

**PROJECT TITLE:** SAUGEEN SHORES, ONTARIO  
PORT ELGIN, WEST PIER REHABILITATION

**PROJECT NUMBER:** 131-23620-00

**PROJECT DATE:** 2016-08-17



<b>Section</b>	<b>Title</b>	<b>Pages</b>
<b>Division 01 - General Requirements</b>		
01 11 03	GENERAL INSTRUCTIONS	6
01 33 00	SUBMITTAL PROCEDURES	3
01 35 29.06	HEALTH AND SAFETY REQUIREMENTS	5
01 35 43	ENVIRONMENTAL PROCEDURES	4
01 74 21	CONSTRUCTION/DEMOLITION AND WASTE MANAGEMENT	3
<b>Division 03 - Concrete</b>		
03 30 00	CAST-IN-PLACE CONCRETE	6
<b>Division 09 - Finishes</b>		
09 91 15	PAINTING	5
<b>Division 31 - Earthwork</b>		
31 09 00	MONITORING	2
31 23 33.01	EXCAVATING, TRENCHING AND BACKFILLING	4
31 62 00	PILE INSTALLATION, GENERAL	4
31 62 16.13	STEEL SHEET PILES	7
<b>Division 35 - Waterway and Marine Construction</b>		
35 49 25	TURBIDITY CURTAIN (SILT CURTAIN)	3
35 59 14	MISCELLANEOUS STEEL	4
<b>Appendices</b>		
APPENDIX A - WATER LEVEL CHART		
APPENDIX B - GEOTECHNICAL REPORT		
APPENDIX C - ELECTRICAL PEDESTAL DETAILS		

**PART 1 GENERAL**

**1.1 MINIMUM STANDARDS**

- .1 Execute work to meet or exceed:
  - .1 National Building Code of Canada 2010, Canadian Highway Bridge Design Code, National Fire Code of Canada 2010, Ontario Building Code 2012 and any other code of provincial or local application, including all amendments up to project date, provided that in any case of conflict or discrepancy, the more stringent requirements shall apply.
  - .2 Rules and regulations of authorities having jurisdiction.
  - .3 Federal Fire Commissioner, No. 301, Standard for Construction Operations, and No. 302, Standard for Welding and Cutting, June 1982.
  - .4 Observe and enforce construction safety measures required by National Building Code 2010, Part 8 Safety Measures at Construction and Demolition Sites, Occupational Health and Safety Act and Regulations for Construction Projects, Revised Statutes of Ontario 1990, Chapter O.1 as amended, O. Reg. 213/91 as amended by O. Reg. 631/94, O. Reg. 143/99, O. Reg. 571/99, O. Reg. 145/00, O. Reg. 527/00, R.R.O. 1990, Reg. 834, O. Reg. 278/05 (Asbestos), Workplace Safety and Insurance Board and municipal statutes and authorities.
  - .5 Environmental Protection Act, O. Reg. 102/94 and O. Reg. 103/94.

**1.2 TAXES**

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

**1.3 FEES, PERMITS, AND CERTIFICATES**

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

**1.4 SITE EXAMINATION**

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

**1.5 SITE**

- .1 Confine work, including temporary structures, plant, equipment and materials to established limits of site.
- .2 Locate temporary buildings, roads, walks, drainage facilities, and services as directed and maintain in clean and orderly manner.

## **1.6 CONSTRUCTION AND STORAGE AREA**

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

## **1.7 DOCUMENTS**

- .1 Keep one copy of contract documents and reviewed shop drawings on the site.
- .2 Most stringent specifications shall govern over Drawings.

## **1.8 CONTRACTOR'S AS-BUILT DRAWINGS AND SPECIFICATIONS**

- .1 As work progresses, neatly record significant deviations from the Contract drawings and specifications using fine, red marker on full size white prints and specifications. Make the same changes on the electronic files. Include general dimensions of existing timber crib and cross walls exposed during construction.
- .2 Neatly print lettering and numbers in size to match original. Lines may be drawn free-hand but shall be neat and accurate. Add at each title block note: "AS BUILT".
- .3 Record following significant deviations
  - .1 Depths of various elements and foundations.
  - .2 Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvement.
  - .3 Location of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of structure.
  - .4 Field changes of dimension.
  - .5 Other significant deviations which are concealed in construction and can not be identified by visual inspection.
  - .6 Alternative materials and systems installed replacing original materials and systems specified by trade name.
- .4 Turn one set, paper copy and electronic copy, of As-Built Record Drawings and specifications over to Departmental Representative on completion of work.
- .5 If project is completed without significant deviations from Contract drawings, declare this in writing and submit to Departmental Representative in lieu of As-Built Record Drawings.

## **1.9 ADDITIONAL DRAWINGS**

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

## **1.10 LAYOUT OF WORK**

- .1 Immediately upon entering site for purpose of beginning work on this project, locate all general reference points and take proper action necessary to prevent their disturbance.
- .2 Supply stakes and other survey markers required for this work. Employ competent personnel to lay out work in accordance with lines and grades provided.

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

#### **1.11 MEASUREMENT & PAYMENT**

- .1 Items measured for payment are in metric (SI) units.
- .2 Submit requests for payment in metric units corresponding with items on the Unit Price Table.
- .3 Submit supporting documents in metric units. Perform all necessary conversions required.
- .4 Items included in this specification shall form part of the lump sum arrangement.

#### **1.12 CONSTRUCTION PHOTOGRAPHS**

- .1 Submit electronic copy of colour digital photography in JPG format, standard resolution.
- .2 Identification: name and number of project and date of exposure indicated.
- .3 Locations: location of viewpoints determined by Departmental Representative.
- .4 Frequency: at regular intervals or milestones during construction, and at completion of work as directed by Departmental Representative.

#### **1.13 EXISTING SERVICES**

- .1 Establish location, protect and maintain existing utility lines.
- .2 Maintain existing services in occupied areas.
- .3 Connect to existing utilities with minimum disturbance to pedestrian and vehicular traffic.

#### **1.14 TEMPORARY FACILITIES AND SERVICES**

- .1 Provide and maintain temporary facilities and services required to carry out work.
- .2 Remove temporary facilities and services on completion of work.

#### **1.15 MATERIAL AND EQUIPMENT**

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

#### **1.16 COORDINATION AND COOPERATION**

- .1 Execute work with minimum disturbance to occupants, public and normal use of site and work

area. Make arrangements with Departmental Representative and Town of Saugeen Shores Engineering Dept. 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.

#### **1.17 INSPECTION AND TESTING**

- .1 Departmental Representative may employ an Inspection and Testing company to ensure work conforms with Contract Documents. Testing to be paid by Owner.
- .2 When initial tests and inspections reveal work not to contract requirements, pay for tests and inspections required by Departmental Representative on corrected work.

#### **1.18 SCHEDULING OF WORK**

- .1 On award of contract submit bar chart construction schedule for work, indicating anticipated progress stages within time of completion.
- .2 When schedule has been reviewed by the Departmental Representative takes necessary measures to complete work within scheduled time. Do not change schedule without notifying Departmental Representative.
- .3 Contract extension requires formal submission and execution of change order in conformance with Departmental Representative's criteria.

#### **1.19 CLEANING**

- .1 Maintain project free of accumulated waste and rubbish.

#### **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 Huron is 176.0 metres I.G.L.D. (1985).
- .3 Water Level Chart for Lake Huron is bound together with these specifications as an Appendix.

---

**PART 2 PRODUCTS**

**2.1 NOT USED**

- .1 Not used.

**PART 3 EXECUTION**

**3.1 ELECTRICAL NAVIGATIONAL AID & EQUIPMENT:**

- .1 New electrical pedestals:  
.1 To be provided by others & installed by the Contractor flush with the deck at the same locations as existing.
- .2 New navigation aid:  
.1 New navigation aid is to be installed to the same alignment as the existing navigation aid. Contractor is to obtain approval from the Owner of alignment prior to fixing to the deck.
- .3 New bollards:  
.1 To be supplied by Contractor.
- .4 Materials & Equipment to be supplied by others:  
.1 New navigational aid.

**3.2 FLOATING DOCK MOORING PILE:**

- .1 To be re-installed after completion of the pier rehabilitation at a new location.
- .2 Contractor is to confirm location of new mooring pile with Owner.
- .3 Contractor is to confirm driving methodology with Owner and obtain approval before driving.
- .4 Final elevation and embedment depth to be confirmed with Owner.

**3.3 MATERIALS & EQUIPMENT TO BE SUPPLIED BY OTHERS:**

- .1 New navigation aid.
- .2 Electrical pedestals.

**3.4 PRECONSTRUCTION SURVEY:**

- .1 Contractor is to obtain direction and approval from the Owner regarding the preconstruction survey before commencing the survey.

**3.5 POST CONSTRUCTION SURVEY:**

- .1 Contractor is to obtain direction and approval from the Owner regarding the post construction survey before commencing the survey.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

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

**1.2 ADMINISTRATIVE**

- .1 Submit to Departmental Representative submittals listed for review. Submit reasonable promptness 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 Work affected by submittal shall not proceed until review is complete.
- .3 Present shop drawings, product data, Commissioning documentation, samples and mock-ups in SI Metric units.
- .4 Where items or information is not produced in SI Metric units converted values are acceptable.
- .5 Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and 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 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, NMSEdit Professional spp, MS Word, MS Excel, MS Project and Autocad dwg files on CD/DVD, USB or through email or alternate electronic file sharing service as directed by Departmental Representative.

**1.3 SHOP DRAWINGS AND PRODUCT DATA**

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

a portion of Work.

- .2 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.
- .3 Where technical sections specify that shop drawings bear the stamp of a Registered Professional Engineer, registered in Province of Ontario.
- .4 Prior to submission check and certify as correct, shop drawings and product data sheets. Issue to Departmental Representative each submission at least 14 days before dates reviewed submission will be needed.
- .5 Allow 5 working days for Departmental Representative's review of each submission.
- .6 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
- .7 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.
- .8 Accompany submissions with transmittal letter containing:
  - .1 Date.
  - .2 Project title and number.
  - .3 Contractor's name and address.
  - .4 Identification and quantity of each shop drawing, product data and sample.
  - .5 Other pertinent data.
- .9 After Departmental Representative's review, distribute copies.
- .10 Submit 1 print and 1 electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.
- .11 Submit 1 print and 1 electronic copy of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.
- .12 Submit 1 print and 1 electronic copy of 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.
- .13 Submit 1 print and 1 electronic copy of manufacturer's instructions for requirements requested in specification Sections and as requested by Departmental Representative.
  - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
- .14 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.

- .15 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 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 coordination of Work of sub-trades.

**PART 2 PRODUCTS**

**2.1 NOT USED**

- .1 Not Used.

**PART 3 EXECUTION**

**3.1 NOT USED**

- .1 Not Used.

**END OF SECTION**

## **PART 1 GENERAL**

### **1.1 REFERENCES**

- .1 Canadian Standards Association (CSA):
  - .1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.
- .2 National Building Code 2010 (NBC):
  - .1 NBC 2010, Division B, Part 8 Safety Measures at Construction and Demolition Sites.
- .3 National Fire Code 2010 (NFC):
  - .1 NFC 2010, Division B, Part 2 Emergency Planning, subsection 2.8.2 Fire Safety Plan.
- .4 Province of Ontario:
  - .1 Occupational Health and Safety Act Revised Statutes of Ontario 1990, Chapter O.1 as amended, and Regulations for Construction Projects, O. Reg. 213/91 as amended, Diving Operations, O. Reg. 629/94, as amended.
  - .2 Ontario Ministry of Labour, Guideline - Lead on Construction Projects.
  - .3 Ontario Ministry of Labour, Guideline - Silica on Construction Projects.
  - .4 Workplace Safety and Insurance Act, 1997.
  - .5 Municipal statutes and authorities.
- .5 Fire Commissioner of Canada (FCC):
  - .1 FC-301 Standard for Construction Operations, June 1982.
  - .2 FC-302 Standard for Welding and Cutting, June 1982.

### **1.2 SUBMITTALS**

- .1 Make submittals in accordance with Section 01 33 00.
- .2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
  - .1 Results of site specific safety hazard assessment.
  - .2 Results of safety and health risk or hazard analysis for site tasks and operations found in work plan.
  - .3 Measures and controls to be implemented to address identified safety hazards and risks.
  - .4 Provide a Fire Safety Plan, specific to the work location.
  - .5 Contractor's and Sub-contractors' Safety Communication Plan.
  - .6 Contingency and Emergency Response Plan addressing standard operating procedures specific to the project site to be implemented during emergency situations.
- .3 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 7 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 3 days after receipt of comments from Departmental Representative.
- .4 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.
- .5 Submit records of Contractor's Health and Safety meetings when requested.

- .6 Submit 1 copy of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative, weekly.
- .7 Submit copies of orders, directions or reports issued by health and safety inspectors having jurisdiction.
- .8 Submit copies of incident and accident reports.
- .9 Submit Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00.
- .10 Submit names of personnel and alternates responsible for site safety and health.
- .11 On-site Contingency and Emergency Response Plan shall address standard operating procedures to be implemented during emergency situations.

### **1.3 FILING OF NOTICE**

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

### **1.4 SAFETY ASSESSMENT**

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

### **1.5 MEETINGS**

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

### **1.6 REGULATORY REQUIREMENTS**

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

### **1.7 GENERAL REQUIREMENTS**

- .1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to commencing any site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.
- .2 Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns either accepting or requesting improvements.
- .3 Relief from or substitution for any portion or provision of minimum Health and Safety standards specified herein or reviewed site-specific Health and Safety Plan shall be submitted to Departmental Representative in writing.
- .4 Erect adequate safety barriers and signs for safety of workers and public.

- .5 Develop a Construction Access Plan. The Town of Saugeen Shores and Fisheries and Oceans (Small Craft Harbours) will have to be notified and consulted.

## **1.8 COMPLIANCE REQUIREMENTS**

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

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

## **1.10 UNFORSEEN HAZARDS**

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

## **1.11 HEALTH AND SAFETY COORDINATOR**

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

## **1.12 POSTING OF DOCUMENTS**

- .1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province having jurisdiction, and in consultation with Departmental Representative.
  - .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 Province of Ontario.
- .7 Address and phone number of nearest Ministry of Labour office.
- .8 Material Safety Data Sheets.
- .9 Written Emergency Response Plan.
- .10 Site Specific Safety Plan.
- .11 Valid certificate of first aider on duty.
- .12 WSIB "In Case of Injury At Work" poster.
- .13 Location of toilet and cleanup facilities.

### **1.13 CORRECTION OF NON-COMPLIANCE**

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

### **1.14 BLASTING**

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

### **1.15 WORK STOPPAGE**

- .1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.
- .2 Assign responsibility and obligation to competent supervisor to stop or start Work when, at competent supervisor's discretion, it is necessary or advisable for reasons of health or safety.
- .3 Departmental Representative may also stop Work for health and safety considerations.

## **PART 2 PRODUCTS**

### **2.1 NOT USED**

- .1 Not used.

## **PART 3 EXECUTION**

### **3.1 NOT USED**

- .1 Not used.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 ENVIRONMENTAL MEASURES**

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

**1.2 FIRES**

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

**1.3 DISPOSAL OF WASTE**

- .1 Do not bury rubbish and waste materials on site unless approved by Departmental Representative.
- .2 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.
- .3 All waste materials should be disposed of in a legal manner at a site approved by local authorities.
- .4 Do not allow deleterious substances to enter the waterway.

**1.4 DRAINAGE**

- .1 Provide temporary drainage and pumping as required to keep excavations and site free from water.
- .2 Do not pump water containing suspended materials and other harmful substances into waterways, sewer or drainage systems.
- .3 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 which are not specifically designated to be removed. Isolate trees from the construction area with protective snow fencing erected along the tree line.
- .2 Remove only trees, tree stumps, saplings, bushes, grass and other plants as ordered by Departmental Representative. Do not cut down any tree or bush without the written permission of the Departmental Representative.
- .3 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage.
- .4 Do not pile excavated material around the base of existing trees.
- .5 Treat all damaged roots over 25 mm in diameter immediately with tree paint.

.6 Support and brace trees potentially undermined by trench construction by means of cables and turnbuckles, for period of open excavation.

.7 Minimize stripping of topsoil and vegetation.

## **1.6 WORK ADJACENT TO WATERWAYS**

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

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

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

.4 Avoid indicated spawning beds when constructing temporary crossings of waterways.

## **1.7 POLLUTION CONTROL**

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

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

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

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

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

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

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

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

.9 Cover or wet down loose or dry materials and rubbish that have the potential to release airborne particulates and/or debris during both transport and installation or removal.

.10 Stabilize all stockpiled material.

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

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

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

- .14 Abide by local noise by-laws.
- .15 Make appropriate spill containment and clean-up materials available at all times on site and ensure crews onsite are fully trained on their use. Develop spill prevention and response procedures. In the event of a spill of a deleterious substance:
  - .1 Immediately contain, limit spread and clean up in accordance with provincial regulatory requirements.
  - .2 Report immediately to Ontario Spills Action Centre: 1 800 268 6060.
  - .3 Further information on dangerous goods emergency cleanup and precautions including a list of companies performing this work can be obtained from the Transport Canada 24-hour number (613) 996-6666 collect.

## 1.8 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. Take action only 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.

## 1.8 MEASUREMENT & PAYMENT

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

## PART 2 PRODUCTS

### 2.1 NOT USED

- .1 Not Used.

## PART 3 EXECUTION

### 3.1 NOT USED

- .1 Not Used.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 CONSTRUCTION & DEMOLITION WASTE**

- .1 Carefully deconstruct and source separate materials/equipment and divert from D&C waste destined for landfill to maximum extent possible. Reuse, recycle or sell material for reuse except where indicated otherwise. On site sales are not permitted.
- .2 Source separate waste and maintain waste audits in accordance with the Environmental Protection Act, Ontario Regulation 102/94 and Ontario Regulation 103/94.
  - .1 Provide facilities for collection, handling and storage of source separated wastes.
  - .2 Source separate the following waste:
    - .1 Brick and hardened concrete.
    - .2 Corrugated cardboard and paper.
    - .3 Wood.
    - .4 Fresh concrete waste.
    - .5 Concrete admixtures and additives.
    - .6 Steel.

**1.2 WASTE PROCESSING SITES**

- .1 Province of: Ontario.
  - .1 Name: Ontario Ministry of Environment and Energy, 135 St. Clair Avenue West, Toronto, ON, M4V 1P5.
  - .2 Telephone: 800-565-4923 or 416-323-4321.
  - .3 Fax: 416-323-4682.
- .2 Recycling Council of Ontario: 215 Spadina Avenue, #225, Toronto, ON, M5T 2C7.
  - .1 Telephone: 416-657-2797.
  - .2 Fax: 416-960-8053.
  - .3 Email: [rco@rco.on.ca](mailto:rco@rco.on.ca).
  - .4 Internet: <http://www.rco.on.ca/>.

**1.3 DEMOLITION REMOVAL AND DISPOSAL - MEASUREMENT FOR PAYMENT**

- .1 Demolition removal and disposal of all components identified on the drawings and as specified, is considered part of the lump sum.
- .2 Item component to be demolished, removed and disposed include, but are not limited to concrete related components, concrete blocks, parapets, deck slab, concrete steps and asphalt.
- .3 Concrete parapet demolition required to install tie rod is considered incidental to the tie rods installation and will not be measured separately for payment.
- .4 Remove and dispose existing bollards. Carefully remove existing rubber fenders and store on-site for future use as directed by the Departmental Representative.

**PART 2 PRODUCTS**

**2.1 NOT USED**

- .1 Not Used.

**PART 3 EXECUTION**

**3.1 CANADIAN GOVERNMENTAL DEPARTMENTS CHIEF RESPONSIBILITY FOR THE ENVIRONMENT**

- .1 Government Chief Responsibility for the Environment:
  - .1 Province: Ontario
    - .2 Ministry of Environment and Energy:
      - .1 Address: 135 St Clair Avenue West, Toronto, ON M4V 1P5 Canada, general inquiries (800)565-4923 or (416)323-4321, fax (416)323-4682
    - .2 Environment Canada:
      - .1 Address: Toronto, ON, general inquiries (416)734-4494.

**3.2 PROTECTION**

- .1 Protect structures including harbour master building, restaurant, existing pavement not designated for removal, and portions of existing wharf structure from damage. In event of damage, immediately replace or make repairs to approval of Departmental Representative at no additional cost.
- .2 Prevent movement, settlement, or damage to adjacent structures, including harbour master building and restaurant, and utilities that are to remain in place. Provide bracing and shoring required.

**3.3 DEMOLITION REMOVAL AND DISPOSAL**

- .1 Saw cut concrete sidewalk slab in a neat line at limits of removal for tie backs to provide for sidewalk reinstatement.
- .2 Existing Materials & Equipment:
  - .1 Electrical pedestals are to be disconnected, removed and stored.
  - .2 Contractor is to maintain existing electrical materials & equipment during construction.
  - .3 Contractor is to remove and dispose of the existing navigation aid tower. The day-mark, lantern, battery, solar panel are to be salvaged and returned to the Owner.
  - .4 Mooring bollards to be removed and stored. Contractor is to obtain direction from Owner.
  - .5 Remove & dispose of existing timber fenders.
  - .6 Remove and re-use rubber fenders.
  - .7 Remove Fuel dock mooring pile. Store for re-use.
  - .8 Existing handrail to be removed. Contractor is to determine the extent of removal with the Owner.
  - .9 Existing interlocking is to be removed, salvaged and placed on skids at a location confirmed by the Owner.

- .10 Existing floating dock anchors are to be removed and disposed of.
  
- .3 Demolition / Relocation work to be done by others:
  - .1 Existing Pump-out shed and related equipment.
  - .2 Benches, planters & ice machine.
  - .3 Gas pump, hoses, amenities & fuel lines.
  - .4 Floating fuel docks will be re-located.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 RELATED SECTIONS**

- .1 Section 35 49 25 - Turbidity Curtain (Silt Curtain).

**1.2 REFERENCES**

- .1 ASTM International:  
.1 ASTM A497/A497M-07, Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.  
.2 ASTM D1751-04(2013)e1, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
- .2 CSA International:  
.1 CSA A23.1-09/A23.2-09, Concrete Materials and Methods of Concrete Construction/ Methods of Test for Concrete.  
.2 CSA A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).  
.3 CSA G30.18-09, Carbon steel bars for concrete reinforcement.  
.4 CSA G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.  
.5 CAN/CSA S269.3-M92(R2013), Concrete Formwork.

**1.3 DESIGN REQUIREMENTS**

- .1 Alternative 1 - Performance: in accordance with CSA A23.1/A23.2, and as described in Mixes of PART 2 - PRODUCTS.

**1.4 SUBMITTALS**

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

**1.5 QUALITY ASSURANCE**

- .1 Submit to Departmental Representative, minimum 4 weeks prior to starting concrete work, valid and recognized certificate from plant delivering concrete.
- .2 Quality Control Plan: submit written report, as described in PART 3 - VERIFICATION, to Departmental Representative verifying compliance that concrete in place meets performance requirements.
- .3 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06.

**1.6 DELIVERY, STORAGE AND HANDLING**

- .1 Concrete hauling time: maximum allowable time limit for concrete to be delivered to site of

Work and discharged not to exceed 120 minutes after batching.

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

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

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

## **1.7 WASTE MANAGEMENT AND DISPOSAL**

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

.2 Ensure emptied containers are sealed and stored safely.

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

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

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

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

## **1.8 MEASUREMENT & PAYMENT**

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

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

.2 Cast-in-place concrete in sidewalk will be measured by the cubic metre calculated from neat dimensions as indicated.

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

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

.4 1. Slab expansion joints, 2. cope beam expansion joints and 3. isolation joints, which will be measured in linear metres and shall include all labour materials and equipment. Joint accessories including smooth bars, pvc sleeves, joint filler, backer rod and sealant are considered included in the construction of joints and will not be measured separately for payment.

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

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

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

## **PART 2 PRODUCTS**

### **2.1 MATERIALS**

- .1 Cast-in-place concrete:
  - .1 Cement: to CSA A23.01-09, Type GU.
  - .2 Minimum compressive strength: 35MPa at 28 days.
  - .3 Exposure class: C-1 to CSA A23.1/ A23.2.
  - .4 Aggregate size: 20 mm maximum size to CSA A23.1/A23.2.
  - .5 Slump: 70 mm +/-20 mm at time of deposit.
  - .6 Air content: Table 4, Category 1, 6%.
  - .7 Admixtures: air entraining to ASTM C233/C233M-11 Standard Test Method for Air-Entraining Admixtures for Concrete. Calcium chloride or compounds containing calcium chloride not permitted.
  - .8 Water: to CSA A23.1/A23.2.
- .2 Reinforcing bars and dowels: to CSA G30.18, Grade 400R.
- .3 Welded steel wire fabric: flat sheets to ASTM A497/A497M, 152 x 152 mm, MW18.7 x MW 18.7.
- .4 Anchor bolts: to CSA G40.20/G40.21, Grade 300W.
- .5 Grout: non-shrink, premixed, 35 MPa compressive strength at 24 hours.
- .6 Joint Filler: bituminous impregnated fibreboard, to ASTM D1751.
- .7 Sealer: exterior grade, non-sag sealant.
- .8 Other concrete materials: to CSA A23.1/A23.2.

### **2.2 MIXES**

- .1 Alternative 1 - Performance Method for specifying concrete: to meet Departmental Representative performance criteria to CSA A23.1/A23.2.
  - .1 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as in PART 3 - VERIFICATION.
  - .2 Provide concrete mix to meet following hard state requirements:
    - .1 Durability and class of exposure: C-1.
    - .2 Compressive strength at 28 age: 35 MPa.
    - .3 Surface texture: smooth formed finish.
  - .3 Concrete supplier's certification: both batch plant and materials meet CSA A23.1/A23.2 requirements.
  - .4 Provide quality management plan to ensure verification of concrete quality to specified performance.

---

**PART 3 EXECUTION**

**3.1 PREPARATION**

- .1 Provide Departmental Representative 24 hours minimum notice before each concrete pour. Placing of concrete is permitted only after approval of equipment and mix.
- .2 During concreting operations:
  - .1 Development of cold joints not allowed.
  - .2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.
- .3 Ensure reinforcement and inserts are not disturbed during concrete placement.
- .4 Prior to placing of concrete obtain Departmental Representative's approval of proposed method for protection of concrete during placing and curing.
- .5 Surfaces shall be thoroughly cleaned of all foreign material prior to depositing fresh concrete. For hardened concrete surfaces, the aggregate shall be partially exposed and surface to be rough.
- .6 Protect previous Work from staining.
- .7 Clean and remove stains prior to application of concrete finishes.
- .8 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.
- .9 In locations where new concrete is dowelled to existing work, drill holes in existing concrete.
  - .1 Place steel dowels and pack solidly with epoxy grout to anchor and hold dowels in positions as indicated
- .10 Do not place load upon new concrete until authorized by Departmental Representative.

**3.2 PLACING REINFORCING STEEL**

- .1 Accurately place reinforcing steel and dowels in the positions shown on the drawings and hold firmly during the placing, compacting and setting of concrete.
- .2 Reinforcement steel and dowels must be in place and inspected by the Departmental Representative prior to placement of concrete.
- .3 Reinforcing steel fabricating and placing tolerances shall not reduce the concrete cover to less than the specified minimum clear concrete cover noted in the general notes.
- .4 Reinforcement requirements are shown on detail drawings. Where details of bar sizing and spacing are not shown, allow for minimum reinforcement in accordance with CAN/CSA A23.3. All reinforcement shown shall be continuous unless detailed otherwise.

**3.3 FORMWORK**

- .1 The design, fabrication, erection, and use of concrete formwork shall conform to the requirements of CAN/CSA-S269.3 and CSA A23.1/A23.2.

- .2 Ensure formwork is held securely in place and is fit tight to profile of existing concrete. Seal all openings prior to placement of concrete. Adequately design forms for concrete pumping pressures.

### **3.4 CONSTRUCTION**

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

### **3.5 FINISHES**

- .1 Finish concrete to CSA A23.1/A23.2, Table 22.
- .2 Wood float at exterior locations.
- .3 Steel trowel to smooth dense surfaces. Provide round edges.

### **3.6 CONTROL JOINTS**

- .1 Cut and form control joints in slabs on grade at locations indicated, in accordance with CSA A23.1/A23.2 and install specified joint sealer/filler as shown on the drawings.
- .2 Contractor to follow joint location plan as shown on the drawings.
- .3 Control joints required at maximum spacing of 10 m.
- .4 Joint filler to be 13 mm asphalt fibreboard with sealant that meets requirements of CAN/CGSB 19.24 - M90.
- .5 Where details of control joint are not shown on the drawings, reinforcement is to be interrupted at the control joint.
- .6 Provide unbonded smooth 20 mm diameter by 600 mm long bars at 600 mm spacing.

### **3.7 EXPANSION JOINTS**

- .1 Install premoulded joint filler in expansion joints to full depth of slab flush with finished surface to CSA A23.1/A23.2.

### **3.8 TIME INTERVAL BETWEEN CONCRETE PLACEMENT**

- .1 Construction joints: 7 days wet cure continuously.
- .2 Control joints: 6 days.
- .3 Expansion joints/contraction joints: 1 day.
- .4 Stage 2 concrete pour of anchor wall may be placed as soon as initial placing has 25% of design strength but no sooner than 12 hours.

**3.9 CURING**

- .1 Cure concrete in accordance with CSA A23.1/A23.2, Clause 7.4.
- .2 Provide cold weather protection during curing period.

**3.10 VERIFICATION**

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

**3.11 UNDERWATER PLACED CONCRETE AND BAGGED CONCRETE**

- .1 Bagged concrete method of placing underwater concrete consists of diver placing bags partially filled with dry concrete mix.
- .2 Bagged concrete placed at wharf closures are considered incidental to closure sealed under Section 31 62 16.13.
- .3 Concrete Materials:
  - .1 Use type GU cement.
  - .2 Minimum compressive strength at 28 days: 35 MPa.
  - .3 Class of exposure: C-1.
  - .4 Maximum water cement ratio by mass: 0.45.
  - .5 Nominal size of coarse aggregate: 20 mm.
  - .6 Fine aggregate content: 42 to 45% of total aggregate mass.
  - .7 Slump at point and time of discharge: 100 to 125 mm for pumped concrete and 0 to 25 mm for bagged concrete.
  - .8 Admixtures: to approval of Departmental Representative. Use Admixtures to correct deficiencies in mix or to improve placement of concrete.
    - .1 Departmental Representative may withdraw prior to approval of admixture if conditions encountered during course of work indicate unsatisfactory results.
    - .2 Do not use calcium chloride or materials containing calcium chloride.
- .4 Installation - bagged concrete method:
  - .1 Use bags made of coarsely woven material to allow concrete to bond between bags.
  - .2 Fill bags with dry concrete mix not more than 80% full before placing.
  - .3 Place each concrete bag individually so that bag is stable and securely resting on foundation material of previously placed bags.

**END OF SECTION**

## **PART 1 GENERAL**

### **1.1 REFERENCES**

- .1 American Society for Testing and Materials International (ASTM)
  - .1 ASTM D2697-03(2008), Standard Test Method for Volume Nonvolatile Matter in Clear or Pigmented Coatings.
- .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-PAI, Shop, Field and Maintenance Painting of Steel.
  - .5 SSPC-PA 2-04, Measurement of Dry Coat Thickness with Magnetic Gauges.
  - .6 SSPC Good Painting Manual, Volume 1, 4<sup>th</sup> Edition.

### **1.2 MEASUREMENT PROCEDURES**

- .1 Cleaning, shop painting and field painting of steel plate and associated hardware for concrete repairs will not be measured separately for payment but shall be considered included in the measurement for payment under Section 03 30 00.
- .2 Cleaning, shop painting and field painting of ladders and associated hardware will not be measured separately for payment but shall be considered included in the measurement for payment under Section 35 59 14.

### **1.3 SUBMITTALS**

- .1 Product Data for each individual product.
  - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00.
  - .2 Submit two copies of WHMIS MSDS – Material Safety Data Sheets in accordance with Section 01 33 00. Indicate VOC's content and composition for paint.

### **1.4 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials in accordance with Section 01 74 21.

## **PART 2 PRODUCTS**

### **2.1 MATERIALS**

- .1 Exterior Protective Two Coat System:
  - .1 Primer coat: zinc rich epoxy primer suitable for severe weather condition.
    - .1 VOC: less than 301 g/L when mixed.

- .2 Coats: 1
  - .3 Dry film thickness (DFT): 50-100microns.
  - .4 Theoretical coverage: 9.2 m<sup>2</sup>/ L at 75 microns DFT or greater.
  - .5 Volume of solid: 70% ± 3% or greater, to ASTM D2697.
- .2 Top coat: Engineered siloxane.
- .1 VOC: 275 g/L or less.
  - .2 Coats: 1
  - .3 Dry film thickness: 75-175 microns.
  - .4 Theoretical coverage: 30 m /L at 25 microns DFT or greater.
  - .5 Volume of solids: 75% or greater, to ASTM D2697.
  - .6 Colour:
    - .1 Curb, bollards, safety ladder and associated hardware: safety yellow.
    - .2 Sand for sandblasting: to SSPC on blast cleaning.

### **PART 3 EXECUTION**

#### **3.1 MANUFACTURER'S INSTRUCTIONS**

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

#### **3.2 PREPARATION OF SURFACES**

- .1 Preparation of metal surfaces to be painted shall be:
  - .1 Commercial blast cleaned to remove paint, rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances. Commercial Blast to SSPC-SP6.
  - .2 When cleaning by air blasting with sand, provide adequate separators and traps to remove detrimental amounts of water and oil from compressed air before reaching nozzle.
  - .3 Remove traces of blast products from surfaces, and from pockets and corners by brushing with clean brushes, by blowing with clean compressed air, or by vacuum cleaning. Do not damage partially or completed work adjacent to area being cleaned.
  - .4 Do not apply paint until prepared surfaces have been inspected and approved.
  - .5 Prior to commencing paint application the degree of cleanliness of surfaces to be in accordance with SSPC-Vis1.

#### **3.3 NUMBER OF PAINT COATS**

- .1 Paint prepared metal surfaces in accordance with the following:
  - .1 One prime coat to minimum dry film thickness of 0.076 mm and maximum of 0.127 mm.
  - .2 Two coats each to minimum dry film thickness of 0.101 mm and maximum of 0.152 mm. Total dry film thickness 0.177mm to 0.279mm.
  - .3 Thickness measurements will be taken according to SSPC-2 thickness specification.

### 3.4 PROTECTION OF SURFACES

- .1 Protection of surfaces.
  - .1 Protect surfaces not to be painted and if damaged, clean and restore such surfaces as directed by Departmental Representative.
  - .2 Apply primer after surface has been cleaned and before deterioration of surface occurs.
  - .3 Clean surfaces again if rusting occurs after completion of surface preparation.
  - .4 Prevent contamination of cleaned surfaces by salts, acids, alkalis, corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats of paint. Remove contaminants from surface and apply paint immediately.
  - .5 Protect cleaned and freshly painted surfaces from dust to approval of Departmental Representative.

### 3.5 MIXING PAINT

- .1 Mix ingredients in container before use and ensure breaking up of lumps, complete dispersion of settled pigment, and a uniform composition.
- .2 Mix paint often enough during application to keep pigment in suspension and composition uniform.
- .3 Mixing or keeping paint in suspension by means of an air stream bubbling under paint surface will not be permitted.
- .4 Do not dilute or thin paint for brush application; use as received from manufacturer.

### 3.6 APPLICATION

- .1 The Departmental Representative shall be notified 48 hours in advance of his intention to mix and apply a coating or coating system.
- .2 Apply paint by spraying. Use sheepskins or daubers when no other method is practical in places of difficult access.
- .3 Application related failures in coatings as described in the chapter "Coating Failures" of the SSPC Painting Manual Vol.1, shall be corrected prior to application of a subsequent coat and after the application of the top coat.
- .4 Where surface to be painted is not under cover, do not apply paint when:
  - .1 Air temperatures is below 5°C or when temperature is expected to drop to 0°C before paint has dried.
  - .2 Temperature of surface is over 50°C unless paint is specifically formulated for application at high temperatures.
  - .3 Fog or mist occur at site; it is raining or snowing; there is danger of rain or snow; relative humidity is above 85%.
  - .4 Surface to be painted is wet, damp or frosted.
  - .5 Previous coat is not dry.
- .5 Provide cover when paint must be applied in damp or cold weather. Protect, shelter, or heat surface and surrounding air to comply with temperature and humidity conditions specified in 3.6.4. Protect until paint is dry or until weather conditions are suitable.

- .6 Remove paint from areas which have been exposed to freezing, excess humidity, rain, snow or condensation during application. Prepare surface again and repaint.
- .7 Apply paint using spraying equipment in accordance with the paint manufacturer's recommendations.
  - .1 All paint coating systems shall be stored, handled, mixed, and applied according to SSPC-PA1 and the recommendations on the manufacturer's product data sheets.
  - .2 Provide and maintain equipment that is suitable for intended purpose, capable of properly atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
  - .3 Provide traps or separators to remove oil and water from compressed air and drain periodically during operations.
  - .4 Keep paint ingredients properly mixed in spray pots or containers; agitators must be used.
  - .5 Apply paint in a uniform layer, with overlapping at edges of spray pattern.
  - .6 Immediately brush out all runs and sags.
  - .7 Use equipment recommended by manufacturer to work paint into cracks, crevices, and places which are not adequately painted by spray.
  - .8 Remove runs and sags and repair before proceeding with another coat.
- .8 Remove paint which does not meet with the requirements of these specifications, thoroughly clean affected surfaces, and repaint at no additional cost to Contract.
- .9 Apply each coat of paint as continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.
- .10 Shop painting:
  - .1 The maximum time between final surface preparation and prime coat application inside the shop shall be 24 hours.
  - .2 Do shop painting after fabrication and surface preparation before any damage to surface occurs from weather or other exposure.
  - .3 Unless otherwise specified, surfaces to be in contact after field erection to be shop painted prior to erection except where paint will interfere with assembly.
  - .4 Do not paint areas of steel surfaces to be in contact with concrete.
  - .5 Remove any weld spatter before painting.
- .11 Field painting:
  - .1 Touch up metal which has been shop coated with same type of paint and to same thickness as shop coat.
- .12 Handling painted steel:
  - .1 Do not handle painted steel until paint has dried, except 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 steel.
  - .3 Do not load painted steel for shipment until the paint is dry.
  - .4 Use wood blocks to minimize damage to paint films resulting from stacking members.

### 3.7 QUALITY CONTROL

- .1 Upon completion of the painting procedures test for dry film reading and evaluate the results as per SSPC PA 2.

**3.8 CLEANING**

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

**END OF SECTION**

**PART 1 GENERAL**

**1.1 MEASUREMENT PROCEDURES**

- .1 Pre-construction and post-construction survey of existing buildings shall be measured as part of the lump sum arrangement and shall include all labour, materials and equipment necessary to complete the work. Vibration monitoring of properties/buildings during construction is considered incidental and will not be measured separately for payment.

**1.2 SUBMITTALS**

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
  - .1 Prepare submissions at least two weeks prior to undertaking construction. Submissions shall be prepared by a qualified Professional Engineer, licensed in the Province of Ontario.
  - .2 Pre-construction and post-construction surveys of buildings:
    - .1 Provide qualifications of proposed individuals undertaking the Preconstruction survey prior to undertaking the work.
    - .2 Provide a Summary Condition Report of the building inspected following completion of field investigation.
  - .3 Monitoring Plan:
    - .1 Provide a submission of the proposed monitoring plan including monitoring rate and reporting.
    - .2 Provide daily/weekly reports of data summary.

**1.3 QUALITY ASSURANCE**

- .1 The preconstruction survey and monitoring shall be undertaken under the direction of a Professional Engineer licensed in the Province of Ontario, employed or retained by the Contractor.
- .2 Personnel conducting monitoring shall be trained in operation of equipment being used.

**PART 2 PRODUCTS**

**2.1 PORTABLE GROUND VIBRATION MONITORING EQUIPMENT**

- .1 General Seismograph Requirements:
  - .1 Battery operated.
  - .2 Twenty four (24) hour clock with real time LCD display of current levels and maximum levels.
  - .3 Capable of measuring vibration accelerations, peak particle velocity (PPV) and amplitudes in three mutually perpendicular directions.
  - .4 Sufficient storage capability for continuous recording.
- .2 Specifications:
  - .1 Velocity range: 0.5 to 50 mm/s.
  - .2 Transducers: three mutually perpendicular axes.

.3 Recording: time-history.

### **PART 3 EXECUTION**

#### **3.1 PRE-CONSTRUCTION & POST-CONSTRUCTION SURVEYS**

- .1 Permission to enter premises will be the responsibility of the Contractor.
- .2 Survey buildings (of various sizes) along the Pier.
  - .1 Document, by means of video tapes, photographs and written records, the existing preconstruction condition of structures such that potential impacts due to pile installation and proximity of heavy equipment can be assessed. Work shall be undertaken under the direction and guidance of a Professional Engineer.
  - .2 Survey all properties on the pier.
- .3 Provide a Summary Condition Report including photographic record (hard copy and digital) of the buildings prior to the start of pile driving. Provide two copies to the Contract Administrator, stamped by a Professional Engineer.

#### **3.2 GROUND VIBRATION MONITORING**

- .1 Initiate monitoring of vibrations throughout the entire pile installation schedule.
- .2 Monitoring ground vibrations at a minimum of five (5) locations along the length of Pier. Select suitable locations for monitoring equipment including placement near building corners.
- .3 Measure ground vibrations as particle velocity.
  - .1 Record peak particle velocity (PPV) in three mutually perpendicular directions.
  - .2 Maximum allowable peak particle velocity shall apply to each of three measurements and vector sum of three measurements.
- .4 Monitor twice daily or at more frequent intervals during shoring installation. Provide a weekly report on the measurements.
  - .1 Do not exceed peak particle velocity (PPV) limit of 13 mm/s. Lower peak particle velocities may be warranted based on preconstruction survey.
  - .2 Where movements or high PPV are detected, the Contractor shall adjust operations to reduce construction vibration peak particle velocities.

#### **3.3 CLEAN-UP**

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

**END OF SECTION**

**PART 1        GENERAL**

**1.1            RELATED REQUIREMENTS**

- .1        Section 03 30 00 - Cast-in-Place Concrete.
- .2        Section 31 62 16.13 - Steel Sheet Piles.

**1.2            SITE CONDITIONS**

- .1        Sub-surface investigation report is bound into specifications as an Appendix.
- .2        Contractor shall review the geotechnical report and follow recommendations provided therein.
- .3        Results of most recent soundings are shown on drawings. This data may differ from present site conditions as erosion and deposition may have occurred since the time of the survey. Contractor to take this into consideration when submitting bid.

**1.3            REFERENCES**

- .1        Ontario Provincial Standard Specification (OPSS):
  - .1        OPSS 1004, November 2012, Material Specification for Aggregates - Miscellaneous.
  - .2        OPSS 514, November 2010, Ontario Provincial Standard Specification, Construction Specification for Trenching, Backfilling, and Compacting.
  - .3        OPSS 1010, April 2004 for Granular A Aggregate.

**1.4            UTILITY LINES**

- .1        Before commencing work, establish location and extent of underground utility lines in area of excavation. Notify Departmental Representative of findings.
- .2        Advise Departmental Representative to remove or re-route existing lines in area of excavation. Pay costs of such work.
- .3        Maintain existing lines in areas of excavation which must remain active as indicated. Pay costs for this work.
- .4        Record locations of maintained, re-routed and abandoned underground utility lines.
- .5        Make good damage to existing utility lines resulting from work.

**1.5            PROTECTION**

- .1        Protect excavated earth from freezing by approved method.
- .2        Grade around excavations to prevent surface water runoff into excavated area.
- .3        Protect bottoms of excavations from weather. Should softening in bottoms occur due to water or other causes remove softened soil and replace with structural concrete at no additional

cost.

- .4 Protect existing structures and surface features which may be affected by work from damage while work is in progress. Repair any damage resulting from work.
- .5 Adequately protect benchmarks, layout markers, survey markers and geodetic monuments for duration of contract.
- .6 Protect existing facilities and equipment situated on site or adjacent to site from damage.
- .7 Protect roots of trees that are to remain. Where excavation necessitates root or branch cutting, do so only as approved by Departmental Representative.
- .8 Employ adequate safety barriers and signs to protect the excavation and work site area to ensure public safety. Supply, install and maintain temporary security fencing for duration of contract.
- .9 Provide all required temporary bracing and supports for all slabs, beams/walls. Temporary bracing and supports must be capable of transferring all imposed construction and dead loads without exceeding specified design loads. Include temporary support and shoring of adjacent buildings including Harbour Centre building and restaurant.

## **1.6 MEASUREMENT & PAYMENT**

- .1 Excavated materials will not be measured for payment.
- .2 Excavation is considered part of the lump sum.
- .3 Materials removed from beyond limits specified will be measured only when Departmental Representative authorizes additional excavation to obtain satisfactory bearing surfaces.
- .4 Imported backfill materials including Granular A and crushed stone will be measured in tonnes of each material as indicated on the Unit Price Table accepted in the work.
- .5 Native backfill materials excavation will be considered incidental to the work.
- .6 Compaction of backfill materials is considered incidental to the work and will not be measured separately.

## **PART 2 PRODUCTS**

### **2.1 MATERIALS**

- .1 Granular material: to Ontario Provincial Standard Specification 1010, April 2004 for Granular A Aggregate. Maximum size of Granular A is 19.0 mm. Maximum size of crushed stone is 51mm.
- .2 Native fill: excavated soil, free from roots, rocks larger than 75 mm and debris. Departmental Representative to approve excavated material before use as backfill.
- .3 Notify Departmental Representative of source of materials. All material to be from sources satisfactory to Departmental Representative.

---

**PART 3 EXECUTION**

**3.1 STOCKPILING**

- .1 Stockpile fill materials in areas designated by Departmental Representative. Stockpile granular materials in manner to prevent segregation and overloading of existing structures.
- .2 Install silt fence barrier around each stockpile of material and maintain for duration of work.

**3.2 EXCAVATING**

- .1 Excavate to elevations and dimensions indicated or required for construction of work.
- .2 Make excavation to clean lines to minimize quantity of fill material required.
- .3 Earth bottoms of excavations to be dry undisturbed soil, reasonably level, free from loose or organic matter.
- .4 When complete have Departmental Representative inspect excavations to verify depths and dimensions.
- .5 Dispose of surplus or unsuitable excavated material at off site location. Take precautionary measures to ensure safe handling and disposal of materials.

**3.3 BACKFILLING**

- .1 Do not commence backfilling until areas of work to be backfilled have been inspected and approved by Departmental Representative.
- .2 Backfill all spaces excavated and not occupied by parts of the structure, or other permanent works, with specified material placed as shown on the drawings.
- .3 Areas backfilled to be free from debris, snow, ice, water or frozen ground.
- .4 Prior to placing fill, compact existing subgrade to obtain same compaction as for specified fill. Cut out "soft" areas and fill with suitable material until specified compaction can be obtained.
- .5 Do not backfill around newly placed concrete until concrete has been in place at least 14 days, test cylinders show strength to be at least twice the working stress used in design, and approval has been obtained from the Departmental Representative.
- .6 Place and compact fill materials in continuous horizontal layers not exceeding 300 mm loose depth. Use methods to prevent disturbing or damaging any part of the work. Make good any damage.
- .7 Maintain optimum moisture content to enable compaction to attain specified density.
- .8 Compact each layer to 98% Standard Proctor Density. Where working space is limited, employ approved mechanical hand operated tamping devices. When such devices are employed, deposit backfill material in layers not exceeding 150 mm in thickness.
- .9 Perform work in accordance with OPSS 514, November 2010, Ontario Provincial Standard Specification, Construction Specification for Trenching, Backfilling, and Compacting.

**END OF SECTION**

**PART 1 GENERAL**

**1.1 RELATED SECTIONS**

- .1 Section 31 62 16.13 - Steel Sheet Piles.

**1.2 REFERENCES**

- .1 Canadian Standards Association (CSA):
  - .1 CSA G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

**1.3 DELIVERY AND HANDLING**

- .1 Protect piles from damage due to excessive bending stresses, impact, abrasion or other causes during delivery, storage and handling.
- .2 Replace or repair damaged piles with steel to CSA G40.20/G40.21.
- .3 If material is stockpiled on a structure, ensure that structure is not overloaded.

**1.4 EXISTING CONDITIONS**

- .1 Sub-surface investigation report is bound into specifications as an Appendix.
- .2 Contractor is responsible for making his own assessment of the type and quality of the in-situ materials and its impact on his proposed construction methods and operations.

**1.5 PROTECTION**

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

**1.6 SCHEDULING OF WORK**

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

**1.7 MEASUREMENT PROCEDURES**

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

**PART 2 PRODUCTS**

## **2.1 MATERIALS**

- .1 For material requirements refer to Section 31 62 16.13.
- .2 Supply full length piles.
- .3 Do not splice piles without written permission of Departmental Representative.

## **2.2 EQUIPMENT REQUIREMENTS**

- .1 Equipment information: Supply equipment of sufficient size and capacity to adequately install the piling to indicated depth. Prior to bringing on site, submit to Departmental Representative for review, details of equipment for installation of piles. For impact hammers give manufacturer's name, type, rated energy per blow at normal working rate, mass of striking parts of hammer and mass of driving cap. For non-impact methods of installation such as auguring, jacking, vibratory hammers or other means, give full details of characteristics necessary to evaluate performance.
- .2 Floating plant used in the work to be of sufficient capacity and in good operating conditions to satisfactorily complete the work, within the time schedule and in accordance with the specifications.
- .3 Contractor shall submit a complete list of proposed floating plant to Departmental Representative for review prior to commencement of work. Any modifications required to floating plant and associated equipment shall be performed by Contractor prior to commencing work at no additional cost to Departmental Representative.
- .4 Mark floating equipment with lights in accordance with the Collision Regulations with Canadian Modifications 1983, and maintain a VHF marine radio watch on board.
- .5 Do not impede navigation during progress of work in accordance with the Collision Regulations with Canadian Modifications 1983. Make no claims for delays resulting from vessel movements in harbour area.

## **PART 3 EXECUTION**

### **3.1 PREPARATION**

- .1 Ensure that ground conditions at pile locations are adequate to laterally support the driven piles. Make provision for access and support of piling equipment during performance of work.

### **3.2 FIELD MEASUREMENT**

- .1 Maintain accurate records of driving for each pile, including:
  - .1 Type and make of hammer, stroke or related energy.
  - .2 Pile size, length and heat number, location of pile in pile group, location or designation of pile group.
  - .3 Sequence of driving piles in group.
  - .4 Final tip, head and cut-off elevations.
  - .5 Other pertinent information such as interruption of continuous driving, pile damage.

- .6 Provide Departmental Representative with three copies of records.

### **3.3 INSTALLATION**

- .1 Notify Departmental Representative at least 48 hours prior to commencement of pile installation.
- .2 Provide all necessary facilities for inspection and co-operate with Departmental Representative in inspecting and recording installation data at all times.
- .3 Furnish such equipment and labour as necessary to enable Departmental Representative to install instrumentation on piles.
- .4 Hold piles securely and accurately in position while installing.
- .5 Do not drive piles within a radius of 8 metres of concrete which has been in place less than 2 days unless otherwise directed by Departmental Representative in writing.
- .6 Cut off piles neatly and square at elevations indicated on drawings.
- .7 Pile cut-offs become property of contractor. Remove cut-off lengths from site on completion of work.

### **3.4 PILE CAPACITY**

- .1 Install each pile with approved pile driving procedures. Departmental Representative will be sole judge of acceptability of each pile with respect to depth of penetration or other criteria specified.
- .2 Drive each pile to a minimum penetration of the pile tip to elevation shown on the drawings.

### **3.5 DRIVING TOLERANCES**

- .1 Install piles to the following tolerances:
- .1 Pile heads within 50 mm of locations shown on drawings.
  - .2 Piles not more than 2 percent of length out of alignment.
  - .3 Cut off elevation at required elevation.

### **3.6 DAMAGED/ DEFECTIVE PILES**

- .1 Departmental Representative will reject any pile that is driven out of position or is damaged during driving or handling. Extend piles driven below cut off elevation as directed by Departmental Representative, at no cost to Departmental Representative.
- .2 Pull out rejected piles and replace with new piles as directed.
- .3 No extra compensation will be made for removing and replacing or other work made necessary through rejection of a defective pile damaged due to faulty workmanship.
- .4 Where piles are damaged or caused to drift outside specified tolerance due to piles obstructions or other causes beyond Contractor's control the remedial measures adopted will be paid at the Contract Unit Price or in accordance with the General Conditions if no unit prices apply.

**3.7 FUEL DOCK MOORING PILE**

- .1 Length of the pile is unknown. The Contractor is to obtain the final location, elevation and embedment for the pile from the Owner. Contractor to obtain approval from the Owner prior to driving the pile.

**END OF SECTION**

## **PART 1 GENERAL**

### **1.1 REFERENCES**

- .1 ASTM International:
  - .1 ASTM A6/A6M-13a, Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
  - .2 ASTM A53/A53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
  - .3 ASTM A615/A615M-13, Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
  - .4 ASTM A325-10e1, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
- .2 CSA International:
  - .1 CSA G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  - .2 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel Structures.
  - .3 CSA W59-13, Welded Steel Construction (Metal Arc Welding).

### **1.2 WELDERS QUALIFICATIONS**

- .1 Use only welders qualified under provisions of CSA W47.1.
- .2 Make available to Departmental Representative currently valid Canadian Welding Bureau Qualification Certificate for each welder employed on the work.

### **1.3 SUBMITTALS**

- .1 Submittals in accordance with Section 01 33 00.
- .2 Quality Assurance:
  - .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  - .2 Instructions: submit manufacturer's installation instructions.
  - .3 Submit pile driving records, as described in PART 3 - RECORDS, for review by Departmental Representative.
- .3 At least two weeks prior to start of pile driving, submit to Departmental Representative two copies of steel producer and mill test data and certification that steel piling, delivered to job site, meets requirements of this section.
- .4 Submit shop drawings in accordance with the Section 01 33 00 for the following items:
  - .1 A plan layout of the steel sheet piling sections of the dockwalls, including all dimensions.
  - .2 Details of the steel sheet piling sections including welding details for plates.
  - .3 Details of falsework and all miscellaneous steel elements.
- .5 Contractor is to submit details for splices for wales and corner details to develop the full strength of material unless otherwise noted.

#### **1.4 HANDLING AND STORAGE**

- .1 Handle and store steel sheet piling materials in such a manner that no damage will be done to materials or work.
- .2 Use slings and/or lifting beams or brackets when lifting piling so that mass is distributed and piling is not subject to excessive bending stresses or deformation.
- .3 Store sheet piling on level ground or provide supports so that piling is level when stored. Provide horizontal blocking at a spacing not exceeding 5 metres so that there is no excessive sagging in piling. Overhang at ends not to exceed 500 mm. Block between lifts directly above blocking in lower lift. Maximum height of pile not to exceed 3 metres.
- .4 Adhere to manufacturer's recommendations and procedures for handling and storing of steel sheet piles.
- .5 If material is stockpiled on a structure, ensure that structure is not overloaded.

#### **1.5 INSPECTION AND TESTING**

- .1 Inspection and testing of steel sheet piling material may be carried out by testing laboratory designated by Departmental Representative at any time during course of work.
- .2 Materials inspected or tested by Departmental Representative which fail to meet contract requirements will be rejected.
- .3 Where tests or inspections by designated testing laboratory reveal work not in accordance with contract requirements, Contractor to pay costs for additional tests or inspections as Departmental Representative may require to verify acceptability of corrected work.
- .4 Design adequate steel falsework systems to support piles and accommodate pile driving operations, in accordance with Section 31 62 00.
- .5 Submit falsework design to Departmental Representative for review one (1) week prior to the commencement of falsework construction.

#### **1.6 MEASUREMENT & PAYMENT**

- .1 Supply of steel sheet piling will be measured in square metres of piling authorized by Departmental Representative and delivered to the site. Area will be calculated by multiplying lengths of piles by widths. Width of steel sheet pile section is defined as centre to center distance between pile interlocks measured along a plan parallel to finished wall. An additional 100 mm for each pile will be allowed for cut-off.
- .2 Steel sheet piling in anchor wall will be measured in square metres of piling remaining in place after cut-off. Area will be calculated by multiplying straight horizontal centreline length, measured at the top of the piles, by average vertical length of piles installed and left in work.
- .3 Installation of steel sheet piling will be measured in square metres of piling remaining in place after cut-off. Area will be calculated by multiplying straight horizontal centreline length measured at the top of the piles, by average vertical length of piles installed and left in work.
- .4 Supply and installation of steel walers, including splices, spacer plates, washers, transfer bolts

and pile caps, including angle clips will be measured in lineal metres of double waler system and pile cap installed and and left in work.

- .5 Supply and installation of tie rods, including nuts, sleeve nuts, pipe sleeves, bearing plates, washers and couplers, will be measured by each linear metre installed and left in work.
- .6 Other associated hardware, supplied and incorporated in the work, as specified is considered incidental to the installation of steel sheet piling and will not be measured separately for payment.
- .7 Vibration monitoring is considered incidental to steel sheet piles and will not be measured separately for payment.
- .8 Any excavation, coring, drilling and surface restoration required for installation of tie rods are considered incidental to installation of steel sheet piling and will not be measured separately for payment. Trimming, coping, drilling and cutting top of sheet piles are considered incidental and shall not be measured separately for payment.
- .9 Supply full length piles. No splicing of piles allowed unless authorized in writing by Departmental Representative.
- .10 Reinforcement of pile heads and tips, if required, is considered to be included in the work involved under the installation of steel sheet piling and will not be considered for separate payment.
- .11 Fabrication of composite junction piles at corners is considered incidental to installation of steel sheet piling and will not be measured separately for payment.
- .12 Wharf closures including, but not limited to, bagged concrete, steel plates and angles will be measured by each wharf closure sealed and shall include all labour, materials and equipment necessary to complete the work.

## **PART 2 PRODUCTS**

### **2.1 MATERIALS**

- .1 Steel sheet piling: Continuous interlocking Z section to CSA G40.20/G40.21, Grade 350W, minimum 30% recycled content, and following:
  - .1 Minimum effective section modulus of 1900 cm<sup>2</sup> per metre of wall.
  - .2 Minimum flange and web thickness of 10.0 mm.
  - .3 Special corners: provide standard fabricated special corners for type of steel sheet piling supplied.
  - .4 Interlocks: alignment to be such that a section of interlock bar of 1 m minimum length will pass along full length of pile without binding.
  - .5 Mark each piece of sheet piling legibly using stencil or die-stamp with following information:
    - .1 Heat number.
    - .2 Manufacturer's name.
    - .3 Length and section number.
  - .6 Do not precut lifting or slinging holes in sheet piles.
- .2 Structural steel: for walers, bearing plates, waler splices, capping channels, support angles and miscellaneous steel to CSA G40.20/G40.21, Grade 300W.

- .3 Tie rods, sleeve nuts, couplers and turnbuckles:
  - .1 To ASTM A615/A615M, Grade 400 MPa.
  - .2 Tie rods: continuously threaded.
  - .3 Sleeve nuts, couplers and turnbuckles: to have a load capacity of 15% in excess of capacity of tie rod.
  - .4 Preassemble, mark and test tie rod to following tolerances as sleeve nut or turnbuckle: 1/80 of normal rod diameter. Deviation of centreline: 1 in 160.
- .4 Nuts and bolts: hexagon nuts, transfer bolts, splice bolts and washers to ASTM A325.
- .5 Steel pipe sleeves: to ASTM A53/A53M.

## **2.2 SOURCE QUALITY CONTROL: HOT ROLLED STEEL SHEET PILING**

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

## **2.3 SOURCE QUALITY CONTROL: COLD FORM STEEL SHEET PILING**

- .1 Provide results of tests of steel sheet piling material to be used as follows:
  - .1 One tension test from each heat for quantities of finished material less than 50 tonnes.
  - .2 Two tension tests from each heat for quantities of finished material exceeding 50 tonnes.
- .2 Tension tests to CSA G40.20/G40.21.
- .3 Provide results of bend tests of steel sheet piling material to be used as follows:
  - .1 Bend tests to ASTM A6/A6M with the following amendments:
    - .1 S14.1 - Bend tests shall be performed with the material in the condition as used in the cold forming operation. Three tests shall be made from each heat and each thickness of material produced. The bend test specimens shall be taken from the edge of each coil. The longitudinal axis of the specimen shall be transverse to the coil rolling direction.
    - .2 S14.1.1 - Except as provided below, bend test specimens shall have a minimum width to thickness ratio of 8, with both edges parallel throughout the section in which bending occurs, and will be machined.
    - .3 S14.2 - Minor surface separations less than 0.8 mm in depth related to superficial steel surface or subsurface discontinuities will not cause rejection. Surface separations in excess of 0.8 mm depth and/or cracks normal to the metal surface will cause rejection.

## **PART 3 EXECUTION**

### **3.1 INSTALLATION**

- .1 Do pile installation work to Section 31 62 00 except where otherwise specified.

- .2 Do welding to CSA W59 except where otherwise specified.
- .3 Submit full details of method and sequence of installation of piling to Departmental Representative for review prior to start of pile installation work.
- .4 Give ample notice of the commencement date of pile driving so that Departmental Representative may be on site to inspect the piles and driving operations.
- .5 Departmental Representative may direct Contractor to alter sequence of construction activities.
- .6 When installing sheet piles by driving, use the following procedures:
  - .1 Provide adequate falsework including temporary guide frames and/or bracing to hold piles in proper alignment during setting and driving.
  - .2 Drive piles two at a time. Drive first double pile to its full depth then place a panel of five to eight double sheet piles in guide frames and secure last double pile in location to prevent spreading of piles in panel.
  - .3 Drive end double pile in panel sufficiently deep into ground to ensure that it will remain plumb, then drive remaining pile next to end double pile and finishing with double pile next to double pile first driven.
  - .4 After one panel has been driven, place and drive succeeding panels in similar manner. Complete driving of end double pile of first panel after double piles of second panel have been driven.
- .7 Maintain piles in specified alignments and position until connection to permanent anchorage system and backfilling is complete.

### 3.2 OBSTRUCTIONS

- .1 Check harbour bottom area where piles will be driven for debris, rocks and other pile driving impediments. Prior to commencement of driving operations, clean harbour bottom along pile driving line to remove obstructions. Debris and obstructions removed from harbour bottom to be disposed of at a suitable off site location.
- .2 Should an obstruction be encountered during driving, leave obstructed pile and proceed to drive remaining piles. Return and attempt to complete driving of obstructed pile later.
- .3 Advise Departmental Representative immediately if it is impossible to drive pile to its full penetration, and obtain written direction on further steps required to complete work.

### 3.3 CUTTING

- .1 In flame cutting tops of piles or cutting holes in piles, adopt following procedure:
  - .1 When air temperature is above 0°C, no preheat is necessary.
  - .2 When air temperature is below 0°C, preheat until steel 25 mm on each side of line of cut has reached a temperature very warm to hand (approximately 35°C). Temperature indicating crayon marks may be used to measure temperature.
  - .3 Use suitable, simple 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 a notch or crack, finished radius shall be at least 5 mm.

### **3.4 SPLICING**

- .1 Splicing of piles is not permitted unless shown on drawings or directed by Departmental Representative.

### **3.5 ANCHORAGE SYSTEM**

- .1 Install anchorage system to secure piles in specified alignments and position.
- .2 Do not place backfill behind anchored bulkhead or remove material from in front of piles until they have been completely driven, adjusted and secured in specified alignments and position by anchorage system.
- .3 Install tie rods at locations midway between tie rods of the existing structures and at each end of the structures. Any existing tie rods damaged by the contractor will be replaced or repaired to the satisfaction of Departmental Representative.
- .4 Support tie rods at intervals along their length.
- .5 Connect and tighten tie rods in the work in accordance with details shown on the drawings so that no slack remains prior to commencing backfilling.
- .6 Spot weld tie rod nuts to the bearing plate or coupler to prevent loosening after completion of tensioning.
- .7 No tie rod shall project beyond face of steel sheet pile wall.

### **3.6 INSPECTION**

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

### **3.7 BACKFILLING**

- .1 Backfill in accordance with Section 31 23 33.01 and as detailed on drawings.
- .2 Protect piling, tie rods and anchorage systems from damage or displacement during backfilling operations.
- .3 Backfill in lifts to allow proper compaction and avoid overloading structure.
- .4 Sheet pile structures shall be continually monitored and checked for alignment during filling operations.

### **3.8 SAFETY LADDERS, BOLLARDS AND PIPE CURB**

- .1 Fabricate and install safety ladders, bollards and pipe curb to details and in locations indicated.

**3.9 WORK IN VICINITY OF STRUCTURES**

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

**3.10 COOPERATION AND ASSISTANCE**

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

**3.11 MONITORING OF WORK**

- .1 Contractor is responsible to monitor effectiveness and productivity of his own work on an ongoing basis.
- .2 Contractor to identify and demonstrate effectiveness of proposed monitoring methods prior to commencement of work.

**END OF SECTION**

## **PART 1 GENERAL**

### **1.1 RELATED SECTIONS**

- .1 Section 31 62 16.13 - Steel Sheet Piles.

### **1.2 REFERENCES**

- .1 Ontario Provincial Standard Specifications (OPSS):
  - .1 OPSS 805 November 2010, Construction Specification for Temporary Erosion and Sediment Control Measures.
- .2 Ontario Provincial Standard Drawings (OPSD):
  - .1 OPSD 219.260 November 2006, Turbidity Curtain.
  - .2 OPSD 219.261 November 2006, Turbidity Curtain, Seam Detail.
- .3 Canadian General Standards Board (CGSB):
  - .1 CAN/CGSB 148.1, No. 2-M85, Methods of Testing Geotextiles and Geomembranes - Mass per Unit Area.
  - .2 CAN/CGSB 148.1, No. 3-M85, Methods of Testing Geotextiles and Geomembranes - Thickness of Geotextiles.
  - .3 CAN/CGSB 4.2, No. 11.2-M89(R2013), Textile Test Methods Bursting Strength - Ball Burst Test.
- .4 American Society for Testing and Materials (ASTM):
  - .1 ASTM D4595-11, Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.

### **1.3 SUBMITTALS**

- .1 Submit details of turbidity curtain system in accordance with Section 01 33 00.
- .2 Submit to Departmental Representative details of geotextile material and seam at least 2 weeks prior to commencing work.

### **1.4 DELIVERY AND STORAGE**

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

### **1.5 MEASUREMENT & PAYMENT**

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

## **PART 2 PRODUCTS**

### **2.1 MATERIALS**

- .1 Geotextile: woven synthetic fibre fabric, supplied in rolls.
  - .1 Composed of: minimum 85% by mass of polypropylene polyester with inhibitors added to base plastic to resist deterioration by ultra-violet and heat exposure for 60 days.
- .2 Physical properties:
  - .1 Thickness: to CAN/CGSB-148.1, No. 3, minimum 0.8 mm.
  - .2 Mass per unit area: to CAN/CGSB-148.1, No. 2, minimum 220 g/m<sup>2</sup>.
  - .3 Tensile strength and elongation (in any principal direction): to ASTM D4595.
    - .1 Tensile strength: minimum 900 N, wet condition.
    - .2 Elongation at break: minimum maximum 25%.
    - .3 Seam strength: minimum 900 N equal to or greater than tensile strength of fabric.
    - .4 Mullen burst strength: to CAN/CGSB-4.2, No. 11.2, minimum 2400 N, equal to or greater than tensile strength of fabric.
- .3 Seams: sewn in accordance with manufacturer's recommendations.
- .4 Thread for sewn seams: equal or better resistance to chemical and biological degradation than geotextile.
- .5 Curtain height: to suit water depth and be bottom-weighted to maintain its vertical position.

## **PART 3 EXECUTION**

### **3.1 GENERAL**

- .1 Supply, install, maintain and remove turbidity curtains when instructed by the Departmental Representative.
- .2 Monitoring of water turbidity outside the turbidity curtain will be done by the Departmental Representative. Turbidity shall not exceed 25 mg/l total suspended solids.

### **3.2 INSTALLATION**

- .1 Turbidity curtains shall consist of geosynthetic, load line, flotation, ballast, anchors, mooring buoys, mooring lines, adjustment lines, and tie-downs.
- .2 Design to conform to Ontario Provincial Standard Specification, OPSS 805 and Ontario Provincial Standard Drawings OPSD 219.260 and OPSD 219.261 as a minimum.
- .3 Turbidity curtains shall be constructed as follows:
  - .1 The flotation shall provide support along the length of the turbidity curtain.
  - .2 A sleeve shall be formed and heat-sealed or sewn along the entire bottom edge of the turbidity curtain geosynthetic, to contain the ballast in the sleeve. Breaks may be made in the sleeve to facilitate pulling, provided they are a minimum 100 mm in size and spaced at minimum 3 m intervals.
  - .3 Where turbidity curtain geosynthetic is joined to provide a continuous run, the sections shall be connected to provide a continuous seal and prevent the escape of turbid water between the sections.

- .4 Turbidity curtain, as prepared for installation, shall be of sufficient width to account for water depth and wave action.
- .5 Turbidity curtain shall be of sufficient length to permit work inside the area enclosed by the curtain without restricting equipment operations, and personnel from working.
- .6 Seal the ends of the turbidity curtain where it terminates at the existing structure face.
- .7 Anchor locations shall be established as is necessary to maintain the turbidity curtain in place and functioning.

### **3.3 OPERATION AND MAINTENANCE**

- .1 Turbidity curtains shall be installed to prevent sediment passage, from the area enclosed by the curtain, to the remaining water body. Turbidity curtains shall be installed and maintained in a manner that avoids entry of equipment, other than hand-held equipment or boats, to the remaining water body.
- .2 Equipment is permitted in the work area enclosed by the turbidity curtain.
- .3 Turbidity curtains shall be operated and maintained in the specified location, with the entire top edge above the water surface.
- .4 The curtain shall be free of tears and gaps, and the bottom edge of the curtain is to be continuously in contact with the water course bed so that sediment passage from the area enclosed is prevented.
- .5 Any folds in the turbidity curtain which form next to the flotation collar shall be regularly monitored and freed of collected sediment.
- .6 Monitor and maintain the turbidity curtains booms both during and outside normal working shifts as required. Provide all personnel, materials and equipment necessary to maintain, repair or relocate the turbidity curtain system.
- .7 Carry out construction operations to minimize impact on fish habitat from both disturbed sediments and fill materials.
- .8 Replace damaged or deteriorated geotextile to approval of Departmental Representative.
- .9 Remove turbidity curtain when authorized by the Departmental Representative after completion of the work.

**END OF SECTION**

## **PART 1 GENERAL**

### **1.1 REFERENCES**

- .1 Canadian Standards Association (CSA):
  - .1 CSA W59-13, Welded Steel Construction (Metal Arc Welding).
  - .2 CSA W47.1-09, Certification of companies for fusion welding of steel.
  - .3 CSA G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
  - .4 CSA G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
- .2 The Society for Protective Coatings:
  - .1 SSPC-SP6, 2007, Commercial Blast Cleaning.

### **1.2 WELDING**

- .1 Perform welding to CSA W59.
- .2 Use only welders qualified under CSA W47.1.
- .3 Make available to Departmental Representative current valid Canadian Welding Bureau Qualification Certificate for each welder employed on the work.

### **1.3 SHOP DRAWINGS**

- .1 Submit shop drawings in accordance with Section 01 33 00.

### **1.4 WASTE MANAGEMENT AND DISPOSAL**

- .1 Separate and recycle waste materials.
- .2 Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.

### **1.5 MEASUREMENT PROCEDURES**

- .1 Safety ladders including connections and hand grips will be measured by the unit installed and shall include all labour, materials and equipment.
- .2 Supply, fabrication and installation of pipe curb on new dockwall shall be measured by the linear metre supplied and installed and shall include all labour, materials and equipment to fabricate and install.
- .3 Supply and installation of pipe anchors at anchor wall locations will be measured by the unit installed and shall include grout and all labours, materials and equipment.
- .4 Painting of safety ladders and pile cap are considered incidental and will not be measured separately for payment.

- .5 Supply fabrication and installation of bollards on new dockwall shall be measured by each supplied and installed and include all labour, materials and equipment.
- .6 Cylindrical rubber fenders will be measured for payment for each fender assembly; there are two fender unit types.
  - .1 New fender assembly, including appurtenances.
  - .2 Salvaged and refurbished fender assembly, including appurtenances.
- .7 Fabrication and installation of new cylindrical rubber fender units including all labour and materials, all cutting, drilling, welding, bolting and disposal of waste will be considered included in payment items. Chain, hardware and securing fasteners, and angle brackets are considered included and will not be measured separately for payment.
- .8 Careful removal, storage and re-installation of existing fender and chain assembly using new hardware, fasteners and angle brackets are considered included and will not be measured separately for payment.
- .9 Costs for loading, transporting, unloading and handling of new fenders are considered included and will not be measured separately for payment.
- .10 Removal of existing timber and rubber fendering, anchor plates, anchor bolts and connectors, and chains including disposal of excess removed materials will not be measured separately for payment.

## **PART 2 PRODUCTS**

### **2.1 MATERIALS**

- .1 Preparation of new metals:
  - .1 Commercial blast clean to remove paint, loose mill scale, welding slag, rust, dirt, oil, grease and other foreign substances.
  - .2 Commercial blast to SSPC-SP6.
  - .3 Amendments.
  - .4 Change orders.
  - .5 Other modifications to Contract.
- .2 Plates, shapes and bars: to CSA G40.20/G40.21, Grade 350W, minimum 30% recycled content.
- .3 Hollow structural sections: to CSA G40.20/G40.21, Grade 350W, Class H, minimum 30% recycled content.
- .4 Primer: rust inhibiting, low VOC, organic or inorganic zinc primer, compatible with specified paint.
- .5 Paint: two component, high solids, polyester-aliphatic urethane suitable for marine environment, volume of solids 65%; colour: traffic yellow.
- .6 Welding materials: to CSA W59.
- .7 Concrete: to Section 03 30 00.
- .8 All chain and fender hardware to be galvanized with fabricated steel to be galvanized in

accordance with CSA G164.

- .9 Cylindrical rubber fender assembly:
  - .1 Rubber fender elements shall be epoxy rubber to ASTM D200 and free from defects, impurities and cracks.
  - .2 127Ø O.P. x 64Ø I.D. x 2000 long on 2540 centre. Cylindrical fender: o-shaped with a reaction/energy absorption ratio of 13.3 at 50% deflection.
  - .3 Bolts and anchor bolts to ASTM A325M.
  - .4 Shackles: bolt type chain shackle, size and grade to match chain strength.
  - .5 Ring: hot dipped galvanized 90 mm diameter ring fabricated from 12.7 mm diameter bar.
  - .6 U-bar: hot dipped galvanized u-bar fabricated from 12.7 mm diameter bar with 25 mm diameter radius.
  - .7 Chain: Grade 30, proof coil, galvanized steel.

### **PART 3 EXECUTION**

#### **3.1 FABRICATION**

- .1 Complete fabrication to details indicated.
- .2 Finish: Neatly finish portions of work. Finish members true to line, free from twists, bends, open joints, and sharp corners and edges. Grind all sharp edges smooth and grind flush all welds.

#### **3.2 PAINTING**

- .1 Preparation of new metals:
  - .1 Commercial blast clean to remove paint, loose mill scale, welding slag, rust, dirt, oil, grease and other foreign substances.
  - .2 Commercial blast to SSPC-SP6.
- .2 Apply paint after new surface has been cleaned.
- .3 Apply paint in shop using spraying equipment in accordance with the paint manufacturer's recommendations.
- .4 Apply one coat of primer 76.2 to 127.0 microns and two coats of paint 101.6 to 152.4 microns. Total dry film thickness 177.8 to 279.4 microns.
- .5 After installation of miscellaneous steel touch up painted surfaces which have been damaged from handling and installation by cleaning to bare metal and apply primer and top coats as specified. For welds at bollards and pipe rail supports, prepare surface touch up paint around perimeter of plates and brackets. Extend paint a minimum 25 mm beyond weld.
- .6 Protect adjacent work and surfaces not to be painted and if damaged, clean and restore such surfaces as directed.
- .7 Apply each coat of paint as a continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied. Allow complete drying of each coat prior to applying succeeding coats.

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

### **3.3 SAFETY LADDERS, BOLLARDS AND PIPE CURB**

- .1 Fabricate, paint and install ladders at pile inpan locations as indicated.
- .2 Anchor ladders with bolt weld inserts and hand grips as indicated.

### **3.4 PIPE ANCHORS**

- .1 Pipe anchors are schedule 80 pipe embedded in existing crib at tie backs drill and place anchor with 1000 mm embedment below Stage 1 Concrete.
- .2 Fill pipe with grout. See Section 03 30 00 for grout properties.
- .3 Cast Stage 1 and Stage 2 of anchor wall.

**END OF SECTION**