PROJECT TITLE: Port Dover, Ontario
Fisherman's Basin
Jetty Rehabilitation,

PROJECT NUMBER: 721972

PROJECT DATE: 2017-06-09

END OF SECTION

DESIGN ENGINEER: Brian Riggs P.Eng., Riggs Engineering Ltd.

END OF SECTION

END OF SECTION

PART 1 - GENERAL

1.1 MINIMUM STANDARDS

.1 Execute work to meet or exceed:

.1 National Building Code of Canada 2010, 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 as directed by the Departmental Representative.

.2 Rules and regulations of authorities having jurisdiction.

.3 Treasury Board of Canada Secretariat, Fire Protection Standard, April 1, 2010.

.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.

.6 Ontario Regulation 634/86 for Diving Operations.

1.2 PRECEDENCE

.1 For Federal Government projects, Division 01 Sections take precedence over technical specification sections in other Divisions of this Specification.

1.3 TAXES

.1 Pay applicable Federal, Provincial and Municipal taxes.

1.4 FEES, PERMITS AND CERTIFICATES

.1 Provide authorities having jurisdiction with information requested.

1.4 FEES, PERMITS AND CERTIFICATES (Cont'd)

.2 Pay fees and obtain certificates and permits required.

.3 Furnish certificates and permits when requested.

1.5 EXAMINATION

.1 Before submitting tender, examine existing conditions and determine conditions affecting work.

.2 Obtain all information which may be necessary for proper execution of Contract.

1.6 SITE

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

.2 Locate temporary buildings, roads, walks, drainage facilities, services as directed and maintain in clean and orderly manner.

1.7 CONSTRUCTION & STORAGE AREA

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

1.8 DOCUMENTS

.1 Keep on site one copy of each of the following:
.1 Contract drawings.
.2 Specifications.
.3 Amendments.
.4 Change orders.
.5 Reviewed shop drawings, product data, and samples.
.6 Other modifications to Contract.
.7 Copy of approved Work schedule.
.8 Field test records.
.9 Inspection certificates.
.10 Manufacturer's certificates.
.11 Manufacturers' installation and application instructions.
.12 Labour conditions and wage schedules.
.13 Material Safety Data Sheets.
.14 Labour and Material Bonds.
.15 All applicable Municipal Permits.

1.8 DOCUMENTS (Cont'd)

.2 Maintain documents in clean, dry, legible condition.

.3 Make documents available at all times for inspection by Departmental Representative.

1.9 MEASUREMENT PROCEDURES

.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.

1.10 CONTRACT METHOD

.1 Construct Work under a combined price contract. All costs for work not specifically identified as a unit price item shall be included in the Lump Sum Arrangement.

1.11 COST BREAKDOWN

.1 Within one week of notification of acceptance of tender furnish a cost breakdown.

.2 Submit breakdown in metric (SI) units.

1.12 AS-BUILT RECORD DRAWINGS

.1 As work progresses, neatly record significant deviations from the Contract drawings using fine, red marker on full size white prints.

.2 Neatly print lettering and numbers in size to match original. Lines may be drawn free-hand but shall be neat and accurate. Add at each title block note: "AS BUILT RECORD".

.3 Record following significant deviations:
.1 Depths of various elements and foundations.
.2 Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvement.

1.12 AS-BUILT RECORD DRAWINGS (Cont'd)

.3 (Cont'd)
.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.

.4 Turn one set of As-Built Record Drawings 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.

1.13 SHOP DRAWINGS

.1 To Section 01 33 00

1.14 ADDITIONAL DRAWINGS

.1 Departmental Representative may furnish additional drawings to clarify work.

.2 Such drawings become part of Contract Documents.

1.15 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. Include marine access points.

.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.

1.16 CO-OPERATION & PROTECTION

.1 Execute work with minimum disturbance to public and normal use of site. Make arrangements with Departmental Representative to facilitate execution of work.

.2 Maintain access and exits.

.3 Provide necessary barriers, warning lights and signs. Protect work from damage. Replace damaged existing work with material and finish to match original.

.4 Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Performance.

.5 Use equipment and procedures that prevent damage to existing structures.

.6 Work shall be conducted in a manner to protect the stability of structures on or adjacent to the Contract Work Area. Repair and clean existing structures, roads or other facilities damaged or fouled by the work. Complete repairs and clean up at no additional expense to the Contract. Repairs made to damaged existing work to equal or better condition.

1.17 EXISTING UTILITIES

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

.2 Connect to existing utilities with minimum disturbance to pedestrian and vehicular traffic.

1.18 OVERLOADING

.1 No part of Work shall be loaded with load which will endanger its safety or will cause permanent deformation.

.2 Repair to original condition any part of work damaged due to overloading at no additional cost to Contract.

1.19 MATERIAL AND EQUIPMENT

.1 Use new products unless otherwise specified.

.2 Deliver and store material and equipment to manufacturer's instructions with manufacturer's labels and seals intact.

.3 When material or equipment is specified by standard or performance specifications, upon request of Departmental Representative, obtain from manufacturer an independent testing laboratory report, stating that material or equipment meets or exceeds specified requirements.

1.20 INSPECTION AND TESTING

.1 The Departmental Representative may employ an Inspection and Testing company to ensure work conforms with Contract Documents.

.2 When initial tests and inspections reveal work not to contract requirements, Contractor to pay for tests and inspections required by Departmental Representative on corrected work.

1.21 SCHEDULING OF WORK

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

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

.3 Minimize disruption to berthing in the Fisherman's Basin. A maximum of two jetties may be out of service at any one time.

.4 Asphalt work must be completed prior to the closing of plants in the fall. Protect asphalt from damage from construction activities.

1.22 PROJECT MEETING

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

1.23 FIRES AND TEMPORARY HEATERS

.1 Burning of rubbish on site not permitted.

.2 Only fires for emporary heaters are permitted on site.

.3 Maintain temperature required to prevent frost damage to work.

1.24 DATUM

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

.2 Chart datum for Lake Erie is 173.5 metres I.G.L.D (1985).

1.25 CONSTRUCTION PARKING

.1 Parking will be permitted on site provided it does not disrupt performance of Work.

.2 Ensure parking does not disrupt normal use and operation of existing facilities and businesses.

1.26 SECURITY

.1 Be responsible for site security at all times.

.2 Entry and egress point shall be secured during non-working hours.

1.27 DEMOBILIZATION

.1 Complete demobilization of equipment no later than two weeks after receiving Departmental Representative's written release from work. Do not leave equipment on job site.

END OF SECTION

PART 1 - GENERAL

1.1 ADMINISTRATIVE

.1 Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

.2 Do not proceed with Work affected by submittal until review is complete.

.3 Present shop drawings, product data and samples in SI Metric units.

.4 Where items or information is not produced in SI Metric units converted values are acceptable.

.5 Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.

.6 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.7 Verify field measurements and affected adjacent Work are co-ordinated.

.8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.

.9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.

1.1 ADMINISTRATIVE (Cont'd)

.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,and Autocad dwg files on USB or through email or alternate electronic file sharing service such as ftp, as directed by Departmental Representative.

1.2 SHOP DRAWINGS AND PRODUCT DATA

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

.2 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario of Canada.

.3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

.4 Allow 5 working days for Departmental Representative's review of each submission.

.5 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

.6 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.

1.2 SHOP DRAWINGS AND PRODUCT DATA (Cont'd)

.7 Accompany submissions with transmittal letter, in duplicate, containing:
- .1 Date.
- .2 Project title and number.
- .3 Contractor's name and address.
- .4 Identification and quantity of each shop drawing, product data and sample.
- .5 Other pertinent data.

.8 Submissions shall include:
- .1 Date and revision dates.
- .2 Project title and number.
- .3 Name and address of:
  - .1 Subcontractor.
  - .2 Supplier.
  - .3 Manufacturer.
- .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
- .5 Details of appropriate portions of Work as applicable:
  - .1 Fabrication.
  - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
  - .3 Setting or erection details.
  - .4 Capacities.
  - .5 Performance characteristics.
  - .6 Standards.
  - .7 Operating weight.
  - .8 Wiring diagrams.
  - .9 Single line and schematic diagrams.
  - .10 Relationship to adjacent work.

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

.10 Submit three hard copies and one electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.

.11 Submit three hard copies and one 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.

1.2 SHOP DRAWINGS AND PRODUCT DATA (Cont'd)

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

.13 Submit three hard copies and one electronic copy of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
.1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
.2 Certificates must be dated after award of project contract complete with project name.

.14 Submit three hard copies and one electronic copy of manufacturers instructions for requirements requested in specification Sections and as requested by Departmental Representative.
.1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

.15 Submit three hard copies and one electronic copy of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.

.16 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

.17 Submit three hard copies and one electronic copy of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.

.18 Delete information not applicable to project.

1.2 SHOP DRAWINGS AND PRODUCT DATA (Cont'd)

.19 Supplement standard information to provide details applicable to project.

.20 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.

.21 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 co-ordination of Work of sub-trades.

1.3 SAMPLES

.1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.

.2 Deliver samples prepaid to Departmental Representative's business address upon request.

.3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.

1.3 SAMPLES (Cont'd)

.4 Adjustments made on samples by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

.5 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.

.6 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.4 CERTIFICATES AND TRANSCRIPTS

.1 Immediately after award of Contract, submit Workers' Safety and Insurance Board Experience Report.

.2 Submit transcription of insurance immediately after award of Contract.

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): Canada
.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 5 Hazardous Processes and Operations, subsection 5.6.1.3 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.
.2 O. Reg. 490/09, Designated Substances.
.3 Workplace Safety and Insurance Act, 1997.
.4 Municipal statutes and authorities.

.5 Treasury Board of Canada Secretariat (TBS):
.1 Treasury Board, Fire Protection Standard April 1, 2010 www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=17316&section=text.

1.2 SUMITTALS

.1 Submit 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 operation found in work plan.

.3 Measures and controls to be implemented to address identified safety hazards and risks.

.3 Contractor's and Sub-contractors' Safety Communication Plan.

1.2 SUMITTALS (Cont'd)

.4 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 7 days after receipt of comments from Departmental Representative.

.5 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.

.6 Submit names of personnel and alternates responsible for site safety and health.

.7 Submit records of Contractor's Health and Safety meetings when requested.

.8 Submit 3 copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative, upon request.

.9 Submit copies of orders, directions or reports issued by health and safety inspectors of the authorities having jurisdiction.

.10 Submit copies of incident and accident reports.

.11 Submit Material Safety Data Sheets (MSDS).

.12 Submit Workplace Safety and Insurance Board (WSIB)- Experience Rating Report.

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.

1.7 PROJECT/SITE CONDITIONS

.1 Work at site will involve contact with:
.1 Silica in concrete.
.2 Work at or near water.

1.8 GENERAL REQUIREMENTS

.1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.

.2 Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns either accepting or 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.

1.9 COMPLIANCE REQUIREMENTS

.1 Comply with Ontario Occupational Health and Safety Act, R.S.O. 1990 Chapter 0.1, as amended.

1.10 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.

1.10 RESPONSIBILITY (Cont'd)

.3 Where applicable the Contractor shall be designated "Constructor", as defined by Occupational Health and Safety Act and Regulations for Construction Projects for the Province of Ontario.

1.11 UNFORESEEN HAZARDS

.1 Should any unforeseen or peculiar safety-related factor, hazard, or condition become evident during performance of Work, immediately stop work and advise Departmental Representative verbally and in writing.

.2 Follow procedures in place for Employees Right to Refuse Work as specified in the Occupational Health and Safety Act for the Province of Ontario.

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 of Ontario, 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 authority having jurisdiction or by Departmental Representative.

1.13 CORRECTION OF NON-COMPLIANCE (Cont'd)

.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. 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 DEFINITIONS

.1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humans; or degrade environment aesthetically, culturally and/or historically.

.2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction.

1.2 WORK ADJACENT TO WATERWAYS

.1 Construction equipment to be operated on land only.

.2 Do not use waterway beds for borrow material.

.3 Do not allow stone, gravel, crushed rock, broken concrete and other deleterious substances to enter the waterway unless otherwise indicated.

1.3 POLLUTION CONTROL

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

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

.3 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area by providing temporary enclosures.

.4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

.5 Abide by local noise by-laws.

.6 Spills of deleterious substances:

1.3 POLLUTION CONTROL (Cont'd)

.6 (Cont'd)
.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.

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

.8 Machinery to arrive on site in a clean, washed condition and maintained free of leaks.

.9 Wash, refuel, and service machinery and store fuel and other materials for the machinery away from water to prevent any deleterious substance from entering the water.

.10 Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.

1.4 CONCRETE OPERATIONS

.1 The following clauses are applicable to all workunder Section 03 30 00.

.2 Employ measures to prevent entry of concrete wash water or leachate from uncured concrete into the water.

.3 Containment facilities shall be provided at the site for the wash-down water from concrete delivery trucks, concrete equipment, and other tools and equipment as required. Water used to wash concrete should not be allowed to enter directly into water bodies. The sediment should be allowed to settle out and reach neutral pH before the clarified water is released to the drain system or allowed to percolate into the ground.

.4 Concrete trucks and concrete equipment should be washed out in a designated area where runoff to the marine environment, adjacent waterways and storm drains can be prevented.

1.4 CONCRETE OPERATIONS (Cont'd)

.5 Prior to placement of concrete, all forms shall be thoroughly inspected to ensure that formwork is fully secured and sealed to prevent the release of concrete or concrete contaminated water into the waterway.

.6 If escape of concrete is observed or detected, pumping and or placement should be stopped and appropriate action taken to immediately rectify the situation.

.7 Measure and record baseline pH levels in the project area prior to commencement of work.

.8 Prior to the commencement of operations, demonstrate satisfactory knowledge and use of pH monitoring equipment to Departmental Representative.

.9 Monitor the pH levels frequently in the waterway immediately downstream of isolated work site until completion of work. Emergency measures shall be taken if pH change more than 1.0 pH unit, measured to an accuracy of 0.2 pH units from the background level or is recorded to be below 6.0 or above 9.0 pH units.

.10 The pH levels are to be maintained within the range of 6.5-8.5 as per Provincial Water Quality Objectives (PWQO).

.11 Keep a carbon dioxide (C02) tank with regulator, hose and gas diffuser readily available during concrete work. Use it to release carbon dioxide gas into the affected area to neutralize pH levels should a spill occur. Train workers to use the tank.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 CLEANING

.1 Leave Work area clean at end of each day.

3.1 CLEANING (Cont'd)

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

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

.4 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

PART 1 - GENERAL

1.1 MEASUREMENT PROCEDURES

.1 Concrete edge, deck, ramps, curb, and parapet demolition, removal and disposal will be measured under Section 03 30 00.

.2 Asphalt pavement demolition, removal and disposal will be measured under Section 32 12 16.

.3 Removal, salvage, repainting, and re-installation of existing double concrete-filled pipe bollards and hardware as indicated on the drawings will be measured by each bollard salvaged, painted, and reinstalled. Perform painting in accordance with Section 05 50 00.

.4 Removal and disposal of the concrete slabs/panels at jetties #3 and #7 shall be measured by each slab/panel removed and shall include all labour and equipment necessary to complete the work. Removal of the timber wales and other slab furnishings as necessary to complete the work will be considered incidental to the work and will not be measured separately for payment.

.5 Removal and stockpiling of the steel sheet pile and removal and disposal of the steel H-pile fenders shall be measured by each pile removed and shall include all labour and equipment necessary to complete the work. Removal and disposal of the hanging tire fenders and associated hardware will be considered incidental to the work and will not be measured separately for payment.

.6 Removal and disposal of storm sewers will be measured under section 33 44 00.

.7 Removal and disposal of the square HSS pile caps and cutting down of the H-piles at jetties #3 and #7 shall be measured under section 05 50 00.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Sustainable Design Submittals:
.1 Construction Waste Management: Submit project Waste Management Plan highlighting recycling and salvage requirements

1.3 EXISTING CONDITIONS

.1 As indicated in the Drawings.

1.4 PROTECTION

.1 Prevent movement, settlement or damage of adjacent parts of existing structure to remain. Make good damage and be liable for injury caused by demolition and removal.

1.5 WORK

.1 Dispose legally off the site all demolished materials.

1.6 SAFETY CODE

.1 Unless otherwise specified, carry out demolition work in accordance with Section 01545 and CSA S350-M1980.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Inspect site and verify with Departmental Representative items designated for removal and disposal, items to remain and items to salvage.

.2 Locate and protect utilities. Preserve active utilities traversing site in operating condition.

3.1 EXAMINATION (Cont'd)

.3 Do not disrupt active power and service lines entering existing buildings and wharf outlets as per rules and regulations of authorities having jurisdiction. Post warning signs on electrical lines and equipment which must remain energized to serve navigational equipment during period of demolition and removal.

.4 Notify and obtain approval of utility companies before starting demolition.

.5 Disconnect, cap, plug or divert, as required, existing utilities within the area of work where they interfere with the execution of the work. Complete work in conformity with the requirements of the authorities having jurisdiction. Mark the location of these and previously capped or plugged services on the site and indicate location (horizontal and vertical) on the record drawings. Maintain pipes and conduits encountered.

.6 Immediately notify Departmental Representative and utility company concerned in case of damage to any utility or service, designated to remain in place.

.7 Immediately notify Departmental Representative should uncharted utility or service be encountered, and await instruction in writing regarding remedial action.

3.2 PROTECTION

.1 Prevent movement, settlement, or damage to adjacent structures, asphalt and concrete pavement to remain, utilities, services, and light standards.

.2 Keep noise, dust, and inconvenience to normal use of the site to a minimum.

.3 Provide temporary dust screens, covers, railings, supports and other protection as required.

3.3 DEMOLITION AND DECONSTRUCTION

.1 Demolish and remove concrete edge, deck, ramps, curb, and parapet to dimension and thickness indicated. Protect and maintain existing reinforcing steel, dowels and steel shapes designated to remain. Saw cut minimum 25 mm at limit of removal unless indicated otherwise prior to commencement of demolition. Limit demolition tool to hand held to 7 kg hammer. Remove existing concrete to depth indicated.

.2 Demolish and remove existing asphalt pavement to lines and grade as shown on the drawings. Saw cut asphalt pavement to full depth in neat line at limits of removal areas.

3.4 REMOVE AND SALVAGE

.1 Remove existing vertical steel sheet pile and H-pile fenders and associated hardware and components such as rubber tires and steel chains at locations indicated on drawing. Stockpile sheet piles for reuse as directed by Harbour Authourity. Dispose of H-Piles and all other fender components. Do not damage existing structures to remain.

.2 Remove and re-route electrical services as required.

.3 Remove and dispose of steel bollards at jetties #1, #2, and #4 through #6 as indicated on the Drawings.

.4 Remove concrete slabs and panels at jetties #3 and #7 and associated appurtances such as timber wales, steel bollards, and service pedestals. Salvage steel bollards as specified and dispose of remainder off site. Paint and reinstall salvaged bollards as per Section 05 50 00.

.5 Remove and dispose of storm sewers as indicated on the Drawings. Perform excavation in accordance with section 31 23 11.

.6 Remove and dispose of square HSS pile caps at jetty #3 and #7. Cut down existing H-piles neatly and squarely to elevation indicated in drawings with a tolerance of 6 mm.

3.5 DISPOSAL

.1 Provide netting to capture/collect all demolished and removed concrete and asphalt, including items not designated to be salvaged. Legally dispose offsite in accordance with provincial regulations.

.2 Disposal in the lake is not permitted.

.3 Provide waste reduction and disposal plan to Section 01 74 20.

3.6 RE-INSTALLATION

.1 Reinstall items designated to be salvaged.

.2 Reinstall pipe bollards after repainting.

3.7 CLEANING

.1 Progress cleaning: leave work area clean at the end of each day.

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

.3 Waste management: in accordance with Section 01 74 20.

END OF SECTION

PART 1 - GENERAL

1.1 MEASUREMENT PROCEDURES

.1 Concrete parapet repair will be measured by the lineal metre to the limits approved by the Engineer and shall include all labour, materials and equipment necessary to complete the work including all saw cutting, demolition, removal and disposal of the existing concrete parapet and supply of reinforcing steel to requirements as shown on the drawings.

.2 Concrete deck repair will be measured by the square metre to the limits approved by the Engineer and shall include all labour, materials and equipment necessary to complete the work including all saw cutting, demolition, removal and disposal of the existing concrete deck and supply of reinforcement and epoxy anchors to requirements as shown on the drawings.

.3 Concrete edge repair will be measured by the lineal metre to the limits approved by the Engineer and shall include all labour, materials and equipment necessary to complete the work including all saw cutting, demolition, removal and disposal of the existing concrete deck and timber planks and supply and installation of the reinforcing steel and new continuous HSS with end caps to requirements as shown on the drawings.

.4 Concrete ramp replacement will be measured by each ramp completed and shall include all labour, materials and equipment necessary to complete the work including all saw cutting, demolition, removal and disposal of the existing concrete ramp and supply of reinforcing steel, electrical conduits, and steel nosing assembly to requirements as shown on the drawings.

.5 New cast-in-place concrete deck will be measured by the cubic metre and shall include all labour, materials, and equipment to complete the work including supply of reinforcing steel. Supply and installation of formwork, including steel decking and support channels , and all associated welding and labour, shall be considered incidental to the work and will not be measured separateley for payment.

1.1 MEASUREMENT PROCEDURES (Cont'd)

.6 Concrete for new concrete-filled pipe piles will be measured under 31 62 16.19.

.7 Concrete for new concrete-filled pipe bollards will be measured under 05 50 00.

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

1.2 REFERENCES

.1 Canadian Standards Association (CSA International):
.1 CSA A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
.2 CAN/CSA A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
.3 CSA G30.18-09(R2014), Carbon Steel Bars for Concrete Reinforcement.
.4 CSA G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

.2 At least 4 weeks prior to beginning Work, inform Departmental Representative of source of fly ash.
.1 Do not change source of fly ash without written approval of Departmental Representative.

.3 At least 4 weeks prior to beginning Work, submit to Departmental Representative samples of following materials proposed for use: curing compound and cold weather protection.

.4 Concrete hauling time: provide for review by Departmental Representative deviations exceeding maximum allowable time of 120 minutes for concrete to be delivered to site of Work and discharged after batching.

1.4 QUALITY ASSURANCE

.1 Provide to Departmental Representative, 2 weeks minimum prior to starting concrete work, valid and recognized certificate from plant delivering concrete.
.1 Quality Control Plan: provide written report to Departmental Representative verifying compliance that concrete in place meets performance requirements.

1.5 DELIVERY, STORAGE AND HANDLING

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

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

.3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials in accordance with Section 01 74 20.

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA

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

2.2 PERFORMANCE CRITERIA

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

2.3 MATERIALS

.1 Cement: to CAN/CSA A3001, Type GU.

2.3 MATERIALS (Cont'd)

.2 Supplementary cementing materials: with minimum 20% fly ash replacement or slag replacement by mass of total cementitious materials to CAN/CSA A3001.

.3 Water: to CSA A23.1/A23.2.

.4 Reinforcing steel:
.1 Bars and dowels: to CSA G30.18, Grade 400R.

.5 Electrical conduits: schedule 40 PVC, dimension as indicated on drawings.

.6 Formwork: to CSA A23.1/A23.2.

.7 Other concrete materials: to CSA A23.1/A23.2.

.8 Steel plates and shapes: to CSA G40.20/G40.21, Grade 350W.

.9 Epoxy: 2 component, solvent free, high modulus moisture insensitive, high strength structural epoxy and capable at minimum depth 170 mm to develop a tensile bond of 150 kN minimum for a 19 mm diameter bolt and 28 MPa concrete.

2.4 MIXES

.1 Alternative 1 - Performance Method for specifying concrete: to meet Departmental Representative performance criteria to CSA A23.1/A23.2.
.1 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as described 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 days: 35 MPa minimum.
.3 Surface texture: coarse broom finish.
.4 Intended application: concrete parapet repairs and new concrete walkway.
.5 Aggregate size 19 mm maximum.
.6 Pre-qualification: yes.
.3 Concrete supplier's certification.
.4 Provide quality management plan to ensure verification of concrete quality to specified performance.

PART 3 - EXECUTION

3.1 DEMOLITION AND REMOVALS

.1 Carry out demolition and removals to Section 02 41 14.

3.2 PREPARATION

.1 Provide Departmental Representative 24 hours notice before each concrete pour.

.2 Place concrete reinforcing in accordance with Section 03 20 00.

.3 During concreting operations:
.1 Development of cold joints not allowed.
.2 Ensure concrete delivery and handling facilitates placing with minimum of rehandling, and without damage to existing structure or Work.

.4 Ensure reinforcement and inserts are not disturbed during concrete placement.

.5 Protect previous Work from staining.

.6 Clean and remove stains prior to application of concrete finishes.

.7 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.

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

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

3.3 INSTALLATION/ APPLICATION

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

.2 Sleeves, inserts, conduits:

3.3 INSTALLATION/ APPLICATION (Cont'd)

.2 (Cont'd)

.1 Cast in sleeves, anchors, dowels, reinforcement, conduit and other inserts required to be built-in. Due regard to ambient temperature at time of erection.

3.4 PLACING REINFORCEMENT, DOWELS AND INSERTS

.1 Accurately place reinforcing steel, dowels, threaded rods, in positions shown on drawings and hold firmly during placing, compacting and setting of concrete by use of chairs and ties as necessary in accordance with CSA A23.1/A23.2.

.2 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material, dowels, threaded rods and inserts and placement.

.3 Ensure cover to reinforcement is maintained during concrete pour.

.4 Maintain existing reinforcing designated to remain.

3.5 FORMWORK

.1 Formwork: to CSA A23.1/A23.2.

3.6 CONCRETE REPAIRS

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

.2 Prior to concrete repairs, saw cut, demolish and remove existing structures designated for removal and disposal to Section 02 41 14 and to details indicated.

.3 Protect previous work from staining.

.4 Use water jets, mechanical scrapers or other means to clean surfaces.

.5 Maintain existing reinforcing steel not designated for removal in place.

.6 Steel Preparation:

3.6 CONCRETE REPAIRS (Cont'd)

.6 (Cont'd)
.1 Remove oxidation and scale from exposed reinforcing steel per ICRI Technical Guideline No. 03730 "Guide to Surface Preparation for hte Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion."

.7 In no case shall concrete be cast against frozen material.

.8 Pour and place concrete to details indicated. Install plates and steel shapes, dowel and reinforcment as required to existing concrete in manner and location shown on drawings.

.9 Complete work to the following tolerances:
.1 Straight to 1:500.
.2 Thickness to 6 mm.
.3 Plumb to 1:600.

3.7 HSS FENDER ATTACHMENT

.1 Fabricate and install in accordance with Section 05 50 00.

3.8 NEW CONCRETE

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

.2 Prior to concrete placement, demolish and remove existing concrete structures designated for removal and disposal to Section 02 41 14 and to details indicated.

.3 Clean existing surfaces as specified.

.4 Moisture surfaces of hardend concrete that are to have new concrete cast against them.

.5 In no case shall concrete be cast against frozen material.

.6 Carry out the placing of concrete continuously from joint to joint. Consolidate concrete mechanically unless otherwise specified.

.7 Pour and place concrete to details indicated. Dowel as required to existing concrete.

.8 Complete work to the following tolerances:

3.8 NEW CONCRETE (Cont'd)

.8 (Cont'd)
.1 Straight to 1:500.
.2 Thickness to 6 mm.
.3 Plumb to 1:600.

3.9 FINISHES

.1 Formed surfaces exposed to view: in accordance with CSA A23.1/A23.2.

.2 Equipment pads: provide smooth trowelled surface.

.3 Pavements, walks, curbs and exposed site concrete:
.1 Screed to plane surfaces and use aluminum floats.
.2 Provide round edges and joint spacings using standard tools.
.3 Trowel smooth to provide lightly brushed non-slip finish.

3.10 CURING AND COLD WEATHER PROTECTION

.1 Use curing compounds compatible with applied finish on concrete surfaces free of bonding agents and to CSA A23.1/A23.2.

.2 Provide cold weather protection in accordance with CSA A23.1/A23.2.

3.11 FIELD QUALITY CONTROL

.1 Concrete testing: to CSA A23.1/A23.2 by testing laboratory designated and paid for by Departmental Representative.

.2 Retesting of concrete for rejected work shall be paid for by the Contractor.

3.12 CLEANING

.1 Use trigger operated spray nozzles for water hoses.

.2 Designate cleaning area for tools to limit water use and runoff.

.3 Cleaning of concrete equipment to be done in accordance with Section 01 35 43.

3.12 CLEANING (Cont'd)

.4 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.

.1 Divert unused concrete materials from landfill to local quarry or facility after receipt of written approval from Departmental Representative.

.2 Provide appropriate area on job site where concrete trucks and be safely washed.

.3 Divert admixtures and additive materials from landfill to approved official hazardous material collections site after receipt of written approval from Departmental Representative.

.4 Do not dispose of unused admixtures and additive materials into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 Canadian Standards Association (CSA International):
.1 CSA W47.1-09(R2014), Certification of Companies for Fusion Welding of Steel.
.2 CSA W59-13, Welded Steel Construction (Metal Arc Welding).

1.2 WELDER QUALIFICATIONS

.1 Use only welders qualified under CSA W47.1.

.2 Make available to Departmental Representative currently valid Canadian Welding Bureau Qualification Certificate for each welder employed on the work.

1.3 MEASUREMENT PROCEDURES

.1 Welding will not be measured separately for payment but is considered included in the paid items as specified and indicated.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Welding materials to CSA W59.

PART 3 - EXECUTION

3.1 WELDING GENERAL

.1 Welding: CSA W59.

.2 Do not deviate the size, length and location of welds from the design or from details shown on reviewed shop drawings without approval of Departmental Representative.

.3 Grind flush all butt welds.

3.2 PREPARATION

.1 Surfaces to be welded shall be smooth, uniform and free from fins, tears and other defects which would adversely affect the quality of the weld.

.2 Ensure areas within 50 mm of the weld are free from loose scale, slag, rust, grease, moisture, paint or other matter which would impair the quality of the weld.

.3 Remove slag before welding over previously deposited metal and brush clean weld and adjacent base. This requirement applies to successive layers, successive beads and to crater area when welding is resumed after any interruption.

.4 Before welding is started from the second side remove to sound metal the root of the initial weld of all butt welds except when produced with the aid of backing. Thoroughly fuse the weld metal with the backing in all butt welds made with the use of backing of the same material as the base metal.

3.3 ASSEMBLY

.1 Bring members to be welded into correct alignment and hold securely in position until the joint has been welded.

.2 Carefully align abutting parts joined by butt welds.

.3 Weld in a sequence that will balance the effects of applied heat of welding on various sides as the welding progresses.

3.4 WELD QUALITY

.1 Weld metal to be sound throughout with no porosity or cracks on the surface of any weld or weld pass.

.2 Ensure complete fusion between the weld metal and the base metal and between successive passes throughout the joint.

.3 Welds shall be free from overlap and the base metal free from undercutting.

3.4 WELD QUALITY (Cont'd)

.4 Fill all craters to the full cross section of the welds.

.5 Fill and grind to profile any craters at the extreme ends of fillet welds.

3.5 TESTING

.1 Give Departmental Representative 48 hours notice of when work is ready for inspection.

.2 All welds will be subject to visual inspection requirements of CSA W59.

.3 Welds which fail the visual inspection will be subject to further nondestructive testing. This testing may be either radiographic or ultrasonic. The full length of the weld will be examined.

.4 If more than 50% of the welds fail the visual inspection requirements all welds will be tested by nondestructive testing methods.

.5 Pay all costs for nondestructive testing resulting from visual inspection failure.

.6 Departmental Representative will not approve any weld until all required inspection is completed, found acceptable and marked as such.

3.6 ACCEPTANCE REQUIREMENTS

.1 Welds subject to nondestructive testing unacceptable if:

.1 There is any imperfection within 25 mm from the beginning or end of a butt weld.

.2 There is any type of crack, tear, zone of incomplete fusion or incomplete penetration regardless of size and location.

.3 Inclusion:

.1 Occurs in any 25 mm of a welded joint containing two or more inclusions where the sum of the greatest dimensions of those inclusions exceed 5 mm;

.2 Is greater that one-third the joint thickness but in no case larger than 19 mm.

3.6 ACCEPTANCE REQUIREMENTS (Cont'd)

.1 (Cont'd)

.3 (Cont'd)

.2 Repair defective welds by chipping, air-arc gouging or grinding out from one side or both sides. Remove all traces of defects before rewelding. Remove all traces of oxidation after air-arc gouging.

.3 Resubmit all repaired welds to nondestructive testing.

END OF SECTION

PART 1 - GENERAL

1.1 MEASUREMENT PROCEDURES

.1 Supply and installation of steel nosing will be measured under Section 03 30 00.

.2 Supply and installation of the replacement pile caps at the existing H-piles at jetties #3 and #7 will be measued by each pile cap installed and shall include all labour, materials, and equipment necessary to complete the work, including the pile cap plates, stiffener plates, and all necessary welding. Removal and disposal of the existing square HSS pile caps and cutting down of the existing H-piles at jetties #3 and #7 shall be considered incidental to the work and will not be measured separately for payment.

.3 Supply and installation of the new steel beam jetty stringers will be measured by each beam incorporated into the work and shall include all labour, materials, and equipment necessary to complete the work including fabrication, supply, and installation of steel angles and 15M bar stubs as per the drawings. All necessary field welding shall be considered incidental to the work and will not be measured separately for payment.

.4 Ladders will be measured by each ladder supplied and installed and shall include all labour, materials and equipment to fabricate, paint and install including fabrication of steel angle connections and all field welding.

.5 Fabrication, painting, supply, and installation of new double concrete-filled pipe bollards will be measured by each bollard installed as indicated on the drawings and shall include all labour, materials, and equipment necessary to complete the work.

.6 Maintenance and painting of existing concrete-filled pipe bollards and concrete-filled double pipe bollards designated to remain will be measured by each bollard repainted and shall include all labour, materials and equipment necessary to repaint.

1.1 MEASUREMENT PROCEDURES (Cont'd)

.7 Removal, salvage, and reinstallation of existing double concrete-filled pipe bollards will be measured under Section 02 41 14.

.8 HSS fender attachments will be measured under Section 03 30 00.

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM International):
.1 ASTM A53/A53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
.2 ASTM A307-14, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60000 PSI Tensile Strength.

.2 Canadian Standards Association (CSA International):
.1 CSA G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
.2 CSA S16-14, Design of Steel Structures.

.3 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
.1 Material Safety Data Sheets (MSDS).

.4 Society for Protective Coatings (SSPC):
.1 SSPC SP 6/Nace No.3 Commercial Blast Cleaning.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Submit shop drawing in accordance with Section 01 33 00.

.3 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for tubing and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Submit two copies of WHMIS MSDS.

1.4 QUALITY ASSURANCE

.1 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certifications: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.5 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Replace defective or damaged materials with new.

1.6 WELDER QUALIFICATIONS

.1 To Section 05 12 35.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 20.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Steel sections/shapes, plates and bars: to CSA G40.20/G40.21, Grade 350W, minimum 30% recycled content.

.2 Hollow structural steel: to CSA G40.20/G40.21, Grade 350W, Class H.

2.1 MATERIALS (Cont'd)

.3 Steel pipe and couplers: to ASTM A53/A53M extra strong, black finish.

.4 Welding materials: to Section 05 12 35.

.5 Bolts, thread rods, couplers, nuts and washers: to ASTM A307.

.6 Concrete: to Section 03 30 00.

.7 Epoxy: to Section 03 30 00.

.8 Primer: rust inhibiting, low VOC, modified alkyd resin primer, 51% solids by volume, compatible with specified paint.

.9 Paint: two component, high solids, polyester-aliphatic urethane suitable for marine environment, volume of solids 65%, colour: traffic yellow. // colour TBD

2.2 FABRICATION

.1 Verify field dimensions prior to commencement of fabrication of all components. Adjust dimensions of new fabrications to accommodate existing conditions.

.2 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

.3 Where possible, fit and shop assemble work, ready for erection.

.4 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for metal fabrications installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Departmental Representative.

3.1 EXAMINATION (Cont'd)

.1 (Cont'd)

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by metal fabrications installation.

3.3 ERECTION

.1 Do welding work in accordance with Section 05 12 35.

.2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

.3 Field cutting or altering steel members: to approval of Departmental Representative.

.4 Make field connections with bolts to CSA S16.

3.4 STEEL NOSING

.1 Fabricate to details indicated.

.2 Paint exposed surface to shop painting requirements specified above.

.3 Install in manner and locations indicated on drawings.

3.5 NEW PILE CAPS

.1 Remove square HSS and cut down piles as per section 02 41 14.

.2 Fabricate and install cap plate, stiffener plates, and beam to details indicated in the Drawings.

3.6 NEW STRINGERS

.1 Fabricate and install steel angle connections and 15M bar stubs to new stringer as indicated in the Drawings.

.2 Field weld stringers to pile caps to details indicated in the Drawings.

3.7 LADDERS

.1 Fabricate, shop paint and install ladders in manner and locations indicated.

3.8 NEW CONCRETE FILLED DOUBLE PIPE BOLLARDS

.1 Fabricate, shop paint, and epoxy anchor new concrete-filled double pipe bollards in locations and manner shown in the Drawings.

3.9 NEW CONCRETE FILLED DOUBLE PIPE BOLLARDS

.1 Prepare and paint concrete-filled double pipe bollards designated to remain as per the Drawings.

3.10 SALVAGED CONCRETE FILLED DOUBLE PIPE BOLLARDS

.1 Salvage designated concrete-filled double pipe bollards as per Section 02 41 14.

.2 Prepare, paint, and epoxy anchor in locations and manner shown in the Drawings.

3.11 HSS FENDER ATTACHMENTS

.1 Fabricate and cast-in new HSS fender attachments with dowels and threaded rod to details shown inthe Drawings.

3.12 EPOXY ANCHORS

.1 Do not epoxy anchor into new concrete until the new concrete has reached a minimum of 70% of the specified 28 day strength of 35 MPa.

3.13 PAINTING

.1 Shop painting:
.1 Preparation of new pipe curb, bollards, steel nosing and ladders:

3.13 PAINTING (Cont'd)

.1 (Cont'd)

.1 (Cont'd)

.1 Commercial blast clean to remove paint, loose mill scale, welding slag, rust, dirt, oil, grease and other foreign substances.

.2 Commerical blast to SSPC-SP6.

.2 Apply paint after 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 3 to 5 mils and one coat of paint 2 to 3 mils. Total dry film thickness 5 to 7 mils.

.2 Painting of existing appurtenances:

.1 Remove existing paint from appurtenances designed to be repaint.

.2 Clean steel surfaces to manufacturer's recommendations.

.3 Apply coating with same type of paint and to same thickness as shop coat.

.3 Fielding painting:

.1 Touch up metal which has been shop coated with same type of paint and to same thickness as shop coat.

3.14 CLEANING

.1 Progress Cleaning: leave Work area clean at end of each day.

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

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 The General Conditions of the Contract, the Supplementary Conditions, and all Sections of Division 01 apply to and are a part of this Section of the Specification.

1.2 APPLICATION

.1 This Section specifies requirements that are common to electrical work Sections of the Specification and it is a supplement to each Section and is to be read accordingly.

1.3 NOTE RE: BOLD LETTERING

.1 "Bold" type lettering is used throughout this Specification in an attempt to enhance the readability of the text. The use of "bold" lettering does not indicate a greater level of importance.

1.4 SUBMITTALS

.1 As specified in this Section, submit the following to the Consultant:

- .1 project close-out documentation: O & M Manuals, record as-built drawings, and all associated data
- .2 Extended Warranties: copies of all extended warranties specified, and in the name of the Owner
- .3 O & M Training Schedules & Manual: a proposed schedule of demonstration and training dates and times, and a preliminary copy of the training manual developed for operational and maintenance training

1.5 DEFINITIONS

.1 The following are definitions of words found in electrical work Sections of the Specification and on associated drawings:

- .1 "concealed" – means work hidden from normal sight in furred spaces, shafts, tunnels, ceiling spaces, walls and partitions

.2 "exposed" – means work normally visible, including work in electrical and equipment rooms and similar spaces
.3 "provide" (and tenses of provide) – means supply and install complete
.4 "install" (and tenses of install) – means install and connect complete
.5 "supply" – means supply only
.6 "finished area" - means any area or part of an area which receives a finish such as paint, or is factory finished
.7 "governing authority" and/or "regulatory authority" and/or "Municipal authority" – means all government departments, agencies, standards, rules and regulations that apply to and govern the electrical work and to which the work must adhere
.8 "Consultant" – means the Architect or Consulting Engineer who has prepared the Contract Documents on behalf of the Owner

.2 Wherever the words "indicated", "shown", "noted", "listed", or similar words or phrases are used in the specification they are understood, unless otherwise defined, to mean that the product referred to is "indicated", "shown", "listed", or "noted" on the drawings.

.3 Wherever the words "approved", "satisfactory", "as directed", "submit", "permitted", "inspected" or similar words or phrases are used in the specification or on the drawings they are understood, unless otherwise defined, to mean that work or product referred to is "approved by", "inspected by", etc., the Consultant.

.4 In the electrical specification, singular may be read as plural, and vice-versa.

1.6 QUALITY ASSURANCE

.1 All electrical work is to be done by journeyman tradesmen who perform only the work that their certificates permit, or by apprentice tradesmen under direct on site supervision of an experienced journeyman tradesman. The use of apprentice tradesmen is to be limited and the journeyman/apprentice ratio is subject to the Consultant’s approval.

.2 An experienced and qualified superintendent is to be on-site at all times when electrical work is being performed.

1.7 CODES, REGULATIONS, AND STANDARDS

.1 All Codes, Regulations, and Standards referred to in this Section and in Sections to which this Section applies are the latest edition of the Codes, Regulations, and Standards in effect at the time of bidding on this Project.

.2 All electrical items are to be certified and bear the stamp or seal of a recognized testing agency such as CSA, UL, ULC, ETL, etc., or bear a stamp to indicate special electrical utility approval.

.3 Requirements of the Contract Documents are to take precedence when they are more stringent than codes, ordinances, standards, and statutes.

1.8 IMPERIAL AND METRIC MEASUREMENTS

.1 Conform to requirements of CAN/CSA-Z234.1, Canadian Metric Practice Guide.

.2 Both Metric and Imperial units of measurement are indicated in the electrical Specification. Metric measurements are "soft" and have been rounded off.

1.9 EXAMINATION OF SITE AND DOCUMENTS

.1 When estimating the cost of the work and prior to submitting a bid for the work carefully examine all of the bid documents and visit the site to determine and review all existing site conditions that will or may affect the work, and include for all such conditions in the bid price.

.2 Report to the Consultant, prior to bid submittal, any existing site condition that will or may affect performance of the work as

per the drawings and specifications. Failure to do so will not be grounds for additional costs.

1.10 DRAWINGS AND SPECIFICATION

.1 Read the electrical work drawings in conjunction with all other structural, architectural, sprinkler, mechanical, etc., drawings.

.2 The electrical drawings are performance drawings, diagrammatic, and show approximate locations of equipment and connecting services. Any information regarding accurate measurement of the building are to be taken at the site. Do not scale the drawings, and do not use the drawings for prefabrication work.

.3 The drawings are intended to convey the scope of work and do not show architectural and structural details. Provide, at your cost, all offsets, fittings, transformations, and similar products required as a result of obstructions and other architectural and structural details but not shown on the drawings.

.4 The locations of equipment and materials shown may be altered, when reviewed by the Consultant, to meet requirements of the equipment and/or materials, other equipment or systems being installed, and of the building, all at your cost.

.5 Sections of the electrical specification are not intended to delegate functions nor to delegate work and supply of materials to any specific trade, but rather to generally designate a basic unit of work, and the Sections are to be read as a whole.

.6 The electrical specification does not generally indicate the specific number of items or extent of material required. The specification is intended to provide product data and installation requirements. It is necessary to refer to drawing schedules, layouts, schematic diagrams, riser diagrams, and details to determine correct quantities.

.7 The electrical drawings and specification are intended to be cooperative. Perform all work that is shown, specified, or reasonably implied on the drawings but not mentioned in the specification, or vice-versa, as though fully covered by both.

.8 When the scale and date of the drawings are the same, or when the discrepancy exists within the specification, the costliest arrangement will take precedence.

.9 In the case of discrepancies or conflicts between the drawings and specification, the documents will govern in the following order:

.1 the specification
.2 drawings of larger scale
.3 drawings of smaller scale
.4 drawings of later date when the scale of the drawings is the same

.10 In the case of discrepancies between the drawings and specifications, the documents will govern in the order specified in the General Conditions, however, when the scale and date of the drawings are the same, or where the discrepancy exists within the specification, the costliest arrangement will take precedence.

1.11 PLANNING AND LAYOUT OF THE WORK, AND ASSOCIATED DRAWINGS

.1 Properly plan, coordinate, and establish the locations and routing of services with all subcontractors affected prior to installation such that the services will clear each other as well as any obstructions, including structural components of the building.

.2 Revise or alter the arrangement of work that has been installed without proper coordination, study and review, even if it was completed in accordance with the Contract Documents, in order to conceal the work behind finishes, or to allow the installation of other work, at no additional cost. In addition, pay for the cost of alterations in other work required by the alterations to your work.

1.12 COORDINATION OF THE WORK

.1 Review all the Contract Documents and coordinate the work with the work of all subcontractors. Coordination requirements are to include, but not be limited to, the following:

- .1 written notifications of all concrete work such as housekeeping pads, bases, etc., required for electrical work, and including required dimensions, operating weight of equipment, location, etc.
- .2 depth and routing of excavation required for electrical work, and requirements for bedding and backfill

1.13 GENERAL RE: INSTALLATION OF EQUIPMENT

.1 Unless otherwise specified all equipment is to be installed in accordance with the equipment manufacturer's recommendations and instructions, and requirements of governing Codes, Standards, and Regulations. Governing Codes, Standards, and Regulations take precedence over manufacturer's instructions.

.2 Ensure that proper access and service clearances are maintained around equipment, and, where applicable, access space for future equipment removal or replacement is not impeded. Remove and replace any equipment which does not meet this requirement.

1.14 PERMITS, FEES, AND CERTIFICATES

.1 Apply for, obtain and pay for all permits required to complete the electrical work.

.2 Include a copy of all approval/inspection certificates in each operating and maintenance manual.

1.15 WORKPLACE SAFETY

.1 Comply with requirements of the Workplace Hazardous Materials Information System (WHMIS) regarding the use, handling, storage and disposal of hazardous materials. Submit WHMIS MSDS (Material Safety Data Sheets) for all

products where required, and maintain one copy at the site in a visible and accessible location available to all personnel.

.2 Comply with all requirements of Occupational Health and Safety Regulations and all other regulations pertaining to health and safety, including worker's compensation/ insurance board and fall protection regulations.

.3 Asbestos, Mould, Lead Paint, Etc.: If at any time during the course of the work asbestos containing materials, black mould, lead paint, or any other such materials are encountered or suspected, immediately report the discovery to the Consultant and cease all work in the area in question. Do not resume work in affected areas until the situation has been properly corrected and without written approval from the Owner.

1.16 SHOP DRAWINGS AND PRODUCT DATA SHEETS

.1 Prior to supplying any products to the site, submit for review, shop drawings and/or product data sheets indicating in detail the design, construction, and performance of products as requested in Sections of this Specification. The number of copies of shop drawings and/or product data sheets will be as later directed.

.2 Shop drawings are those prepared specifically for the Project. Product data sheets are copies of manufacturer's standard catalogue, etc., literature.

.3 Unless otherwise specified or required, submit shop drawings/product data sheets via email in AutoCAD or PDF format only.

.4 Wherever possible, shop drawings and/or product data sheets are to be 215 mm x 280 mm (8½" x 11"), 215 mm x 356 mm (8½" x 14"), or 356 mm x 432 mm (11" x 17") single side white bond paper with sufficient clear space for review stamps, comments, and identification as

specified below.

.5 Shop drawings and product data sheets must confirm that the product proposed meets all requirements of the Contract Documents.

.6 Each shop drawing or product data sheet is to be properly identified with the project name and the product drawing or specification reference, i.e. "Lighting Fixture F1", and all shop drawing or product data sheet dimensions are to be either SI or Imperial to match dimensions on the drawings.

.7 Carefully review each shop drawing and product data sheet prior to submittal to ensure that the proposed product is correct and meets with all requirements of the Project. Endorse each copy of each shop drawing or product data sheet “Correct for Review By Consultant”, or "Certified to Be In Accordance With All Requirements" and include your company name, the submittal date, and the signature of an officer of your company to indicate your review and approval as above.

.8 The Consultant will review shop drawings and product data sheets and will indicate the review status by stamping the shop drawings and product data sheets as follows:

- .1 "Reviewed" or "Revised" to indicate that his review is final and no re-submittal is required
- .2 "Resubmit" to indicate that the submission is rejected and is to be revised in accordance with comments marked on the shop drawings and product data sheets by the Consultant and re-submitted

.9 The Consultant will retain one or two copies of each shop drawing or product data sheet submission.

.10 The following is to be read in conjunction with the wording on the Consultant’s review stamp applied to each and every electrical work shop drawing or product data sheet submitted:

"This review is for the sole purpose of

ascertaining conformance with the general design concept. This review does not approve the detail design inherent in the product data/shop drawings, responsibility for which remains with the Contractor, and such review does not relieve the Contractor of the responsibility for errors or omissions in the product data/shop drawings or of his responsibility for meeting all requirements of the Contract Documents. Be responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or to techniques of construction and installation, and for coordination of the work of all sub-trades."

1.17 CHANGES OR REVISIONS TO THE WORK

.1 Whenever the Consultant proposes in writing to make a change or revision to the design, arrangement, quantity or type of any work from that required by the Contract Documents, prepare and submit to the Consultant for approval, a quotation being your proposed cost for executing the change or revision.

.2 Your quotation is to be a detailed and itemized estimate of all products, material, labour, and equipment costs associated with the change or revision, plus overhead and profit percentages and all applicable taxes and duties.

.3 Unless otherwise stated in the Contract Documents, the following requirements apply to all quotations submitted:

- .1 when the change or revision involves deleted work as well as additional work, the cost of the deleted work (less overhead and profit percentages but including taxes and duties) is to be subtracted from the cost of the additional work before overhead and profit percentages are applied to the additional work
- .2 material costs are not to exceed those published in local estimating price guides

such as Allpriser, less applicable trade discounts

.3 costs for journeyman and apprentice labour must not exceed prevailing rates at the time of execution of the Contract and must reflect the actual personnel performing the work

.4 cost for the site superintendent must not exceed 10% of the total hours of labour estimated for the change or revision, and the change or revision must be such that the site superintendent's involvement is necessary

.5 costs for rental tools and/or equipment are not to exceed local rental costs

.6 if overhead and profit percentages are not specified in the General Conditions of the Contract, Supplementary Conditions, or elsewhere in preceding Sections of the Specification, but allowable under the Contract, then allowable percentages for mark-up and overhead and profit are to be 10% and 5% respectively

.7 the overhead percentage will be deemed to cover all quotation costs other than actual site labour, product and materials, and rentals

.8 all quotations, including those for deleted work, must include a figure for any required change to the Contract time

.4 Quotations submitted that are not in accordance with requirements specified above will be rejected and returned for re-submittal. Failure to submit a proper quotation to enable the Consultant to expeditiously process the quotation and issue a Change Order will not be grounds for any additional change to Contract time.

.5 If, in your opinion, changes or revisions to the work should be made, inform the Consultant in writing and, if the Consultant agrees a Notice of Change will be issued.

.6 Do not execute any change or revision until written authorization for the change or revision has been obtained

1.18 SCAFFOLDING RIGGING AND HOISTING

.1 Unless otherwise specified or directed, supply, erect and operate all scaffolding, rigging, hoisting equipment and associated

hardware required for your work. Immediately remove from the site all scaffolding, rigging, and hoisting equipment when no longer required.

1.19 PROJECT CLOSEOUT SUBMITTALS

.1 Prior to application for Substantial Performance, submit all required items and documentation specified, including the following:

- .1 Operating and Maintenance Manuals
- .2 as-built record drawings and associated data
- .3 extended warranties for equipment as specified
- .4 all operating test certificates, i.e. ESA Certificate
- .5 identified keys for electrical equipment and/or panels for which keys are required, and all other items required to be submitted
- .6 other data or products specified

.2 Operating and Maintenance Manuals: Submit three hard copies of operating and maintenance manuals consolidated in hardcover three "D" ring binders, each binder sized to include approximately 25% spare space for future data, and identified permanently with the Project name, "ELECTRICAL OPERATING AND MAINTENANCE MANUAL" wording, and the date. Manuals are to include the following:

- .1 an Introduction sheet listing the Consultant’s, Contractor’s, and Subcontractor names, street addresses, telephone and fax numbers, and e-mail addresses
- .2 a Table of Contents sheet, and corresponding index tab sheets
- .3 a copy of each "Reviewed" or "Reviewed As Noted" shop drawing or product data sheet, with manufacturer’s/supplier’s name, telephone and fax numbers, email address, and the email address for local source of parts and service
- .4 test reports, and certificates issued by governing authorities
- .5 Operating Data: Operating data is to include:
  - .1 a description of each system and its controls
  - .2 operation instruction for each system and each component
  - .3 description of actions to be taken in event of emergencies and/or equipment failure
- .6 Maintenance Data: Maintenance data is to

include:
.1 servicing maintenance, operation and trouble-shooting instructions for each item of equipment and each system
.2 schedules of tasks, frequency, tools required, and estimated task time
.3 complete parts list with numbers

.7 Performance Data: Performance data is to include:
.1 equipment and system start-up data sheets
.2 equipment performance verification test results, and final commissioning report

.8 Review Submittal: Assemble one copy of the O & M Manual and submit to the Consultant for review prior to Owner training and instructions, and assembling the remaining copies. Incorporate all comments into the final submission.

.9 Digital O & M Manuals: Submit four digital versions of the hard copy manual using the latest version of Adobe Acrobat Portable Document Format and enhanced with bookmarks, internet links, and internal document links. The digital copies are to be copied to CDR with custom labels which indicate the project name, date, the Consultant’s name, and "Operating & Maintenance Manual for Electrical Systems".

.3 Record "As-Built" Drawings and Data: As work progresses at the site, clearly mark in red in a neat and legible manner on a set of white prints of the Contract Drawings, all significant changes and deviations from the routing of services and locations of equipment shown on the Contract Drawings and resulting from the issue of Addenda, Site Instructions, Change Orders, and job conditions. Use notes marked in red as required. Maintain the white print red line as-built set at the site for the exclusive use of recording as-built conditions, keep the set up-to-date at all times, and ensure that the set is always available for periodic review. The as-built set is also to include the following:

.1 the dimensioned location of all inaccessible concealed work
.2 the locations of control devices with identification for each
.3 the location of all junction boxes, terminal cabinets, etc.
.4 for underground conduit, ducts, etc., record

dimensions, invert elevations, all offsets, fittings, and accessories if applicable, and locate dimensions from benchmarks that will be preserved after construction is complete

.5 the location of all concealed services terminated for future extension

.6 Review and Submittal: Prior to inspection for Substantial Performance of the work, submit for review, the red line site as-built white prints. The Consultant will review the drawings and, if necessary, return the marked-up white prints for corrections or further revisions, in which case complete the corrective and/or revision work and resubmit the white prints until they are determined to be acceptable, all prior to issue of a Certificate of Substantial Performance.

1.20 PROGRESS PAYMENT BREAKDOWN

.1 Submit, prior to submittal of the first progress payment draw, a breakdown of the cost of the electrical work to assist the Consultant in reviewing and approving monthly progress payment claims.

.2 The payment breakdown is subject to the Consultant’s approval and progress payments will not be processed until an approved breakdown is in place. The breakdown is to include one-time claim items such as mobilization and demobilization, insurance, bonds (if applicable), shop drawings and product data sheets, commissioning, and project closeout submittals.

1.21 EXTENDED WARRANTIES

.1 Unless otherwise specified, all extended warranties specified in electrical work Sections of the Specification are to be full parts and labour warranties, at the site, and in accordance with requirements of the Contract warranty, but direct from the equipment manufacturer/supplier to the Owner. Submit signed and dated copies of extended warranties which clearly state requirements specified above.

PART 2 - PRODUCTS

2.1 NOT APPLICABLE

PART 3 - EXECUTION

3.1 NOT APPLICABLE

PART 1 - GENERAL

1.1 APPLICATION

.1 This Section specifies products, common criteria and characteristics, and methods and execution that are common to one or more electrical work Sections of the Specification, and it is intended as a supplement to each Section and is to be read accordingly.

1.2 SUBMITTALS

.1 Submit the following for review:

.1 product data sheets: submit for:

.1 electrical work identification products

.2 additional submittals: submit any other submittals specified in this Section or other electrical work identification products

1.3 MEASUREMENT

.1 All mutli-cable transits, identification materials, and electrical enclosures will be considered part of the lump sum arrangement and will not be measured separately for payment.

PART 2 - PRODUCTS

2.1 MULTI-CABLE TRANSITS

.1 UL/ULC listed and labelled multi-cable transits sized to suit the fire barrier opening and the number of cables/conduits involved and to facilitate a minimum 2 hour water-tight fire and smoke seal. Each assembly is to be complete with a stainless steel frame, cadmium plated compression bolts, proper end packing, compression plates, steel stay plates, and fire rated neoprene insert blocks.

2.2 IDENTIFICATION MATERIALS

.1 Equipment Nameplates: Minimum 1.6 mm (1/16") thick 2-ply laminated coloured plastic plates, minimum 12 mm x 50 mm (½" x 2") for smaller items such as single phase starters and switches, minimum 25 mm x 65 mm (1" x 2½") for equipment, and minimum 50 mm x 100 mm (2" x 4") for control panels and similar items. Additional requirements are as follows:

.1 unless otherwise specified or required, each nameplate is to be white, complete with bevelled edges and black engraved capital letter wording to completely identify the equipment and its use with no abbreviations;

.2 wording is generally to be as per the drawings, i.e. Lighting Panel A, and is to include equipment service and building area/zone served, but must be reviewed prior to engraving;

.3 supply stainless steel screws for securing nameplates in place

.4 nameplates for equipment suspended above floor level or generally not within easy viewing from floor level are to be increased in size so as to be easily readable from floor level

.2 Self-Adhesive Label: Electronic labelling system self-adhesive labels with size and colour as directed, and permanently printed circuit identification nomenclature which is to be approved by the Consultant prior to producing the labels.

.3 Warning Signs: "BP" Series 250 mm x 355 mm (10" x 14") semi-rigid vinyl signs with corner screw holes, the required printed wording (generally red on a white background with black trim), pressure sensitive adhesive on the back, and stainless steel screws.

.4 Conduit and Armoured Cable Identification: Minimum 50 mm (2") wide self-adhesive coloured vinyl tape.

.5 Conductor Termination: Slip-on "Z" type.

.6 Conductor Colour Coding: As specified with the conductors.

2.3 ELECTRICAL ENCLOSURES

.1 Unless otherwise specified electrical enclosure are to be floor mounting NEMA/EEMAC/CSA enclosures as follows:
.1 outdoor, Type 3R

PART 3 - EXECUTION

3.1 GENERAL ELECTRICAL WORK INSTALLATION REQUIREMENTS

.1 Unless otherwise specified, install all conduits and conductors concealed in finished spaces, and concealed to the degree possible in partially finished and unfinished spaces.

.2 Access: Locate all work to permit easy access for service or maintenance as required and/or applicable. Locate all products which will or may need maintenance or repairs and which are installed in accessible construction so as to be easily accessible.

.3 Manufacturer's Instructions: Ensure that equipment and material manufacturer's installation instructions are followed unless otherwise specified herein or on the drawings, and unless such instructions contradict governing codes and regulations.

.4 Cleaning: Carefully clean all conduits, raceway, fittings prior to installation. Temporarily cap or plug ends of conduit which are open and exposed during construction.

.5 Surfaces To Receive Your Work: Inspect surfaces and structure prepared by other trades before performing your work. Verify that surfaces or the structure to receive your work have no defects or discrepancies which could result in poor application or cause latent defects in installation and workmanship. Report defects in writing. Installation of your work will constitute acceptance of such surfaces as being satisfactory.

3.1 GENERAL ELECTRICAL WORK INSTALLATION REQUIREMENTS (Cont'd)

.6 Repair of Finished Surfaces: For factory applied finishes, repaint or refinish all surfaces damaged during shipment and installation. The quality of the repair work is to match the original finish. This requirement also applies to galvanized finishes.

.7 Work In High Humidity Areas: Where electrical work is located in high humidity areas where ferrous metal products will be subject to corrosion and protection for such products is not specified, provide finishes on the products to protect against corrosion or provide products which will not corrode in the environment.

3.2 INSTALLATION OF SLEEVES

.1 Where conduits, round ducts, and armoured cable pass through concrete and/or masonry surfaces provide sleeves as follows:
.1 in poured concrete slabs: unless otherwise specified - minimum 16 gauge flanged galvanized steel or, where permitted by governing authorities, factory fabricated plastic sleeves
.2 in concrete or masonry walls: Schedule 40 galvanized steel pipe

.2 Size sleeves, unless otherwise specified, to leave 12 mm (½") clearance around the conduit, duct, cable, etc.

.3 Pack and seal the void between the sleeves and the conduit, duct, cable, etc., in non-fire rated construction for the length of the sleeves as follows:
.1 exterior below grade: seal sleeves in exterior walls below grade (and any other wall where water leakage may be a problem) with link type mechanical seals as specified below.

.4 Where sleeves are required in masonry work, accurately locate and mark the sleeve location, and hand the sleeves to the mason for installation.

3.2 INSTALLATION OF SLEEVES (Cont'd)

.5 Terminate sleeves that will be exposed so that the sleeve is flush at both ends with the building surface concerned so that the sleeve may be completely covered by an escutcheon plate, except for sleeves in waterproof floors which are to terminate 100 mm (4") above the finished floor.

.6 "Gang" type sleeving will not be permitted.

3.3 INSTALLATION OF FASTENING AND SECURING HARDWARE

.1 Provide fastening and securing hardware required for electrical work to maintain installations attached to the structure or to finished floors, pads, walls, and ceilings in a secure and rigid manner capable of withstanding the dead loads, live loads, superimposed dead loads, and any vibration of the installed products.

.2 Use fasteners compatible with structural requirements, finishes and types of products to be connected. Do not use materials subject to electrolytic action or corrosion where conditions are liable to cause such action.

.3 Where floor, wall, or ceiling construction is not suitable to support the loads, provide additional framing or special fasteners to ensure proper securement to the structure. Provide reinforcing or connecting supports where required to distribute loading to structural components.

.4 Obtain written consent before using explosive actuated fastening devices. If consent is given, comply with requirements of CAN3-Z166.1 and .2.

3.4 ELECTRICAL WORK IDENTIFICATION

.1 Identify all new/relocated electrical work in accordance with existing identification standards at the site.

.2 Identify all electrical work, including conduit systems and wiring, as follows:
.1 the size and wording of identification nameplates must be approved by the Consultant

3.4 ELECTRICAL WORK IDENTIFICATION (Cont'd)

.2 (Cont'd)

.2 identification wording for equipment is to follow drawing nomenclature unless otherwise specified

.3 secure nameplates to equipment with stainless steel screws unless such a practice is prohibitive, in which case use epoxy cement applied to cleaned surfaces

.4 locate nameplates in the most conspicuous and readable location

.5 for multi-cell or multiple component equipment provide a main nameplate and a smaller nameplate for each cell or component

.6 where electrical work is to be identified in conjunction with mechanical work, coordinate with the mechanical trades to ensure identical tagging

.7 all identification wording is to be in English

.8 all identification and colour coding is to be indicated on "as-built" record drawings

.3 Terminal Cabinets, Pull Boxes, Junction Boxes, Etc.: Clearly identify terminal cabinets, main pull and junction boxes by neatly spray painting the outside surface of the cover with a paint colour as specified below for conduit and conductor identification. Provide a nameplate on terminal boxes, main pull and junction boxes in communication systems specified in Division 27.

.4 Branch Circuit Pedestals: Pedestal nameplates must identify the electrical source connected to the panelboard, each circuit breaker, and, neatly typed on the door directory card, the load connected to each breaker.

.5 Conduit & Armoured Cable: Colour code conduit and armoured cable by means of 25 mm (1") wide primary colour plastic adhesive backed tape or neatly applied suitable paint with, where scheduled, a 20 mm (¾") wide auxiliary colour at all points where the conduit or cable penetrates a wall, ceiling, floor, at 6 m (20') intervals or at least once in each room or accessible ceiling space, at each access door location, and elsewhere at 15 m (45') intervals. Unless otherwise indicated/specified, colours are to be as follows:

IDENTIFICATION (Cont'd)

Service	Primary Colour	Secondary Colour
-up to 250V	yellow	
-250 up to & inluding 600V	yellow	green
-above 600V to 500kV	yellow	blue
-above 5kV to 28kV	yellow	red
-telephone	green	
-fire alarm	red	
-emergency voice	red	blue
-security systems	red	yellow
-other communication systems	green	
-isolated power	orange	

.6 Wire & Cable Terminations: Identify both end of wire and cable terminations with the same unique number. Where numbers are not indicated or specified, assign a number and record them.

.7 Buried Cable/Duct Runs: Identify buried cable/duct runs under paved and landscaped areas with appropriate concrete markers, flush with grade at each change in direction, at least twice on runs less than 60 m (200') and on 60 m (200') centres on longer runs.

3.5 GENERAL ELECTRICAL WORK TESTING

.1 Perform testing in accordance with the Electrical Work Testing Section, and, in addition, any tests required by governing Codes, Standards.

3.6 FINISH PAINTING OF ELECTRICAL WORK

.1 Finish paint exposed electrical work as specified and/or scheduled in accordance with requirements of the painting Section in Division 09.

3.6 FINISH PAINTING OF ELECTRICAL WORK (Cont'd)

.2 Touch-up paint all damaged factory applied finishes on electrical work products.

3.7 INTERRUPTION TO AND SHUT-DOWN OF ELECTRICAL SERVICES AND SYSTEMS

.1 Co-ordinate all shut-down and interruption to existing electrical systems with the Owner.

.2 Upon award of a Contract, submit a list of anticipated shut-down times and their maximum duration.

.3 Prior to each shut-down or interruption, inform the Owner and Consultant in writing seventy-two hours in advance of the proposed shut-down or interruption and obtain written approval to proceed. Do not shut-down or interrupt any system or service without such written approval.

.4 Perform work associated with shut-downs and interruptions as continuous operations to minimize the shut-down time and to reinstate the systems as soon as possible, and, prior to any shut-down, ensure that all materials and labour required to complete the work for which the shut-down is required are available at the site.

3.8 EQUIPMENT BASES AND SUPPORTS

.1 Structural Steel Stands/Supports: For equipment not designed for base mounting, where required, provide welded, cleaned and prime coat painted structural steel stands or supports conforming to the following requirements:

.1 all stands and supports, except those for small equipment, are to be designed by a structural engineer registered in the jurisdiction of the work, and stamped and signed design drawings with calculations are to be submitted as shop drawings for review

.2 all steel stands are to be flange bolted to concrete housekeeping pads

.3 all stands and supports are to be seismically restrained in accordance with applicable requirements

3.9 CUTTING, DRILLING, AND PATCHING

.1 Accurately and carefully mark out the location and extent of cutting or drilling required and co-ordinate with other trade(s). Note that all cut or drilled openings must not be larger than is absolutely necessary.

.2 Do all cutting, drilling and patching of the existing building for the installation of your work. Perform all cutting and drilling with proper tools and equipment. Confirm the exact location of cutting and drilling with the Consultant prior to commencing the cutting and/or drilling work.

.3 Patch surfaces, where required, to exactly match existing finishes using tradesmen skilled in the particular trade or application worked on.

.4 Where new conduits, conductors, etc., pass through existing construction, core drill an opening. Size openings to leave 12 mm (½") clearance around the product involved.

.5 You will be responsible for the repair of any damage to existing services, exposed or concealed, caused as a result of your cutting or drilling work.

3.10 PACKING AND SEALING CORE DRILLED OPENINGS

.1 Pack and seal the void between the core drilled opening and the service insulation for the length of the opening as follows:
.1 exterior walls above grade: pack sleeves in exterior walls above grade with mineral wool and seal both ends of the sleeves water-tight with approved non-hardening silicone base caulking compound unless mechanical type seals have been specified;
.2 exterior walls below grade: seal sleeves in exterior walls below grade (and any other wall where water leakage may be a problem) with link type mechanical seals as specified below.

3.11 CLEANING ELECTRICAL WORK

.1 Refer to cleaning requirements specified in Division 01.

3.11 CLEANING ELECTRICAL WORK (Cont'd)

.2 Clean all electrical work prior to application for Substantial Performance of the work.

3.12 MAINTAINING EQUIPMENT PRIOR TO ACCEPTANCE

.1 Maintain all equipment in accordance with the manufacturer's printed instructions prior to start-up, testing and commissioning.

3.13 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with requirements of Canadian Construction Association Standard Document CCA 81, A Best Practices Guide to Solid Waste Reduction.

.2 Place materials defined as hazardous or toxic waste in designated containers.

.3 Ensure emptied containers are sealed and stored safely for disposal.

END OF SECTION

PART 1 - GENERAL

1.1 SUBMITTALS

.1 None required.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 RIGID PVC CONDUIT

.1 Rigid PVC conduit to CSA C22.2 No. 211.1, Rigid Types EB1 and DB2/ES2 PVC Conduit, FT-4 rated, complete with site made heat gun bends for conduit to and including 50 mm (2″) diameter, factory made fittings for conduit larger than 50 mm (2″) diameter, solvent weld joints, factory made expansion joints where required, and terminations made with proper and suitable connectors and adaptors.

.2 FLEXIBLE PVC CONDUIT

.1 Flexible, water-tight, corrugated PVC conduit with “Kwikon” fittings and ESU conduit supports spaced at every 600 mm to 900 mm (2′ to 3″), and proper and suitable terminations and adapters.

.3 FISH CORD

.1 Polyethylene or nylon fish cord/tape with cable pull accessories to suit the application.

PART 3 - EXECUTION

3.1 GENERAL

.1 Refer to the article entitled General Conduit and Conductor Installation Requirements in the electrical work Section entitled Basic Electrical Materials and Requirements.

.2 Ensure that all open empty conduit ends are properly protected against dirt and debris during the construction process.

3.2 CONDUIT INSTALLATION REQUIREMENTS

.1 Unless otherwise specified, provide conduit for all conductors except armoured cable, mineral insulated fire rated cable, and except where cable tray, cable duct, or a similar raceway is used.

.2 Conduit Types: Conduit is to be as follows:

- .1 for branch circuit conductors underground inside the building, and underground outside the building beneath structures and concrete or asphalt paving – rigid PVC
- .2 for branch circuit conductors in concrete slabs on grade, and in concrete and masonry walls except exterior walls - rigid PVC
- .3 for branch circuit conductors in concrete slabs above grade – flexible PVC

.3 Conduit Fittings: Unless otherwise specified, conduit fittings are to be of the same material as the conduit and suitable in all respects for the application. Provide proper adaptors for joining conduit of different materials.

.4 Site Cutting Conduit: Cut square and ream all site cut conduit ends.

.5 Conduit Sizes: Generally, conduit is sized on the drawings. Conduit not sized on the drawings is to be sized in accordance with the governing Codes/Regulations. The sizes of branch circuit conductors shown/specified are minimum sizes and must be increased to suit length of run and voltage drop, and where this occurs, increase the conduit size to suit. Do not use conduit less than 15 mm (½″) diameter.

3.3 CONDUIT INSTALLED IN POURED CONCRETE

.1 When and where conduit is permitted in structural poured concrete, abide by the following requirements:

.1 install the conduit in accordance with requirements of CAN/CSA-A23.1, Concrete Materials and Methods of Concrete Construction
.2 the conduit must be secured in a manner such that the concrete will not be displaced when the concrete is poured, and during the concrete pour, monitor the conduit installation to prevent displacement or damage, and immediately report any misplacement or damage observed
.3 where more than 2 conduits are adjacent to each other they are to be spaced the greater of 3 conduit diameters or 100 mm (4″) apart
.4 the total depth of conduits crossing over each other is to be less than 1 third the thickness of the slab
.5 place conduit in the middle third of the slab thickness, and do not in any case lay conduit directly on reinforcing steel
.6 do not locate conduit adjacent to parallel reinforcing bars
.7 the maximum size of any conduit is 1/5th of slab thickness
.8 slope all underground conduit to drainage points and ensure that the conduit can be drained

3.4 CONDUIT SUPPORT

.1 Underground Conduit: Unless otherwise shown or specified, support underground conduit on a well tamped bed of earth or sand, free from rocks or protrusions of any kind.

.2 Surface Mounted & Suspended Single/Double Conduit Runs: Support and secure single and double runs of conduit at support spacing in accordance with Code requirements by means of galvanized steel pipe straps, conduit clips, ring bolt type hangers with galvanized steel hanger rods, or by other approved manufactured devices.

.3 Support of Multiple Conduit Runs: Support multiple conduit runs by means of Electrovert Ltd. “CANTRUSS” or Burndy Ltd. “FLEXIBLE” conduit racks or approved equivalent and galvanized steel rods with support spacing to suit requirements of the smallest diameter conduit in the group.

PART 1 - GENERAL

1.1 SUBMITTALS

.1 Product Data: Submit product data sheets for wiring devices. Ensure that the sheets indicate colours and faceplate finishes.

1.2 QUALITY ASSURANCE

.1 All wiring devices are to be CSA certified as a minimum, in accordance with the following standards, as applicable:

.1 CAN/CSA C22.2 No. 42, General Use Receptacle, Attachment Plugs and Similar Wiring Devices

.2 CAN/CSA C22.2 No. 42.1, Cover plates for Flush Mounted Devices

.3 CSA C22.2 No. 111, General Use Snap Switches

.2 Wherever possible, all wiring devices are to be supplied by the same manufacturer.

PART 2 - PRODUCTS

2.1 SPECIFICATION GRADE LOCKING RECEPTACLES

.1 Specification Grade, back or side wired, U-ground 2-pole, 3-wire locking type receptacles as follows:

.1 30 Amp. 250 Volt Simplex Receptacle: NEMA configuration L15-30R

.2 30 Amp. 125 Volt Simplex Receptacle: NEMA configuration L5-30R

2.2 SPECIFICATION GRADE GROUND FAULT RECEPTACLES

.1 Heavy-duty, 15 ampere, 125 volt, ULC Class A, Group 1. automatic ground fault circuit interrupting duplex receptacles with a 10 kA short circuit current rating automatic self-test diagnostics, green power on LED, and red ground fault LED. Ground fault receptacles for outdoor areas are to be as follows:

.1 outdoor areas: to be self-testing with a minimum frequency of once per 60 seconds

PART 3 - EXECUTION

3.1 GENERAL RE: INSTALLATION OF WIRING DEVICES

.1 Provide all required wiring devices and faceplates.

3.2 WIRING DEVICE AND FACEPLATE TYPES AND COLOURS

.1 Unless otherwise specified, wiring devices colours and faceplate types and colours are to be black or grey.

3.3 TESTING

.1 When installation is complete, test operation of all devices.

PART 1 - GENERAL

1.1 MEASUREMENT

.1 Rehabilitation of electrical pedestals will be measured by each pedestal rehabilitated and will include all labour, materials, and equipment necessary to complete the work, including all branch circuit panelboards, wiring, and conduit as indicated in the drawings.

1.2 SUBMITTALS

.1 Product Data: Submit product data sheets for products specified in this Section.

PART 2 - PRODUCTS

2.1 BRANCH CIRCUIT PANELBOARDS

.1 General Re: Panelboards: Breaker type branch circuit panelboards are to be dead front, factory assembled panelboards designed for sequence phase connection of branch circuit breakers, as per the drawing schedule and plans, and in accordance with requirements CAN/CSA-C22.2 No. 29, Panelboards and Enclosed Panelboards Industrial Products. Comply with OESC Rule 14-014 with regards to series rated combinations of over-current protective devices and ensure that equipment in which the lower rated devices are installed are marked with a series combination interrupting rating at least equal to the available fault current., Each panelboard is to be complete with:

.1 electrical grade, 95% conductivity copper sequence phase bus mains for the full length of each enclosure

.2 a fully capacity neutral unless

otherwise specified

.3 main and branch circuit conductor solderless set-screw type lugs approved for copper conductors

.4 neutral bus and main lugs at the same end, and a removable cover for main lugs

.5 a manufacturer's nameplate which indicates panelboard characteristics including the fault current that the panelboard, including breakers, has been constructed to withstand

.2 Circuit Breakers: Breakers are to be moulded case, bolt-on breakers in accordance with CSA/C22.2 No. 5, Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit Breaker Enclosures, calibrated for operation in a 40° C (105° F) ambient temperature, sized in accordance with the drawing schedules, and as follows:

.1 branch circuit breaker interrupting capacity is to suit the panelboard voltage and be as scheduled, or in accordance with Code requirements to suit the application

.2 odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number

.3 for dedicated breakers, handle lock devices

PART 3 - EXECUTION

3.1 INSTALLATION OF BRANCH CIRCUIT

.1 Provide breaker type branch circuit panelboards where shown. Ensure adequate

PANELBOARDS

operation and maintenance clearance on all sides of each panelboard as per Code requirements.

.2 Unless otherwise specified, supply panelboards from a single manufacturer only.

PART 1 - GENERAL

1.1 MEASUREMENT

.1 New lighting fixtures will be measured by each fixture supplied and installed and shall include all labour, materials, and equipment necessary to complete the work, including lamps, ballasts, poles, conduit, wiring, and mounting brackets to the requirements indicated.

1.2 SUBMITTALS

.1 Product Data: Product data submittal requirements are as follows:

- .1 submit product data sheets for lighting fixtures, and include certified horizontal and vertical beam spread, beam lumens, beam efficiency, complete photometric data which includes total input watts, candlepower summary, candela distribution zonal lumen summary, CIE type, coefficient of utilization, and lamptypeand lumen rating in accordance with CSA IESNA testing procedures.
- .2 for pole mounted fixtures, submit documentation to confirm that the poles proposed are suitable for the steady wind velocity and wind gust velocity data for the area of installation, and for the total weight and project area of the fixtures.
- .3 concrete bases will be formed as part of the new water’s edge concrete work.

.2 Lighting Fixture and Accessory Colour(s): For all lighting fixtures and accessories where the colour is to be selected after award of the Contract, submit colour charts and obtain fixture and accessory colour information in writing prior to ordering.

1.3 QUALITY ASSURANCE

.1 All lighting fixtures and lamps are to be ULC listed and/or CSA certified and labeled.

PART 2 - PRODUCTS

2.1 GENERAL RE: LIGHTING FIXTURES AND LAMPS

.1 Lighting fixtures to match existing on the North wall of the Fisherman's Basin.

.2 All lighting fixtures are to be completely weatherproof, non-corrosive, suitable in all respects for the mounting locations indicated on the drawings, and are to be complete with all required mounting hardware.

.3 Confirm exact colour and finish of lighting fixtures at the submittals stage and prior to ordering.

2.2 LAMPS

.1 Lamps are scheduled with the lighting fixtures and are specified in the Section entitled Ballasts, Lamps, Lenses and Louvres.

2.3 BALLASTS

.1 Ballasts are to be supplied with the lighting fixtures and are specified in the Section entitled Ballasts, Lamps, Lenses and Louvres.

2.4 POLES

.1 Steel Poles: Hot dipped galvanized, minimum 4.5 mm (⅛") thick steel, squaremonotube style poles 10.67m (35') tall, designed for underground wiring and mounting on a concrete base. Unless otherwise specified poles are to be straight and complete with an access hand hole with frame and cover for wiring connections 450 mm (18") above grade, a minimum of four non-corrosive anchor bolts and nuts with shims and tamper-proof covers, and a suitably sized grounding lug.

2.5 LIGHTING FIXTURE MOUNTING BRACKETS

.1 Corrosion-resistant metal brackets, cantilevered without under-braces, of sizes and styles specified with the fixtures they are required for, and complete with all required non-corrosive mounting and connection hardware.

PART 3 - EXECUTION

3.1 INSTALLATION OF EXTERIOR LIGHTING FIXTURES

.1 Provide exterior lighting fixtures where shown and in accordance with the drawing schedule. Include for all required site assembly, and provide all required installation and support hardware.

.2 Confirm exact lighting fixtures locations prior to roughing-in.

3.2 INSTALLATION OF LIGHTING FIXTURES POLES

.1 Provide poles with mounting brackets for pole mounted lighting fixtures.

.2 Secure metal poles to reinforced concrete bases. Install pole anchor bolt support hardware in the base concrete during the pour, and ensure that the hardware is properly positioned and remains properly positioned until concrete has set. Provide vandal-proof anchor bolt covers.

.3 Ensure that all poles are true and plumb.

3.3 LIGHTING FIXTURES ALIGNMENT

.1 Aim and align building floodlighting and/or spotlighting during evening hours under the direction and to the approval of the Consultant, and secure the fixture positions after the Consultant’s approval.

3.4 LAMPS

.1 Provide new lamps for each lighting

fixture.

.2 Include a full listing of lamps in O & M Manuals.

3.5 LIGHTING FIXTURES CIRCUIT WIRING

.1 Connect lighting fixtures to circuits indicated with wiring as specified. Install wiring in conduit.

.2 Minimize the number of splices required.

.3 Connect metal parts of poles with ground conductors connected to the grounding system.

3.6 CLEANING

.1 When all lighting fixtures installation work is complete, clean all fixtures and lamps, and surfaces soiled as a result of the fixture installation work.

PART 1 - GENERAL

1.1 MEASUREMENT PROCEDURES

.1 Granular A backfill for asphalt pavement base, storm drain bedding, and storm drain surround will be measured by the tonne of materials supplied and placed as indicated. Compaction is considered incidental to the work and will not be measured separately for payment.

.2 Excavation and backfill of native soil for storm sewer replacement will be measured under Section 33 44 00.

.3 Excavation to indicated limits for asphalt pavement base will be measured under Section 32 12 16.

.4 Removal and disposal of unsuitable excavated materials is considered incidental to the items above and will not be measured separately for payment.

1.2 UTILITY LINES

.1 Before commencing work, establish location and extent of underground utility lines in area of excavation. Notify Departmental Representative of findings.

.2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work. Pay costs for relocating services.

.3 Maintain existing lines in areas of excavation which must remain active. 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.

1.3 PROTECTION

.1 Protect excavated earth from freezing by approved method as necessary.

1.4 SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Granular A: to OPS.PROV 1010, April 2013, Ontario Provincial Standard Specification, Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Material. Maximum size Granular A 19.0 mm.

.2 Native fill: excavated soil, free from roots, rocks larger that 75 mm and debris. Departmental Representative to approve excavated material before use as fill.

PART 3 - EXECUTION

3.1 PREPARATION/ PROTECTION

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

.2 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.

.3 Protect existing features from damage during work. Make good of all damages at no extra costs to Departmental Representative.

.4 Keep excavations clean, free of standing water, and loose soil.

.5 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Departmental Representative approval.

.6 Protect natural and man-made features required to remain undisturbed.

3.2 STOCKPILING

.1 Stockpile fill materials in areas designated by Departmental Representative. Stockpile granular materials in manner to prevent segregration.

3.3 DEWATERING

.1 Provide pumps and other equipment and materials necessary to keep excavations free of water while work is in progress.

.2 Dispose of water in such a manner as not to be detrimental to public health, environment, public and private property, or any portion of work completed or under construction.

.3 Protect open excavations against flooding and damage due to surface run-off.

3.4 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 Excavation exceeding that shown on drawings, if authorized in writing by Departmental Representative, will be paid as extra to Contract price in accordance with General Conditions. Quantities will be calculated in place, compaction included. Truck load measurements not acceptable.

.6 Correct unauthorized excavation at no extra cost as follows:
.1 Place rock fill for over excavation below waterline.
.2 Place Granular A fill for over excavation above waterline, compacted to 100% Standard Proctor Density.

.7 Dispose of unsuitable surplus excavated material off site.

3.4 EXCAVATING (Cont'd)

.8 Excavate trenches to provide uniform continous bearing and suppport for 150 mm thickness of pipe bedding material on solid and undisturbed ground. Trench width 300 mm above pipe crown and below not to exceed diameter of pipe plus 600 mm.

.9 Do not commence excavation of adjacent outfall until backfilling is completed at the in-progress outfall.

.10 Provide Departmental Representative 48 hours advance notice for inspection of each installed outfall pipe prior to backfilling.

.11 Excavate for concrete walkway and asphalt pavement to depth indicated on drawings.

3.5 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 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 150 mm loose depth. Use methods to prevent disturbing or damaging any part of the work. Make good any damage.

3.5 BACKFILLING (Cont'd)

.7 Backfill and compact to layers indicated on drawings.

.8 Maintain optimum moisture content to enable compaction to attain specified density.

.9 Under concrete walkway and asphalt pavement:
.1 Use native fill up to bottom of Granular A base course.
.2 Use Granular A for base courses.

.10 Compact each layer to 100% 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.

3.6 CLEANING

.1 Progress Cleaning: leave Work area clean at end of each day.

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

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.

END OF SECTION

PART 1 - GENERAL

1.1 DELIVERY, STORAGE AND HANDLING

.1 Protect piles from damage due to excessive bending stresses, impact, abrasion or other causes during delivery, storage and handling.

.2 Replace damaged piles as directed by Engineer.

1.2 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 20.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Material requirements for piles are specified in Section 31 62 16.16 and 31 62 16.19.

.2 Supply or fabricate full length piles as indicated and provide equipment to handle full length piles without cutting and splicing.

.3 Do not splice piles without written approval of Engineer. When permitted, provide details for Departmental Representative review. Design details of splice to bear dated signature stamp of professional engineer registered or licensed in Ontario, Canada.

PART 3 - EXECUTION

3.1 EQUIPMENT

.1 Prior to pile installation, submit to Engineer details of equipment for installation of piles.

.1 Impact hammers: provide manufacturer's name, type, rated energy per blow at normal working rate, mass of striking parts of hammer, mass of driving cap and type and elastic properties of hammer and pile cushions.

3.1 EQUIPMENT (Cont'd)

.1 (Cont'd)

.2 Non-impact methods of installation such as augering, jacking, vibratory hammers or other means: provide full details of characteristics necessary to evaluate performance.

.2 Hammer:

.1 Hammers to be selected on basis of driveability analysis using wave equation theory, performed to show that piles can be driven to levels indicated.

.2 Driveability analysis to include, but not be limited to, following: hammer, cushion, and capblock details; static soil parameters; quake and damping factors, total soil resistance, blow count, pile stresses and energy throughput at representative penetrations.

.3 When required criteria can not be achieved with the proposed hammer, use larger hammer and take other measures as required.

.3 Leads:

.1 Construct pile driver leads to provide free movement of hammer. Hold leads in position at top and bottom, with guys, stiff braces, or other means reviewed by the Engineer to ensure support to pile while being driven.

.4 Followers:

.1 Obtain approval from Engineer prior to using followers. Provide followers of such size, shape, length and mass to permit driving pile in desired location to required depth and resistance. Provide followers with socket or hood carefully fitted to top of pile to minimize loss of energy and prevent damage to pile.

.2 Drive applicable load test piles using similar follower.

3.2 FIELD MEASUREMENT

.1 Maintain accurate records of driving for each pile, including:

.1 Type and make of hammer, stroke or related energy.

.2 Other driving equipment including water jet, driving cap, cushion.

3.2 FIELD MEASUREMENT (Cont'd)

.1 (Cont'd)

.3 Pile size and length, location of pile in pile group, location or designation of pile group.

.4 Sequence of driving piles in group.

.5 Number of blows per metre for entire length of pile and number of blows per 100 mm for last 1000 mm.

.6 Final tip and cut-off elevations.

.7 Other pertinent information such as interruption of continuous driving, pile damage.

.8 Record elevation taken on adjacent piles during, before, and after driving of each pile.

.2 Provide Engineer with three copies of records.

3.3 DRIVING

.1 Use driving caps and cushions to protect piles. Reinforce pile heads as required by Departmental Representative. Piles with damaged heads as determined by Departmental Representative will be rejected.

.2 Hold piles securely and accurately in position while driving.

.3 Deliver hammer blows along axis of pile.

.4 Restrike already driven piles lifted during driving of adjacent piles to assure set.

.5 Remove loose and displaced material from around piles after completion of driving, and leave clean, solid surfaces to receive foundation concrete.

.6 Cut off piles neatly and squarely at elevations as indicated to tolerance of plus or minus 6 mm. Provide sufficient length above cut-off elevation so that part damaged during driving is cut off.

.7 Remove cut-off lengths from site on completion of work.

3.4 DRIVING TOLERANCES

.1 Pile heads to be within 25 mm of locations as indicated.

.2 Piles not to be more than 0.4% of length out of vertical alignment.

3.5 OBSTRUCTIONS

.1 Where obstruction is encountered that causes sudden unexpected change in penetration resistance or deviation from specified tolerances, immediately inform Engineer and proceed as directed.

3.6 REPAIR/ RESTORATION

.1 Pull out rejected piles and replace with new piles.

.2 Remove rejected pile and replace with a new, and if necessary, a longer pile.

.3 No extra compensation will be made for removing and replacing or other work made necessary through rejection of defective piles.

3.7 PROTECTION

.1 Protect adjacent structures, services and work of other sections from hazards due to pile driving operations.

.2 Arrange sequencing of pile driving operations and methods to avoid damages to adjacent existing structures. When damages occur, remedy damaged items to restore to original or better condition at own expense.

END OF SECTION

PART 1 - GENERAL

1.1 MEASUREMENT PROCEDURES

.1 Fabrication, supply, and installation of new H-Piles with attached steel pipe pin will be measured by each pile pair installed and shall include all labour, materials and equipment necessary to complete the work. Supply and field welding of the pile cap beam, stiffener plates, and cap plates is considered included and will not be measured separately for payment.

.2 Trimming, coping and cutting top of the new H-Piles is considered incidental to the pile installation and will not be measured separately for payment.

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
.1 ASTM A615/A615M-15a, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

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

1.3 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00.

.2 Submit shop drawings for temporary work, shall drawing shall bare the stamp and signature of a Professional Engineer registered or licensed in the Province of Ontario, Canada.

.3 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 installation records, as described in PART 3 - RECORDS, for review by Engineer.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Steel H-Piles, plates, threaded studs, nuts and washers: to CSA G40.20/G40.21, Grade 350W.
.1 Size and weight as indicated.

.2 Cap plates: to CSA G40.20/G40.21, Grade 300W.

.3 Welding materials: to Section 05 12 35.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Fabricate and install steel cap plates and pipe pin to details indicated.

.2 Install piling in accordance with Section 31 61 13.

.3 Drill holes to be snug fit.

.3 Install each pile to pile tip elevation as indicated.

.4 Cut off piles neatly and squarely at elevation as indicated to tolerance of plus or minus 6 mm. Provide sufficient length above cut-off elevation so that part damaged during installation is cut off.

.5 Remove cut-off lengths from site on completion of work.

.6 Trim, cut and cope piles as indicated.

.7 Fabricate, supply, and install pile cap to details indicated in the drawings.

3.2 WELDING

.1 Weld to Section 05 12 35.

3.3 RECORDS

.1 Keep complete and accurate record of each pile installed.

.2 Indicate:
.1 Pile location.
.2 Deviations from design location.
.3 Cross section shape and dimensions.
.4 Original length.
.5 Ground elevation.
.6 Tip elevation.
.7 Cutoff elevation.
.8 Penetration in blows per meter for entire length of penetration.
.9 Hammer data including: rate of operation, make and size.
.10 Unusual pile behavior or circumstances experienced during driving such as redriving, heaving, weaving, obstructions, jetting, and unanticipated interruptions.

3.4 CLEANING

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

END OF SECTION

PART 1 - GENERAL

1.1 MEASUREMENT PROCEDURES

.1 New concrete-filled pipe pile fenders will be measured by each pile fender supplied and installed acceptably into work and shall include all labour, materials and equipment necessary to complete the work including cap plate, tires, threaded rods, concrete fill, drilling, and all necessary field welding.

.2 Trimming, coping and cutting top of the new pipe piles is considered incidental to the pile installation and will not be measured separately for payment.

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
.1 ASTM A106-13/A106M-13, Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service.
.2 ASTM A252-10, Standard Specification for Welded and Seamless Steel Pipe Piles.

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

1.3 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

.2 Product data: submit manufacturer's printed product literature, specifications and datasheet.

.3 Quality Assurance:
.1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
.2 Submit pile installation records, as described in PART 3 - RECORDS, for review by Engineer.

1.4 DELIVERY, STORAGE, AND HANDLING

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

.2 Deliver new, undamaged materials to site, accompanied by certified test reports, with manufacturer's logo and mill identification mark provided on pipe piling.

.3 Storage and Protection:
.1 Store and handle pipe piling in accordance with manufacturer's written instructions to prevent permanent deflection, distortion or damage to interlocks.
.2 Support pipe piling on level blocks or racks spaced not more than 3 m apart and not more than 0.60 m from ends.
.3 Store pipe piling to facilitate required inspection activities and prevent damage to coatings and corrosion prior to installation.

.4 Waste Management and Disposal:
.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Steel pipe: seamless, of sizes and wall thicknesses indicated, plain cut ends to ASTM A252, Grade 3.

.2 Pipe material to have following minimum properties:
.1 Yield strength: 310 MPa.
.2 Tensile strength: 455 MPa.
.3 Weldable steel: to ASTM A106/A106M carbon equivalent less than 0.55%.

.3 Pipe chemical composition: to ASTM A252.

.4 Plates, shaped and bars: to CSA G40.20/G40.21, Grade 300W.

.5 Welding: to Section 05 12 35.

.6 Concrete and reinforcing steel: in accordance with Section 03 30 00.

2.1 MATERIALS (Cont'd)

.7 Tires: to section 35 59 13.

.8 Ultrahigh Molecular Weight Polyethylene:
.1 Density: 940-960 kg/m3 to ASTM D-792,
.2 Tensile Strength, Ultimate, 37.9 MPa, to
.3 Tensile Modulus: 0.8 GPa, to ASTM D638,
.4 Flexural Modulus: 0.8 GPa to ASTM D790,
.5 Flexural Yield Strength: 24.8 MPa to ASTM
.6 Compression Strength: 22.8 MPa to ASTM
.7 Compression Modulus: 689 MPa to ASTM D695
.8 Coefficient of friction: 0.15, dry versus steel,
.9 Hardness, Shore D: 68, to ASTM D2240.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 FABRICATION

.1 Fabricate full length piles.

.2 Allowable tolerance on axial alignment to be 0.25% as measured by 3 m straight edge.

.3 Repair defective welds as approved by Engineer and in accordance with Section 05 12 35.

.4 Repair damaged exterior protective coating of piles.

3.3 INSTALLATION

.1 Install piling in accordance with Section 31 61 13.

.2 Drill holes to pile outer diameter to ensure snug fit. Drive pile tip to elevations indicated in the Drawings.

.2 If approved by Engineer, splice piles in place during installation by welding.

3.3 INSTALLATION (Cont'd)

.2 (Cont'd)
.1 To prevent distortion, tack opposite points first and then weld opposite sections for pipe walls thinner than 10 mm weld against a back up ring. Hold members in alignment during splicing operation.
.2 Make splice by complete joint penetration groove welds.

.3 Perform internal visual inspection of steel pipe, joints and base prior to placing of concrete.
.1 Ensure pipe inside is free from foreign matter.

.4 Place concrete in accordance with Section 03 30 00.

.5 Install pile caps as indicated.

.6 Touch up scratches to Section 09 91 15.

3.4 WELDING

.1 Weld to Section 05 12 35.

3.5 RECORDS

.1 Keep complete and accurate record of each pile installed.

.2 Indicate:
.1 Pile location.
.2 Deviations from design location.
.3 Cross section shape and dimensions.
.4 Original length.
.5 Ground elevation.
.6 Tip elevation.
.7 Cutoff elevation.
.8 Penetration in blows per meter for entire length of penetration.
.9 Hammer data including: rate of operation, make and size.
.10 Unusual pile behaviour or circumstances experienced during driving such as redriving, heaving, weaving, obstructions, jetting, and unanticipated interruptions.

END OF SECTION

PART 1 - GENERAL

1.1 MEASUREMENT PROCEDURES

.1 Asphalt base course will be measured by the tonne used and accepted in the work and shall include all labour, materials and equipment necessary to complete the work. Saw cutting and compaction is considered incidental and will not be measured separately for payment.

.2 Asphalt surface course will be measured by the tonne used and accepted in the work and shall include all labour, materials and equipment necessary to complete the work. Saw cutting and compaction is considered incidental and will not be measured separately for payment.

.3 Speed bumps will be measured by each constructed in the manner and locations indicated on the Drawings and will include all labour, materials, and equipment necessary to complete the work.

.4 Granular A fill will be measured under Section 31 23 11.

.5 Cold mill (grinding) of existing asphalt pavement, removal, disposal, and excavation to indicated limits will be considered included in the above items and will not be measured separately for payment.

.6 Asphalt tack coat will be considered incidental to asphalt base and surface courses and will not be measured separately for payment.

.7 All compaction testing and grading related to granular base, asphalt base and surface courses is consider incidental and not measured separately for payment.

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM International)
.1 ASTM D140/D140M-15, Standard Practice for Sampling Bituminous Materials.

.2 Ontario Provincial Standard Specifications (OPSS):

1.2 REFERENCES (Cont'd)

.2 (Cont'd)

.1 OPSS 1103 Novemeber 2012, Ontario Provincial Standard Specifications, Material Specification for Emulsified Asphalt.

.2 OPSS 1150 Novermber 2010, Material Specification for Hot Mix Asphalt.

1.3 PROTECTION

.1 Keep vehicular traffic off newly paved areas until paving surface temperature has cooled below 38°C. Do not permit stationary loads on pavement until 24 h after placement.

.2 Provide access to buildings and jetties as required.

.3 Protect landscaping, roads, curbs and walks on site and adjacent property that may be damaged by paving machinery, equipment or personnel. Make good property damaged due to paving operations.

.4 Take necessary precautions to protect workmen and public from hazards of paving operations.

.5 Arrange paving schedule so as not to interfere with normal use of premises.

1.4 ENVIRONMENTAL CONDITIONS FOR TACK COAT APPLICATION

.1 Apply tack coat when air temperatures are 10°C or higher.

.2 Do not apply when weather is foggy or rainy.

.3 Apply tack coat within the temperature ranges recommended by the Canadian General Standards Board for the material supplied.

1.5 QUALITY ASSURANCE

.1 Upon request by Departmental Representative, submit manufacturer's test data and certification that asphalt tack coat material meets requirements of this section.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle mateials in accordancewith ASTM D140.

.2 Divert unused asphalt from landfill to facility capable of recyclying materials.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

.2 Diver unused asphalt from landfill to facility capable of recyling materials.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Asphalt base course: to OPSS 1150, November 2010 for type HL 8. Maximum size aggregrate 26.5 mm.

.2 Asphalt surface course: to OPSS 1150, November 2010 for type HL 3. Maximum size aggregate 16.0 mm.

.3 Anionic emulsified asphalt: to OPSS 1103, November 2012 for slow setting type, grade SS-1.

.4 Water: clean, potable, free from foreign matter.

.5 Granular A: to Section 31 23 11.

PART 3 - EXECUTION

3.1 ASPHALT REMOVAL

.1 Saw cut pavement to full depth in neat lines around limits of asphalt removal areas to expose fresh vertical surfaces.

.2 Remove asphalt and excavate to requirements as shown on the drawing and to Section 02 41 14.

3.2 GRANULAR BASE

.1 Excavate and backfill with specified fill materials to Section 31 23 11 and compact to thicknesses indicated.

3.3 TACK COAT APPLICATION

.1 Obtain Departmental Reprensentative's approval of surface before applying asphalt tack coat.

.2 Tack coat shall be applied to all vertical concrete surface and vertical asphalt surface.

.3 Apply asphalt tack coat only on clean and dry surface.

.4 Dilute asphalt emulsion with water at 1:1 ratio for appliction.
.1 Mix thoroughly by pumping or other method approved by Departmental Represenative.

.5 Do not apply asphalt tack coat when air temperature is less than 10°C or when rain is forecast within 2 hours of application.

.6 Apply asphalt tack coat only on unfrozen surface.

.7 Evenly distribute localized excessive deposits of tack coat by brooming as directed by Departmental Representative.

.8 Re-tack contaminated or disturbed areas as directed by Departmental Representative.

.9 Permit asphalt tack coat to set before placing asphalt pavement.

3.4 ASPHALT PAVING

.1 Obtain approval of granular base and primer from Departmental Representative before placing asphalt.

.2 Place asphalt mix only when granular base is dry and air temperature is above 7°C.

.3 Place 60 mm of compacted asphaltic base course.

.4 Place 40 mm of compacted asphaltic surface course.

.5 Minimum 118°C mix temperature required when spreading.

.6 Maximum 149°C mix temperature permitted at any time.

3.4 ASPHALT PAVING (Cont'd)

.7 Compact each course with roller as soon as it can support roller weight without undue cracking or displacement.

.8 Roller, power driven, minimum mass of 9 tonnes, minimum wheel width 600 mm.

.9 Roll until roller marks are eliminated. Compact to density not less than 99% laboratory density.

.10 Keep roller speed slow enough to avoid mix displacement and do not stop roller on fresh pavement.

.11 Moisten roller wheels with water to prevent mix adhesion.

.12 Compact mix with hot tampers or other approved equipment in areas inaccessible to roller.

.13 Finish surface smooth, true to grade and free from deviations exceeding 1:1000 when measured in any direction with a 3 m straight edge.

.14 Carefully place and compact hot asphaltic material against joints and catchbasin frames.

.15 Place base course flush to existing pavement surface. Place around catch basin covers such to permit placement of full thickness asphalt paving overlay.

3.5 SPEED BUMPS

.1 Form to details indicated in the Drawings.

END OF SECTION

PART 1 - GENERAL

1.1 MEASUREMENT PROCEDURES

.1 Supply and installation of new stormwater drainage piping including fittings and testing will be measured by the lineal metre and shall include all labour, materials and equipment necessary to complete the work.

.2 Excavation and removal of the existing storm drains as designated shall be considered incidental to the above item and will not be measured separately for payment.

.3 Backfilling of native soil and removal and disposal of unsuitable soils as directed is considered included in the above items and will not be measured separately for payment.

.4 Granular A bedding and surround material will be measured under Section 31 23 11.

.5 New concrete outfall plugs will be measured by each plug constructed and shall include demolition, removal, and disposal of the existing plug and all labour, materials, and equipment necessary to complete the work.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA B1800-11, Thermoplastic Non-pressure Piping Compendium - B1800 Series (Consists of B181.1, B181.2, B181.3, B181.5, B182.1, B182.2, B182.4, B182.6, B182.7, B182.8 and B182.11).

.1 CSA B182.8-11, Profile Polyethylene (PE) Storm Sewer and Drainage Pipe and Fittings.

.2 CSA B182.11-11, Recommended Practice for the Installation of Thermoplastic Drain, Storm, and Sewer Pipe and Fittings.

1.3 DEFINITIONS

.1 A pipe section is defined as length of pipe between successive catchbasins and/or maintenance holes.

1.4 SUBMITTALS

.1 Submit to Section 01 33 00.

.2 Submit manufacturer's test data and certification at least 2 weeks prior to beginning Work.

.3 Certification to be marked on pipe.

.4 Submit to Departmental Representative 1 copy of manufacturer's installation instructions.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

1.6 DELIVERY, STORAGE AND HANDLING

.1 To manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 STORMWATER DRAINAGE PIPE

.1 Pipe properties:
.1 Material: High density polyethylene - HDPE with non-perforated corrugated exterior and smooth inner wall, to CSA B182.8.
.2 Ring stiffness: minimum 320 KPa to CSA B182.8.
.3 Joints: Sealing gaskets to meet requirements of CSA B182.2 and withstand a minimum hydrostatic pressure of 345 KPa without leakage.
.4 Fittings: to be watertight injection-molded gasketed HDPE fittings to CSA B182.2.

2.2 CONCRETE PLUG

.1 Concrete to Section 03 30 00.

PART 3 - EXECUTION

3.1 EXCAVATION .1 To Section 31 23 11.

3.2 REMOVALS .1 Remove designated storm drains in accordance with Section 02 41 14.

3.1 PREPARATION .1 Clean pipes and fittings of debris and water before installation, and remove defective materials from site to approval of Departmental Representative.

3.2 TRENCHING .1 Do trenching Work in accordance with Section 31 23 33.

.2 Do not allow contents of sewer or sewer connection to flow into trench.

.3 Trench alignment and depth to neat lines as indicated on Drawings and approval by Departmental Representative prior to placing bedding material and pipe.

3.3 PIPE BEDDING .1 Place Granular A bedding material as indicated in the Drawings in unfrozen condition.

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

.3 Shape transverse depressions as required to suit joints.

.4 Compact each layer full width of bed in accordance with CSA B182.11 and manufacturer's recommendations to minimum 95% Standard Proctor Density.

3.4 INSTALLATION

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

.2 Handle pipe using methods recommended by manufacturer.
.1 Do not use chains or cables passed through rigid pipe bore so that weight of pipe bears upon pipe ends.

.3 Lay pipes on prepared bed, true to line and grade with pipe inverts smooth and free of sags or high points.
.1 Ensure barrel of each pipe is in contact with shaped bed throughout its full length.

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

.5 Install joints to manufacturer's recommendations.

.6 When any stoppage of Work occurs, restrain pipes as recommended by manufacturer, to prevent "creep" during down time.

.7 Cut pipes as required for special inserts, fittings or closure pieces, as recommended by pipe manufacturer, without damaging pipe or its coating and to leave smooth end at right angles to axis of pipe.

.8 Make watertight connections to maintenance holes and catch basins.
.1 Use shrinkage compensating grout when suitable gaskets are not available.

.9 Connect to existing catch basin manhole as shown on Drawings.

3.5 PIPE SURROUND

.1 Place surround material in accordance with CSA B182.11 and in unfrozen condition.

.2 Upon completion of pipe laying, and after Departmental Representative has inspected pipe joints, surround and cover pipes as indicated.

3.5 PIPE SURROUND (Cont'd)

.3 Hand place and compact surround material in uniform layers not exceeding 150 mm. Do not dump material.

.4 Place layers uniformly and simultaneously on each side of pipe.

.5 Compact each layer full width in accordance with CSA B182.11 and manufacturer's recommendations to 95% Standard Proctor Density.

.6 When field test results are acceptable to Departmental Representative, place surround material at pipe joints.

3.6 BACKFILL

.1 Backfill to Section 31 23 11.

.2 Place backfill material in unfrozen condition.

.3 Place backfill material, above pipe surround, in uniform layers not exceeding 150 mm compacted thickness up to grades as indicated.

3.7 FIELD TESTING

.1 Repair or replace pipe, pipe joint or bedding found defective.

.2 When directed by Departmental Representative, draw tapered wooden plug with diameter of 50 mm less than nominal pipe diameter through sewer to ensure that pipe is free of obstructions.

.3 Remove foreign material from sewers and related appurtenances by flushing with water.

.4 Do field testings in accordance with manufacturer's recommendations.

END OF SECTION

PART 1 - GENERAL

1.1 MEASUREMENT PROCEDURES

.1 Supply, installation, maintenance and removal of turbidity curtain for all in-water work will be measured as a lump sum item and shall include all labour, materials and equipment necessary to complete the work.

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM)

.1 ASTM D751-06(2011), Standard Test Methods for Coated Fabrics.

.2 ASTM D2261-13, Standard Test Method for Tearing Strength of Fabrics by the Tongue (Single Rip) Procedure (Constant-Rate-of-Extension Tensile Testing Machine).

.3 ASTM D5034-09(2013), Standard Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test).

1.3 SUBMITTALS

.1 Submit details of the temporary turbidity curtain system to the Departmental representative prior to the start of the Work.

.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.

PART 2 - PRODUCTS

2.1 MATERIAL

.1 Turbidity Curtain:

.1 Flotation Properties:

.1 Size: 200 mm x 200 mm.

.2 Length: 200 m.

.3 Curtain Depth: 10 m.

2.1 MATERIAL (Cont'd)

.1 (Cont'd)
.1 (Cont'd)
.4 Bouyancy: 13 Kg/m.
.2 Curtain Body Properties:
.1 Nylon Vinyl Reinforced: 610 g/m^2.
.2 Grab Tensile: to ASTM D5034, 1765N x 1660N.
.3 Tear: to ASTM D2261, 427 N x 382 N.
.4 Adhesion:to ASTM D751, 67 N.
.5 Hydrostatic Resistance: to ASTM D751, 2654 kPa.
.6 Seam strength: Heat Sealed.
.7 Connections: 15.8 mm rope hem edge.
.8 Ballast Chain: 8 mm.

.2 Seams: sewn in accordance with manufacturer's

.3 Thread for sewn seams: equal or better resistance to chemical and biological degradation than geotextile.

PART 3 - EXECUTION

3.1 GENERAL

.1 Supply, install, maintain and remove silt 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 8 NTU above background conditions.

3.2 INSTALLATION

.1 Turbidity curtains shall consist of turbidity curtain geosynthetic, load line, flotation, ballast, anchors, mooring buoys, mooring lines, adjustment lines, and tie-downs.

.2 Design to conform to US Army Corps of Engineers EP 1110-1-16 Appendix C, BMP 27 Type 1.

.3 Turbidity curtains shall be constructed as follows:
.1 The flotation shall provide support along the length of the turbidity curtain.

3.2 INSTALLATION (Cont'd)

.3 (Cont'd)

.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 The turbidity curtain, as prepared for installation, shall be of sufficient width to account for water depth and wave action.

.5 The turbidity curtain shall be of sufficient length to permit work inside the area enclosed by the curtain without restricting equipment operations, and personnel from working.

.6 Seal the ends of the turbidity curtain where it is terminates at the existing structure face.

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.

3.3 OPERATION AND MAINTENANCE (Cont'd)

.5 Any folds in the turbidity curtain which form next to the floatation collar shall be regularly monitored and freed of collected sediment.

.6 Monitor and maintain the silt curtains booms both during and outside normal working shifts as required. Provide all personnel, materials and equipment necessary to maintain, repair or relocate the silt 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 silt curtain when authorized by the Departmental representative after completion of the work.

END OF SECTION

PART 1 - GENERAL

1.1 MEASUREMENT PROCEDURES

.1 Square-shape rubber fender including steel plates, anchor bolts, threaded rods, nuts, and washers will be meausred by the lineal metre and shall include all labour, materials and equipment necessary to complete the work.

.2 New concrete filled pipe pile fenders will be measured under 31 62 16.19.

.3 New tire fenders including steel plate attachments, chains, and epoxy anchors will be measured by each installed and shall include all labour, materials, and equipment necessary to complete the work.

.4 New vertical HSS fenders including steel angles and epoxy anchors will be measured by each installed and shall include all labour, materials, and equipment necessary to complete the work.

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM International)
.1 ASTM A307-14, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60000 PSI Tensile Strength.

.2 Canadian Standards Association (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(R2014), Certification of Companies for Fusion Welding of Steel.
.3 CSA W59-13, Welded Steel Contruction (Metal Arc Welding).

1.3 WELDER QUALIFICATIONS

.1 Use only welders qualified under CSA W47.1.

.2 Make available to Departmental Representative currently valid Canadian Welding Bureau Qualification Certificate for each welder employed on the work.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Square-shaped fenders:
.1 Rubber elements shall be extruded rubber homogeneous and free from any defects, impurities and cracks.
.2 Slope side D-shaped, D-bore, with Reaction/Energy Absorption ratio of 10.9 at 50% deflection.
.3 Steel shapes and plates: to CSA G40.20/G40.21, Grade 300W.
.4 Threaded rods, anchor bolts, nuts and washers to ASTM A307.
.5 Epoxy to Section 03 30 00.

.2 Tires: use tires free from tears, holes, and damage. Tires are to be uniform in size with:
.1 Pipe Pile Fenders: diameter not greater than 381 mm and width not greater than 205 mm.
.2 Tire Fenders: diameter between 1500 mm and 1800 mm and width 550 mm.

.3 Vertical HSS fenders:
.1 Steel shapes and plates: to CSA G40.20/G40.21, Grade 300W.
.2 Threaded rods, anchor bolts, nuts and washers to ASTM A307.
.3 Epoxy to Section 03 30 00.

PART 3 - EXECUTION

3.1 FABRICATION

.1 Fabricate attachment steel plates and washers to details indicated on plan.

.2 Do welding to CSA W59 and to Section 05 12 35.

.3 Grind smooth all welds.

3.2 D-SHAPED FENDER MODULE INSTALLATION

.1 Secure the fender attachments to jetty decks in manner and locations indicated.

.2 Accurately drill and epoxy threaded rods to concrete to details indicated.

3.2 D-SHAPED FENDER MODULE INSTALLATION (Cont'd)

.3 Do not make alteration to system components without written permission of Departmental Representative.

3.3 TIRE FENDERS

.1 Secure tire fender attachments to concrete parapet in manner and locations indicated.

.2 Accurately drill and epoxy threaded rods to concrete to details indicated.

.3 Do not make alteration to system components without written permission of Departmental Representative.

3.4 VERTICAL HSS FENDERS

.1 Secure vertical HSS fender attachments to concrete parapet in manner and locations indicated.

.1 Accurately drill and epoxy threaded rods to concrete to details indicated.

.2 Do not make alteration to system components without written permission of Departmental Representative.

3.5 EPOXY ANCHORS

.1 Do not install epoxy anchors in new concrete until it has reached a minimum of 70% of the specified 28 day strength of 35 MPa.

END OF SECTION