PROCEDURES

- .1 Clearing and grubbing as identified on the drawings and as specified is considered part of the lump sum arrangement. The Contractor shall assume that the area between the sheet piles and/or anchor walls require clearing and grubbing. There will be no measurement for payment. Clearing and grubbing is also required on the west side of the West Pier along the existing rock berm.
- .2 The Contractor shall assume the permanent removal of 5 trees ranging in diameter from 75 mm to 350 mm as part of the lump sum arrangement. There will be no measurement for payment.

1.3 STORAGE AND PROTECTION

- .1 Prevent damage to fencing, trees, landscaping, natural features, bench marks, existing buildings, existing pavement, utility lines, site appurtenances, water courses and root systems of trees which are to remain. Repair damaged items to approval of Departmental Representative.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Consider felled timber from which saw logs, pulpwood, posts, poles, ties, or fuel wood can be produced as saleable timber.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not used.

PART 3 - EXECUTION

3.1 PREPARATION

- .1 Inspect site and verify with Departmental Representative, items that require.
- .2 Obtain area locates and protect affected utility services in the area. Notify Departmental Representative immediately of unknown existing utility lines
- .3 Keep roads and walks free of dirt and debris.

3.2 CLEARING

- .1 Clearing includes felling, trimming, and cutting of trees into sections and satisfactory disposal of trees and other vegetation designated for removal, including downed timber, snags, brush, and rubbish occurring within cleared areas.
- .2 Remove cleared materials and dispose off site.

3.3 GRUBBING

- .1 Remove and dispose off site stumps and roots larger than 25 mm in diameter, in the designated working areas north and south of the South Pier.
- .2 Fill depressions made by grubbing with suitable material and to make new surface conform with existing adjacent surface of ground.

3.4 TREES

- .1 Except where indicated for removal on the Contract Drawings, retain existing trees where possible in place.
- .2 Review with Department Representative the trees on site. Where possible and practical, retain existing trees in place or temporarily remove the tree. For larger diameter trees, where temporarily removal is not practical, obtain permission from the Department Representative to permanently remove.
- .3 Where a tree is designated for temporarily removal but deemed an obstruction, remove the tree and root ball with appropriately sized equipment. Set the tree aside, wrap the root ball, protect and water the tree until reinstallation.

3.5 FINISHED SURFACE

- .1 Leave ground surface in condition suitable for excavation work and other operations to approval of Departmental Representative.

3.6 CLEANING

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

PART 1 - GENERAL

- 1.1 SCOPE
- .1 This Section covers Work related to excavation, trenching and backfilling.
- 1.2 MEASUREMENT PROCEDURES
- .1 Granular A will be measured in tonnes of material placed.
- .2 Excavation, stock-piling and reuse of native fills and rock berms will be considered as part of the Lump Sum arrangement
- .3 Excavation and legal disposal of fill materials will be considered as part of the Lump Sum arrangement
- .4 Excavation (underwater) will be measured by length in linear metres of excavation, as calculated along the front face of the sheet pile. The measurement will include clearance of miscellaneous obstructions necessary to prepare the surface for sheet pile work.
- .1 The width of excavation will be as indicated on the contract drawings to suit the toe berm.
- .4 Supply and installation of silt fence barrier is considered incidental to excavating and backfilling of native fill and will not be measured separately for payment.
- .5 Payment at the Contract price of unit rate tender items shall be full compensation for all labour, equipment and material to do the work.
- .6 Aggregate weigh tickets may be submitted in support of material placed, provided that the material is confirmed installed.
- 1.3 RELATED REQUIREMENTS
- .1 Section 01 74 21 - Construction / Demolition Waste Management and Disposal.
- .2 Section 02 41 16 - Structure Demolition.
- .3 Section 31 11 00 - Clearing and Grubbing.
- .4 Section 31 05 16 - Aggregate Materials.
- .5 Section 31 32 19.01 - Geotextiles

- 1.4 REFERENCES .1 Ontario Provincial Standard Specifications (OPSS)
- .1 OPSS.MUNI 1004 November 2013, Material Specification for Aggregate - Miscellaneous.
- .2 OPSS.MUNI 1010 November 2013, Material Specification for Aggregate - Base, Subbase, Select Subgrade, and Backfill Material.
- 1.5 SUBMITTALS .1 Provide the source of all materials.
- 1.6 WASTE MANAGEMENT AND DISPOSAL .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

- 2.1 MATERIALS .1 Clear stone for voids: 19.0 mm diameter, uniformly graded, to Ontario Provincial Standard Specification OPSS.MUNI.1004.
- .2 Granular A: to Ontario Provincial Standard Specification OPSS.MUNI.1010.
- .3 Native fill: excavated soil, free from roots and debris. Departmental Representative to approve excavated materials before use as backfill.

PART 3 - EXECUTION

- 3.1 UTILITY LOCATES .1 Before commencing work, establish location and extent of underground utility lines in area of excavation. Notify Departmental Representative of findings.
- .2 Arrange for and de-energize existing street lighting lines. Retain, protect and support, as required, existing conduit and lines.
- .3 Record and submit the locations of all lines.
- 3.2 EXCAVATION .1 Excavate and stockpile native material as required.
- .3 Remove concrete, masonry, paving, walks, demolished

foundations, rubble and other obstructions encountered during excavation in accordance with Section 02 41 16 - Structure Demolition.

- .4 Keep excavated and stockpiled materials safe distance away from edge of excavations.
- .5 Dispose of surplus and unsuitable excavated material off site.
- .6 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .7 Correct over-excavation by backfilling with an approved material (without cost to the Owner), to the satisfaction of the Departmental Representative.
- .8 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
- .9 Employ divers as required to complete the work.

3.3 BACKFILLING

- .1 Do not proceed with backfilling until tie rod and waler installation has been inspected and approved by Departmental Representatives.
- .2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
- .3 Place backfill all spaces not occupied by parts of the structure, or other permanent works, with specified material, placed as shown on the drawings
- .4 Place Granular A materials in areas as indicated. Place material in uniform layers not exceeding 200 mm compacted thickness up to grades indicated and be uniformly compacted to at least 98% SPMDD.
- .5 Backfill not explicitly identified on the drawings shall assumed to be Granular A.
- .6 When geotextile is shown in the Contract Drawing, place Granular fill in a manner so as not to damage the geotextile.

3.4 VOIDS

- .1 When approved by Departmental Representatives, install Granular A or Clear Stone into voids or cavities in the existing timber crib structure.

PART 1 - GENERAL

- 1.1 SCOPE .1 This Section covers Work related to Geotextiles.
- 1.2 MEASUREMENT AND PAYMENT .1 Measure geotextiles in square metres of surface covered by material. No allowance will be made for seams and overlaps.
- 1.3 REFERENCES .1 Ontario Provincial Standard Specifications (OPSS)
- .1 OPSS 1860, April 2011, Material Specification for Geotextiles.
- 1.4 SUBMITTALS .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for geotextiles and include product characteristics, performance criteria, physical size, finish and limitations.
- 1.5 DELIVERY, STORAGE AND HANDLING .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Storage and Handling Requirements:
- .1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect geotextiles from direct sunlight and UV rays.
- .3 Replace defective or damaged material.

PART 2 - PRODUCTS

- 2.1 MATERIAL .1 Geotextile: non-woven synthetic fibre fabric, supplied in rolls.
- .2 Physical properties:

- .1 OPSS 1860 Table 1 (Class II)
- .3 Hydraulic properties:
 - .1 Filtration opening size (FOS): 75 to 150 um.
- .4 Factory seams: sewn in accordance with manufacturer's recommendations.
- .5 Thread for sewn seams: equal or better resistance to chemical and biological degradation than geotextile.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Place geotextile materials as indicated on drawings.
- .2 Place geotextile materials smooth and free of tension stress, folds, wrinkles and creases.
- .3 Overlap each successive strip of geotextile 1 m over previously laid strip.
- .4 Protect installed geotextile material from displacement, damage or deterioration before, during and after placement of material layers.
- .5 After installation, cover with overlying layer within 4 hours of placement.
- .6 Replace damaged or deteriorated geotextile to approval of Departmental Representative.
- .7 Place and compact soil layers.

3.2 PROTECTION

- .1 Heavy equipment is not permitted directly on geotextile.

3.3 CLEANING

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

PART 1 - GENERAL

1.1 SCOPE

- .1 This Section covers Work related to steel sheet piles including tie rods, anchor walls, wales, closure ends and toe pins.

1.2 MEASUREMENT PROCEDURES

- .1 Steel sheet pile will be measured by length in linear metres of steel sheet pile installed, as calculated from neat dimensions measured on-site along the centerline. The measurement will not include bends of the actual steel sheet pile section or bends in the arrangement.
- .1 The length of steel sheet pile is based on the supplied length of the sheet pile as detailed on the Contract Drawings.
- .2 There will be not separate payment for cutting of sheet piles.
- .3 There will be not separate payment for custom or standard corner pieces.
- .2 Steel sheet pile anchor wall will be measured by length in linear metres of steel sheet pile installed, as calculated from neat dimensions measured on-site along the centerline. The measurement will not include bends of the actual steel sheet pile section or bends in the arrangement.
- .1 The length of steel sheet pile anchor wall is based on the supplied length of the anchor wall as detailed on the Contract Drawings.
- .3 Steel wales will be measured by length in linear metres of wales installed, as calculated from neat dimensions measured on-site along the centerline of wall. The measurement will not include bends of the actual steel sheet pile section or bends in the arrangement.
- .1 Splices, bolts, nuts, tapered plates/washers, washers, spacer plates, field welding, and field drilling of holes shall be considered included in the unit price of wales and will not be measured separately for payment.
- .4 Tie rods will be measured by length in linear metres of tie rod installed, as calculated from neat dimensions measured on-site from fill/inside edges of sheet pile to sheet pile (or anchor wall).
- .1 Turnbuckets, nuts, tapered plates/washers,

washers, shall be considered included in the unit price of tie rods and will not be measured separately for payment.

- .5 Closure ends will be measured by each end suitably installed.

.1 Steel member, field welds, custom sheet pile sheets, anchors, and concrete shall be considered included in the unit price of closure end and will not be measured separately for payment.

- .6 Toe pins will be measured by each toe pin suitably installed.

.1 Field welds, steel forms, steel W200, rock coring, excavation and tremie concrete shall be considered included in the unit price of toe pins and will not be measured separately for payment.

- .7 Payment at the Contract price of unit rate tender items shall be full compensation for all labour, equipment and material to do the work.

- .8 Mobilization and de-mobilization of equipment, including access for installation will be considered part of the Lump Sum Arrangement

1.3 RELATED REQUIREMENTS

- .1 Section 03 30 00 - Cast in Place Concrete

- .2 Section 31 05 16 - Aggregate Materials.

- .3 Section 31 23 33.01 - Excavating, Trenching and Backfilling.

- .4 Section 35 59 14 - Miscellaneous Metals

1.4 REFERENCES

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

- .1 ASTM A6/A6M-17a, Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
- .2 ASTM F3125/F3125M-15a, Standard Specification for High Strength Structural Bolts and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 105 ksi (1040 MPa) Minimum Tensile Strength.
- .3 ASTM A 1011/A 1011M-17, Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.

- .2 Canadian Standards Association (CSA International)
 - .1 CSA G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CSA Standard S16.1-14
 - .3 CSA W47.1-09 (R2014), Certification of Companies for Fusion Welding of Steel Structures.
 - .4 CSA W59-2018, Welded Steel Construction (Metal Arc Welding).

1.3 SUBMITTALS

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 General sheet pile submission requirements.
 - .1 A plan layout of steel sheet piling sections indicating all dimensions.
 - .2 Details of sheet piling sections including lengths.
 - .3 Layout and details of the steel double channel waler indicating location of splices, splice details, tie bolt details and steel washer plate details.
 - .4 For end and corner locations not suitable for a prefabricated corner section, provide a suitable welded custom corner detail.
 - .5 Details of steel tie rods, steel plate washers, nuts, lock nuts and couplers.
 - .6 Details of tapered steel plate washers.
 - .7 Submit a list of equipment and access methods to be used for pile driving.
 - .8 Submit method and sequence of installation of piling. Details must include templates, bracing, setting and driving sequence and number of piles in panels for driving
- .3 Document and submit the installation depth of all piles.

1.4 STEEL CERTIFICATES

- .1 Submit mill test data and certification that all steel piling, delivered to job site, meets requirements of this section. This data shall include a tension test from each heat for quantities of finished material.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Use slings for lifting piling so that mass is evenly distributed and piling is not subjected to excessive bending stresses.
- .2 Store sheet piling on level ground or provide

supports so that sheet piling is level when stored.

- .1 Provide blocking at spacing not exceeding 5 m so that there is no excessive.
- .2 Overhang at ends not to exceed 0.5 m.
- .3 Block between lifts directly above blocking in lower lift.

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

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .2 Divert unused metal materials from landfill to metal recycling facility for disposal.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Steel sheet piles: to CSA Standard G40.21, Grade 350W, and following:
- .2 Continuous interlocking sections:
 - .1 Steel Sheet Piling - Type SSP 1
 - .1 Minimum effective section modulus of $1800 \times 10^3 \text{ mm}^3$ per metre of wall.
 - .2 Minimum thickness of 9.5 mm.
 - .3 Length of sheet supplied - 13.7 m min.
 - .2 Steel Sheet Piling - Type SSP 2
 - .1 Minimum effective section modulus of $1100 \times 10^3 \text{ mm}^3$ per metre of wall.
 - .2 Minimum thickness of 8.0 mm.
 - .3 Length of sheet supplied - 9.1 m min.
 - .2 Anchor Walls
 - .1 Consisting of Steel Sheet Piling section Types SSP 1 and SSP 2.
- .3 Structural steel for rolled sections including walers and waler splices: to CSA Standard G40.21, Grade 350W.
- .4 Structural steel for plates and miscellaneous steel: to CSA Standard G40.21, Grade 300W.

- .5 Tie rods:
 - .1 Material properties: ASTM A615, Grade 75, continuous threaded bar.
 - .2 Bars to be 36 mm diameter continuous threaded bar, with lengths to suit the drawing details.
 - .3 Sleeve nuts, couplers, connector sleeves to have 100% of the tie rod load capacity
 - .4 Preassemble, mark and test tie rod assemblies in shop to ensure quality.
- .6 Nuts and bolts: hexagon nuts, bolts, and washers: to ASTM F3125M, Grade 830 MPa, Type 1.

2.2 SOURCE QUALITY CONTROL: COLD FORMED STEEL SHEET PILING

- .1 Provide results of tension tests of sheet piling material to be used on project as follows:
 - .1 One tension test from each heat for quantities less than 50 tonnes.
 - .2 Two tension tests from each heat for quantities exceeding 50 tonnes.
- .2 Tension tests in accordance with CSA G40.20/G40.21.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 All welding shall be in accordance with CSA W59.
- .2 Prior to installation, provide an underwater dive review of the sheet pile line to identify obstructions. Clear existing obstructions, rock and other obstructions on the harbour bed prior to sheet piling operations.
- .3 Provide access for sheet piling operations, including by not limited to barges.
- .4 Steel sheet piling walls:
 - .1 Install temporary templates or bracing to hold piles in alignment during setting and driving.
 - .2 Place panel of four to eight sheet piles in templates to prevent spreading of piles in panel.
- .5 For each type of sheet pile length, install the sheet to the top of pile required. If refusal is

encountered, leave the pile and proceed to drive remaining piles. Return and attempt to complete driving of obstructed pile later. Cut the tops of piles to suit the arrangement. See additional requirements for cutting in Clause 3.5.

- .6 Document the depth of all piles and notify the Departmental Representative of all piles which encounter refusal.

3.2 TOLERANCES

- .1 The face of wall at top of sheet piles shall be within 50 mm of location and deviation from vertical not to exceed 1 in 100.

3.3 OBSTRUCTIONS

- .1 If obstruction encountered during driving, leave obstructed pile and proceed to drive remaining piles. Return and attempt to complete driving of obstructed pile later.
- .2 Advise Departmental Representative immediately if impossible to drive pile to full penetration, and obtain direction from Departmental Representative on further steps required to complete Work.

3.4 HOLES

- .1 Patch holes in sheet pile wall, except where permanent holes are indicated.
 - .1 Use 9.5 mm thick plate of material equal to that of piling to patch holes and overlap not less than hole diameter.
 - .2 Weld to develop full strength of plate.
- .2 Drill any required holes in piling. Do not use flame cutting without permission of Departmental Representative.

3.5 CUTTING

- .1 When flame cutting tops of piles, and flame cutting holes in piles is approved by Departmental Representative, use following procedure:
 - .1 When air temperature is above 0 degrees Celsius, no pre-heat is necessary.
 - .2 When air temperature is below 0 degrees Celsius, pre-heat until steel 25 mm on each side of line of cut has reached a temperature very warm to hand (approximately 35 degrees Celsius). 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.

3.6 SPLICING

- .1 Use full length piles with no splicing.

3.7 TOE PINS

- .1 Install toe pins in piles that cannot be fully driven. Do not place backfill behind piles until toe pins have been completely installed.
- .2 Provide 2 toe pins in successive in-pans at each end in the section of sheet pile requiring toe pins. Provide a toe pin in alternating in-pans between the ends.
 - .1 Based on existing geotechnical information, toe pins are only anticipated at the north end of the west pier.
- .3 Employ divers during the duration of work to complete the work.
- .4 Mark all locations of toe pins above the water line for the review of the Departmental Representative.
- .5 Core holes into the bedrock and drive pipe through the fill overburden such that it project above the harbour bottom. Excavate fill materials and debris.
- .6 Install and support the W200 toe in a vertical alignment, a close to the sheet pile wall.
- .7 Install tremie-concrete (conforming to Section 03 33 00) and fill the steel form and core hole completely to the harbour bottom.

3.8 WALES

- .1 Fabricate and erect steel in accordance with CSA Standard S16.1. Fabricate horizontal members with weep holes for drainage where required.
- .2 Fit joints and intersecting members accurately. Make Work in true planes with adequate fastenings. Build and erect Work perfectly rigid, plumb or true to slope, square, straight, level and accurate to sizes detailed, free from distortion or defects detrimental to appearance or performance.
- .3 Set and secure framing brackets, hangers, anchors, inserts or similar supports for proper erection.
- .4 Bolt, splice and field weld members as detailed on

the Contract Drawings.

- .5 Install tapered plates and tapered washers where required to suit skewed tie rods. Provide a minimum thickness of 16 mm on tapered plates.

3.9 TIE ROD ANCHORAGE SYSTEM

- .1 Do not place backfill behind anchored bulkhead until piles have been completely driven, adjusted and secured in final position by anchorage system.
- .2 Support tie rods at intervals along their length.
- .3 Fit and adjust tie rod systems so that connections at waling and anchor end of tie rods are tight before backfilling.
- .4 Saw cut tie rods to required lengths. Do not flame cut.
- .5 At splices, butt the two ends of the tie-rods together. Locate the couplers such that they are centred over the joint. Tighten the locking nuts onto the couplers to create a rigid assembly.
- .6 Place granular material around tie-rods as indicated. Pack granular sub-base material below tie-rods to provide continuous supports.
- .7 Ensure that tie-rods are not disturbed when backfill is placed.

3.10 ANCHOR BLOCKS

- .1 Excavate fills to 0.3 m below the wale location.
- .2 Carefully align and place steel sheet anchor anchors as indicated on the drawings.
- .3 Provide temporary support for the anchor blocks in order to prevent movement and/or displacement.
- .4 After plate washers, nuts, and locking nuts are installed, and after prestressing, place granular sub-base material evenly around the anchor blocks as indicated.

3.11 BACKFILLING

- .1 Do not commence backfilling until tie-rods and anchor blocks have been installed.
- .2 Carefully place backfill materials between the new steel sheet piling and the existing structure.
- .3 Ensure that the steel sheet piling, tie-rods and anchoring systems, are not damaged when backfill

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Region Project
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STEEL SHEET PILES

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material is placed.

PART 1 - GENERAL

- 1.1 SCOPE .1 This Section covers Work related to the placement and compaction of hot mix asphalt pavement
- 1.2 MEASUREMENT AND PAYMENT .1 Asphalt pavement will be measured by tonnes of hot mix asphalt suitably placed and compacted. Use of HL3 and HL8 asphalt mixes shall be considered included in the unit rate and will not be measured separately for payment.
- .2 Payment at the Contract price of unit rate tender items shall be full compensation for all labour, equipment and material to do the work.
- 1.3 RELATED REQUIREMENTS .1 Section 31 23 33.01 - Excavating, Trenching and Backfilling.
- .2 Section 31 05 16 - Aggregate Materials.
- 1.3 REFERENCES .1 Ontario Provincial Standard Specifications (OPSS)
- .1 OPSS.MUNI 310 November 2017, Construction Specification for Hot Mix Asphalt.
- .2 OPSS 1150 November 2010, Material Specification for Hot Mix Asphalt.
- 1.4 SUBMITTALS .1 Submit in accordance with Section 01 33 00.
- .2 Submit a Hot Asphalt Mix Design:
- .1 Material proportions and sources, including the Owner's Mineral Aggregate Inventory for the aggregate sources, when such information is available. The amount of RAP in per cent by mass and volumetric data shall also be included.
- .2 Designation of the fine aggregate and the coarse aggregate.
- .3 PGAC and source and per cent by mass of the required new asphalt cement.
- .4 For both coarse and fine aggregates, complete grading and volumetrics are required.
- .5 The per cent air voids, Marshall flow, voids in mineral aggregate, and Marshall stability of the mixture selected and the mix design criteria to be met for each test.
- .6 Mix bulk relative density and Mix maximum

relative density.

.3 Test and Evaluation Reports:

.1 Submit manufacturer's test data and certification that asphalt cement meets specification requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 OPSS 1150, HL3 Surface Course (50 mm).

.2 OPSS 1150, HL8 Binder Course (50 mm).

PART 3 - EXECUTION

3.1 CONSTRUCTION

.1 Prior to placing asphalt pavement on a granular grade, finish roll the grade ahead of the paver to ensure a compacted, smooth, and float-free surface. Any distortion that will impact the specified thickness of the pavement to be placed shall be repaired.

.2 Surfaces shall be free of standing water and contamination, such as mud, loose aggregate, or debris.

.3 Install and compact hot mix asphalt according to the requirements of OPSS.MUNI 310.

3.2 CLEANING

.1 Promptly as the Work proceeds and upon completion, clean-up and remove from the site, rubbish and surplus material resulting from the Work of this Section.

PART 1 - GENERAL

- 1.1 SCOPE .1 This Section covers Work related to the installation of a water service pipe including faucets for servicing the docks.
- 1.2 MEASUREMENT AND PAYMENT .1 The water distribution line will be measured by length in linear metres of line water installed.
- .1 There will be no separate measurement or payment for disinfection and commissioning of the line.
- .2 There will be no separate measurement or payment for number of faucets with hose bib connections.
- .3 There will be no separate measurement or payment for couplings/connection to the existing water supply pipe.
- .2 Payment at the Contract price of unit rate tender items shall be full compensation for all labour, equipment and material to do the work.
- 1.3 CONNECTION .1 Connection with existing suspended water supply shall be integrated at the south limits of the project.
- 1.4 REFERENCES .1 Canadian Standards Association
- .1 B137.1 - Polyethylene Pipe, Tubing, and Fittings for Cold Water Pressure Services.
- .2 National Sanitation Foundation
- .1 NSF/ANSI 14 - Plastics Piping System Components and Related Materials.
- 1.5 SUBMITTALS .1 Submit in accordance with Section 01 33 00.
- .2 Submit the piping layout including:
- .1 Material sizes and sources.
- .2 Locations of faucets.
- .3 Connections.
- .6 Disinfection methodology.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 New 32 diameter surface mounted water service lines consisting of Polyethylene pipe, high density Polyethylene pipe or Polyvinylchloride pipe.
 - .1 Pressure rating to 75 psi.
- .2 Provide 20 mm diameter water faucets with threaded hose bib connections.
- .3 Provide all fittings, gaskets, joints, sealant, solvent welding materials and other material to suit the system.
- .4 Connections and supports to suit surface mounted pipe along limestone block and steel sheet pile surfaces.

PART 3 - EXECUTION

3.1 CONSTRUCTION

- .1 Verify that site conditions including previously installed water service piping.
- .2 Clean pipes, fittings, faucets, and appurtenances of accumulated debris and water before installation.
- .3 Provide temporary access when completing the work in this Section and provide temporary supports for the piping until permanent supports are installed.
- .4 Install piping from Stations W2+775 to W2+972. Terminate the pipe at the south end of the west pier at the existing surface mounted supply line.
- .5 Connect piping segments to achieve a watertight system and install faucets, fittings, gaskets, joints and sealants.
- .6 Complete hydrostatic and leakage testing. Notify the Departmental Representative at least 24 hours in advance of the testing. Test the system when the ambient air temperature is greater than 10°C.
- .7 Examine exposed pipe, joints, fittings, faucets and appurtenances while system is under pressure. Remove joints, fittings, faucets and appurtenances found defective and replace with new sound material and make watertight. Repeat hydrostatic test until

defects have been corrected.

3.2 DISINFECTION

- .1 Complete flushing and disinfection. Notify the Departmental Representative at least 48 hours in advance of the testing.
- .2 Flush piping through available outlets with a sufficient flow of potable water to produce velocity of 1.5 m/s, within pipe for minimum 10 minutes, or until foreign materials have been removed and flushed water is clear.
- .3 Open and close faucets to ensure thorough flushing. Repeat disinfection as required to ensure that the system satisfies all regulations.
- .4 Comply with local bylaws and regulations regarding additional process for disinfections and approvals.

PART 1 - GENERAL

1.1 SCOPE

- .1 This Section covers Work related to miscellaneous metal fabrications such as safety ladders, pile caps, marine bollards and chain link fencing.

1.2 MEASUREMENT PROCEDURES

- .1 Safety ladders will be measured by the number of units installed.
- .1 Anchors, connections, field drilling and finishing shall be considered included in the unit price of ladders and will not be measured separately for payment.
- .2 Pile caps will be measured by length in linear metres of cap installed, as calculated from neat dimensions measured on-site along the centerline of cap.
- .1 Splices, anchor plates, field drilling and finishing shall be considered included in the unit price of caps and will not be measured separately for payment.
- .3 Chain link fencing will be measured by length in linear metres of cap installed.
- .1 The Contractor shall provide the design of the fencing which will be included in the unit cost and will not be measured separately for payment.
- .2 Two gates shall be considered included in the unit price of fencing and will not be measured separately for payment.
- .4 Payment at the Contract price of unit rate tender items shall be full compensation for all labour, equipment and material to do the work.
- .5 The removal, refinishing, connections and installation of bollards and life saving stations will be considered part of the Lump Sum Arrangement.
- .6 The removal, salvage and connections of the Ornamental Fence (West Pier) will be considered part of the Lump Sum Arrangement.

1.3 RELATED REQUIREMENTS

- .1 Section 12 41 16 - Structure Demolition.
- .2 Section 31 62 16.13 - Steel Sheet Piles.

1.4 REFERENCES

- .1 Canadian Standards Association
 - .1 CSA G40.20/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CSA Standard S16.1-14
 - .3 CSA W47.1-09 (R2014), Certification of Companies for Fusion Welding of Steel Structures.
 - .4 CSA W59-2018, Welded Steel Construction (Metal Arc Welding).
- .2 The Society for Protective Coatings (SSPC)
 - .1 SSPC-SP 2-82(R2004), Hand Tool Cleaning.
 - .2 SSPC-SP 6/NACE No. 3-07, Commercial Blast Cleaning.
 - .3 SSPC-Vis-1-89, Visual Standard for Abrasive Blast Cleaned Steel (Standard Reference Photographs) Editorial Changes September 1, 2000 (Steel Structures Painting Manual, Chapter 2 - Surface Preparation Spec.).
 - .4 SSPC-PA 2-04, Measurement of Dry Coat Thickness with Magnetic Gauges.
 - .5 SSPC Good Painting Practices, Volume 1, 4th Edition.
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-138.1 Fabric for Chain Link Fence
 - .2 CAN/CGSB-138.2 Steel Framework for Chain Link Fence
 - .3 CAN/CGSB-138.3 Installation of Chain Link Fence
 - .4 CAN/CGSB-138.4 Gates for Chain Link Fence

1.3 SUBMITTALS

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop Drawings:
 - .1 Prior to fabrication, submit fabrication shop drawings with general layout, detailed dimensions, welding details, fastener details and all other relevant information necessary for fabrication.
 - .2 Submit manufacturer's instructions, printed product literature and data sheets for paint, MSDS sheets, surface preparation requirements, application temperature / conditions, finish and limitations.
 - .3 Submit manufacturer's instructions and product data sheets for dowels into concrete, including required equipment list.

- .4 Design the chain link fence including post embedments. Submit arrangement and layout of the chink link fences, following verification of site conditions.
- .3 Provide a detailed schedule for fabrication and coating work.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Structural steel for rolled sections: to CSA Standard G40.21, Grade 350W.
- .2 Structural steel for plates and miscellaneous steel: to CSA Standard G40.21, Grade 300W.
- .3 Hot dipped galvanizing for steel components shall be according to ASTM A123.
- .4 Paint for various steel components: ultra-durable solvent-free, self-priming, Polyamido-Amine Epoxy coating: Carboguard 1207 by Carboline, or approved equal, meeting the following requirements.
 - .1 Marine grade
 - .2 Volume solids content: 98% ± 2%
 - .3 Dry Film Thickness: 2 coats x 80 mils.
 - .4 Dark Grey (bollards) ; Yellow (other)
 - .5 Surface profile for abrasive blasting to SSPC-SP10 with 3 - 4 mils surface profile
- .5 Zinc-Rich Touch-up coating shall be brush, roller or spray applied.
 - .1 Percent solids: greater than 85% by weight.
 - .2 Zinc content: greater than 88% by weight in dry film.
 - .3 Applied in 2 coats with 1.5 mil dry film thickness.
- .6 Dowels into concrete shall be chemical adhesive type.
 - .1 Hilti Hit HY 200 or Redhead A7+ Adhesive Fastening System with zinc plated threaded rods.
 - .2 Alternate anchoring systems may be substituted in place as specified above, with the approval of the Department Representative.
 - .3 Expansion type anchors are not permitted

- .7 Chain link fencing conforming to CAN/CGSB-138.1:
- .1 The fence fabric shall be a Type 1, Steel Fabric; Class A, Zinc-Coated Galvanized After Weaving (GAW); Style 2, Medium, 3.5 mm.
- .2 Finishing shall be Grade 2, Galvanizing Thickness and Black Vinyl coating, where required, conforming to ASTM F1664, 0.045 mm dry film thickness.
- .3 Concrete shall conform to Section 03 33 00, with a compressive strength of 20 MPa.
- .4 Furnish 2 1.5 m wide gates per section, with galvanized malleable iron hinges, latch and latch catch with provision for padlock which can be attached and operated from either side of installed gate.

PART 3 - EXECUTION

3.1 STEEL FABRICATION

- .1 Fabricate steel components as detailed on drawings and weld according to CSA W59.
- .2 All flame cut edges shall be as smooth and regular as those produced by edge planing and shall be free of slag.
- .3 Surfaces to be welded shall be smooth, uniform and free from birs, fins and other defects which would adversely affect the quality and uniformity of the weld.
- .4 Notify Departmental Representative of fabrication and coating schedules. Allow sufficient time for the Departmental Representative to inspect the fabricated components prior to coating work.

3.2 SAFETY LADDERS

- .1 Fabricate as detailed on drawings and hot-dip galvanize the ladder. The top grab bar shall be painted similar to the pile caps.
- .2 Provide access and install ladders.
- .3 Field weld ladder to the sheet pile and grind all field welds smooth.
- .4 Apply touch-up paint and zinc-rich touch-up coating to ladder components damaged by handling and installation.

3.3 PILE CAPS

- .1 Fabricate as detailed on drawings and shop apply painted coatings.
- .2 Install steel pile caps and field weld to sheet piling as indicated on the drawings. Where the cap is not fully supported on the sheet piles due low cutoff elevations, weld angles for support and connection to sheeting.
- .3 Apply touch-up coating on pile caps damaged by handling and installation.

3.4 BOLLARDS

- .1 Review with Department Representative the marine bollards on site. Where possible and practical, remove, refinish and reinstall bollards. Where removal is not practical, retain existing bollards in place refinish on site.
- .2 When bollards are removed, modify the bollards but removing anchorage legs attached to the base plate, as applicable.
- .3 Review each type of bollard with the Department Representative and anchor bollards to the concrete deck or embed into concrete as appropriate.
- .4 Prepare steel surfaces and recoating steel according to Parts 3.5 and 3.6 of this specification.
- .5 Touch-up coating damaged by handling and installation.

3.5 PAINTING
PREPARATION

- .1 Clean surfaces of metal to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and foreign substances in accordance with SSPC-SP10 Near-White Metal Blast Cleaning.
- .2 Remove traces of blast products from surfaces, pockets and corners to be painted by brushing with clean brushes, by blowing with clean dry compressed air, or by vacuum cleaning.

3.6 PAINTING
APPLICATION

- .1 Comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
- .2 Paint shall be applied by spray, brush, or roller. All paint work shall be completed in the shop for components other than fixed bollards, unless

approved by the Departmental Representative.

- .3 Apply each coat of paint as continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.
- .4 Allow 28 days for coating curing or according to the Manufacturer's recommendations if greater.
- .5 Handling painted metal:
 - .1 Handle painted metal after paint has dried, or when necessary for handling for painting or stacking for drying.
 - .2 Scrape off and touch up paint which is damaged in handling, with same number of coats and kinds of paint as were previously applied to metal.

3.7 DOWELS INTO CONCRETE

- .1 Drill holes to the required dimensions.
- .2 The holes shall be cleaned using compressed air to remove all deleterious material including dust, debris and water prior to placing the epoxy adhesive.
- .3 The handling and placement of the epoxy adhesive shall conform to the manufacturer's written instructions. All excess epoxy adhesive shall be struck-off flush with the concrete surface and removed from the surrounding concrete surface area.
- .4 Doweling operations shall not cause spalling, cracking or other damage to the surrounding concrete. Concrete spalled or otherwise damaged shall be repaired in a manner acceptable to the Departmental Representative.
- .5 Dowels shall be clean and free of deleterious material.
- .6 The Contractor shall maintain dowels within the specified dimensions during the setting of the epoxy adhesive. Prevent the loss of epoxy adhesive from the holes.
- .7 Pull testing of dowels is not required.

3.8 CHAIN LINK FENCE

- .1 Confirm the final arrangement of the fence and gates with the Departmental Representative.
- .2 Excavate post holes. Erect fence along lines per the accepted shop drawings and CAN/CGSB-138.3.

- .3 Space line posts as measured parallel to ground surface. Install corner post where change in alignment exceeds 10 degrees. Install end posts at ends of fence and at both sides of the gate openings.
- .4 Place concrete in post holes to embed posts to the depth per the accepted shop drawings.
- .5 Install fence fabric after concrete has cured, minimum of 4 days.
- .6 Install top rail between posts and fasten securely to posts and secure waterproof caps and overhang tops.
- .7 Install bottom tension wire, stretch tightly and fasten securely to end, corner, gate and straining posts with turnbuckles and tension bar bands.
- .8 Secure fabric to top rails, line posts and bottom tension wire with tie wires at 0.45 m (maximum) intervals.
- .9 Install two gates per section. Level ground between gate posts and set gate bottom approximately 0.05 m above ground surface.
- .10 Clean damaged surfaces with wire brush removing loose and cracked coatings. Apply two coats of organic zinc-rich coating to damaged areas.