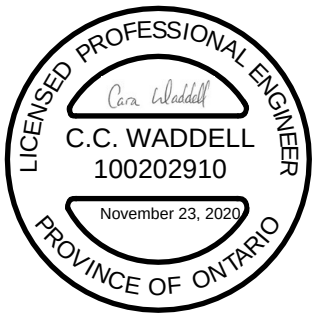
Project Title PARRY SOUND, ONTARIO
WASAUKSING SWING BRIDGE
PIER AND FENDER REHABILITATION

Project Number R.089868.004

Project Date 2020-11-23

END OF SECTION

Consultant for General, Structural, Construction Specifications



Consultant for Electrical Specifications

END OF SECTION

Part 1 General

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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 LIST OF DRAWING SHEETS

DRAWING NO.	DESCRIPTION
B-00	COVER PAGE
STRUCTURAL	
B-01	GENERAL ARRANGEMENT
B-02	SITE PLAN
B-03	FENDER PIER RECONSTRUCTION DETAILS SHEET 1
B-04	FENDER PIER RECONSTRUCTION DETAILS SHEET 2
B-05	EAST TRESTLE TIMBER CRIBBING REPAIRS
B-06	EAST AND WEST REST PIER TIMBER CRIBBING REPAIRS
B-07	EAST REST PIER REPAIRS
B-08	WEST REST PIER REPAIRS
B-09	PIVOT PIER TIMBER CRIBBING REPAIRS
B-10	TIMBER TRESTLE REPAIRS SHEET 1
B-11	TIMBER TRESTLE REPAIRS SHEET 2
B-12	TIMBER TRESTLE REPAIRS SHEET 3
B-13	STEEL REPAIR DETAILS
B-14	ACCESS LADDER AND CAGE DETAILS
B-15	STANDARD DETAILS
ELECTRICAL	
E-01	FENDER LIGHT SITE PLAN
E-02	FENDER LIGHT DETAILS

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 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract comprises pier, and fender rehabilitation of Wasauksing Swing Bridge, located at Parry Sound, Ontario.

.2 The Wasauksing Swing Bridge provides access for vehicles crossing the South Channel of Parry Sound between Seguin Township and Parry Island. The bridge is an operating movable bridge that permits the passage of navigation traffic through the South Channel. The movable span is an equal arm through truss pivot bridge with an overall length of 52.8 m. The spans from the east and west abutments to the swing span nose piers consist of a series of timber trestle spans. The 58.6 m long west approach consists of seventeen (17) spans of both timber pile and post/sill construction and the 42.3 m long east approach consists of twelve (12) spans of similar construction.

.3 The work under this Contract includes: reconstruction of the timber fender system, concrete repairs on the piers, reconstruction of the ballast wall with replacement of the joint armouring, localized timber repairs to the timber cribbing foundations, installation of pile jackets, shimming between the piles and cap beams and the stringers and cap beams, localized replacement of timber bracing, replacement of truss ladder, steel repairs within the drum girder and installation of new fender lights on the piers and timber fender system.

1.2 CODES

.1 Perform all work in accordance with the Canadian Bridge Highway Design Code CSA S6-19 (CHBDC), the Occupational Health and Safety Act of Ontario, and the Ontario Traffic Manual - Book 7.

.2 Materials and workmanship must conform to or exceed applicable standards of Canadian General Standards Board (CGSB), Canadian Standards Association (CSA), American Society for Testing and Materials (ASTM) and other standards organizations.

.3 Conform to latest revision of any reference standard as re-affirmed or revised to date of specification. Standards or codes not dated shall be deemed editions in force on date of tender advertisement.

.4 Vehicle weights and dimensions shall conform to the Highway Traffic Act of Ontario.

1.3 SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit Project construction progress schedule in accordance with Section 01 32 16.19 - Construction Progress Schedule - Bar (GANTT) Chart.

.3 Submit site-specific and Work Plan Health and Safety Plan accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.4 WORK BY OTHERS

.1 Co-operate with other Contractors in carrying out their respective works and carry out instructions from Departmental Representative.

.2 Co-ordinate work with other contractors. If any part of work under this Contract depends for its proper execution or result upon work of another contractor, report promptly to Departmental Representative, in writing, any defects which may interfere with proper execution of Work.

.3 Work of this Project must include provision for coordinating work, identified in Contract Documents, for following principal items.

.1 Spring start-up work to be completed Wasauksing First Nation under the existing service agreement in March-April 2021.

.2 Wasauksing First Nation operation of the Swing Bridge starting April 15th, 2021.

.3 Deck Rehabilitation to be completed by Wasauksing First Nation in the winter of 2021 at night between 11:55PM to 6:00AM. The work is to be completed by March 31st, 2021.

1.5 WORK SEQUENCE

.1 Construct Work in stages to accommodate Owner's continued use of premises during construction.

.2 Co-ordinate Progress Schedule and co-ordinate with Owner Occupancy during construction.

.3 Required stages:

.1 Project award.

.2 Prepare and submit project schedule showing critical path.

.3 Obtain necessary permits.

.4 Contractor mobilization and installation of environmental control measures.

.5 Initiate and maintain shop drawing submittal and review process.

.6 Implement and maintain navigation control measures.

.7 Implement and maintain traffic control measures for night closures.

.8 Remove existing signs, lights, and ballast from fender system. Remove existing timber crib fender system. Modify existing timber piles and reconstruct timber fender system with new timbers. Place salvaged and new ballast in reconstructed fender. Reinstate signs and install new lights.

.9 Remove and replace deteriorated timbers from timber cribbing beneath East Approach Span. Replace missing ballast in timber cribbing beneath Bent 4-6 on East Approach Trestle as required.

.10 Replace missing timbers and reinforce portions of the timber cribbing with steel plates beneath concrete piers. Secure timbers with steel connector plates as required.

.11 Complete partial depth concrete repairs on the bearing seat of the concrete piers.

.12 Cut end of laminated timber deck and remove timber tie and joint armouring at concrete piers. Perform partial depth concrete removal on ballast wall. Construct new concrete ballast wall with new joint armouring.

.13 Installation of pile jackets on water and land-based piles.

.14 Shim piles and stringers.

.15 Replacement of timber bracing and timber brace hardware as specified.

.16 Replacement of Bent 12 of the East Approach Span.

.17 Remove and replace vertical ladder on truss.

.18 Installation of fender lights on the concrete piers.

.19 Demobilization and removal of environmental control measures.

.4 Construct Work in stages to provide for continuous public usage. Do not close off public usage of facilities until use of one stage of Work will provide alternate usage.

.5 Maintain access to the Operator's house at all times.

.6 Protect workers and public safety.

1.6 WORK IN WINTER

.1 Construction work will need to occur during the winter months to complete the following work:

.1 All steel repairs within the drum girder shall be completed by March 31st, 2021.

.2 All concrete repairs to the top of the piers and installation of joint armouring shall be completed by April 14th, 2021.

.2 The Contractor shall include all costs for the necessary provisions to work in the winter months in their bids.

.3 The Contractor shall assume the cost of all material and labour to protect the Work during winter conditions, including any required heating or insulation.

.4 A delay in the schedule due to winter conditions will not be accepted.

1.7 CONTRACTOR USE OF PREMISES

.1 Unrestricted use of site until Substantial Performance. The only exceptions are:

.1 The Contractor shall permit passage of boat/vessel traffic. The swing span shall remain operational and shall "open every second hour on the odd hour" (when required) from 7:00 AM to 9:00 PM daily (7 days a week). The winter shut down for the navigational opening of the channel is from November 27, 2020 to April 15, 2021.

.2 Limit use of premises for Work, for storage, and for access, to allow:

.1 Owner occupancy.

.2 Work by other contractors including Wasauksing First Nation performing work under the Service Agreement.

.3 Public usage of the bridge (vehicular and pedestrian).

.4 Public usage of "Rose Point Road" (vehicular and pedestrian).

.5 Permit usage of boat/vessel traffic. The swing span shall remain operational and shall "open every second hour on the odd hour" (when required).

.3 Co-ordinate use of premises under direction of Departmental Representative.

.4 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.

.5 Refer to Section 01 52 00 - Construction Facilities and Section 01 56 00 - Temporary Barriers and Enclosures, for temporary facilities, access roads and parking areas, traffic regulations, and utilities.

.6 Remove or alter existing work to prevent injury or damage to portions of existing work which remain.

.7 Repair or replace portions of existing work which have been altered during construction operations to match existing or adjoining work, as directed by Departmental Representative.

.8 Ensure that operations conditions of exiting work at completion are still the same, equal to or better than that which existed before new work started.

.9 The Contractor shall not permit any tools, equipment, vehicles, temporary structures, or parts thereof used or maintained for the purpose of building or placing a work in a navigable water to remain in such water after the completion of the project.

.10 Where a work or a portion of the work that is being constructed or maintained in navigable water causes debris or other material to accumulate on the bed or surface of such water, the Contractor shall immediately remove the debris or other material to the satisfaction of the Departmental Representative.

1.8 OWNER OCCUPANCY

.1 Owner will occupy premises during entire construction period for execution of normal operations.

.2 The swing span is operated by the Bridgemaster. The Contractor is required to ‘stand down’ while the bridge is operated. The Bridgemaster will operate the bridge “every second hour on the odd hour” (when required during Navigation Season and to complete winter shutdown). The Contractor should make allowance for additional openings.

.3 Co-operate with Owner in scheduling operations to minimize conflict and to facilitate Owner usage.

1.9 EXISTING SERVICES

.1 Notify, Departmental Representative and utility companies of intended interruption of services and obtain required permission.

.2 Where Work involves breaking into or connecting to existing services, give the Departmental Representative 48 hours notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to pedestrian and vehicular traffic.

.3 Establish location and extent of service lines in area of work before starting Work. Notify Departmental Representative of findings.

.4 Submit schedule for approval by Departmental Representative for any shut-down or closure of active service or facility including power and communications services. Adhere to approved schedule and provide notice to affected parties.

.5 Provide temporary services when directed by Departmental Representative.

.6 Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.

.7 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.

.8 Protect, relocate, or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.

.9 Record locations of maintained, re-routed, and abandoned service lines.

.10 Construct barriers, as required, in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.10 DOCUMENTS REQUIRED

.1 Maintain at job site, one copy of each document as follows:

.1 Contract Drawings.
.2 Specifications.
.3 Addenda.
.4 Reviewed Shop Drawings.
.5 List of Outstanding Shop Drawings.
.6 Change Orders.
.7 Other Modifications to Contract.
.8 Field Test Reports.
.9 Copy of Approved Work Schedule.
.10 Health and Safety Plan and Other Safety Related Documents.
.11 Other documents as specified.
.12 Environmental mitigation measures

1.11 VERIFICATION OF SITE DIMENSIONS

.1 The Contractor is advised that all elevations and dimensions shown on the plans are approximate only. Verify all dimensions before preparing and submitting shop drawings and before planning and undertaking any construction work. Immediately report all discrepancies, in writing, to the Departmental Representative.

1.12 SIGNS

.1 Provide common-use signs related to traffic control, information, instruction, use of equipment, public safety devices, etc., in both official languages or by the use of commonly understood graphic symbols to the Departmental Representative’s approval.

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 ACCESS AND EGRESS

.1 Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders and scaffolding, independent of finished surfaces and in accordance with relevant municipal, provincial, and other regulations.

1.2 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated.

.2 Maintain existing services to building and provide for personnel and vehicle access.

.3 Where security is reduced by work provide temporary means to maintain security.

.4 Closures: protect work temporarily until permanent enclosures are completed.

1.3 EXISTING SERVICES

.1 Notify, Departmental Representative and utility companies of intended interruption of services and obtain required permission.

.2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 48 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends.

.3 Provide for pedestrian and vehicular traffic.

.4 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.4 SPECIAL REQUIREMENTS

.1 Submit schedule in accordance with Section 01 32 16.19 - Construction Progress Schedule - Bar (GANTT) Chart.

.2 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.

.3 Keep within limits of work and avenues of ingress and egress.

.4 Deliver materials outside of peak traffic hours 7:00 to 09:00 and 16:00 to 18:00 unless otherwise approved by Departmental Representative.

1.5 ACCOMODATION OF TRAFFIC

.1 Maintain full access for residents to their private property and the Operator’s House at all times.

.2 Maintain vehicular, pedestrian and cyclist traffic in accordance with the Contract Drawings and Documents. Maintain existing conditions for traffic throughout period of contract except where required to complete the work under contract and where measures have been taken in accordance with the Traffic Control Plan and as approved by the Departmental Representative to protect and control public traffic.

.3 Road Closures

.1 A minimum of 2 weeks' notice is required in advance of any planned road closure.

.2 Road Closures are restricted to 0:00 to 6:00.

.3 Pedestrian traffic must be maintained across the bridge at all times.

1.6 LOAD RESTRICITON ON BRIDGE

.1 The Wasauksing Swing Bridge is posted with a maximum 10 tonne per axle and a speed limit of 10km/h. The Contractor must observe this posting at all times during construction.

1.7 SCHEDULING OF WORK

.1 The swing span shall remain operational at all times during the navigational season. The winter shut down for the navigational opening of the channel is from November 27, 2020 to April 15, 2021.

1.8 MAINTENANCE OF NAVIGATIONAL CHANNEL

.1 Maintain at all times a 10m wide by 3m high navigational channel under the bridge.

.2 Supply, erect and maintain signs on the Canal both upstream and downstream of the construction site to clearly warn boat traffic of construction operations. Provide reflective surfaces on signs that are in both official languages.

.3 Envelope the fender system during reconstruction with cautionary buoys. No work on the deconstruction of the fender system shall commence until the signs have been erected and the buoys have been installed to the satisfaction of the Departmental Representative.

1.9 WASAUKSING FIRST NATIONS LABOUR ENGAGEMENT

.1 The Contractor must ensure a minimum of 10% of the labour force working on site is represented by Wasauksing First Nations workers.

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 RELATED REQUIREMENTS

.1 Particular requirements for inspection and testing to be carried out by testing laboratory designated by Departmental Representative are specified under sections as follows:

.1 Section 03 30 00 – Cast-In-Place Concrete

1.2 APPOINTMENT AND PAYMENT

.1 The Contractor is responsible to appoint and pay for services of testing laboratory as follows:

.1 Inspection and testing required by laws, ordinances, rules, regulations, or orders of public authorities.

.2 Inspection and testing performed exclusively for Contractor's convenience.

.3 Testing, adjustment and balancing of conveying systems, mechanical and electrical equipment, and systems.

.4 Mill tests and certificates of compliance.

.5 Tests specified to be carried out by Contractor under supervision of Departmental Representative.

.6 Additional tests specified as follows:

.1 Concrete and grout testing will be arranged and paid for by the Contractor using an independent CSA Certified Testing Company and field personnel. This includes all site tests of the plastic concrete and grout during placement and all compression tests (including curing) and other tests performed on the hardened concrete and grout. Representative samples from each concrete placement shall be taken and tested. The Departmental Representative may run parallel test at their discretion.

.2 Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, pay costs for additional tests or inspections as required by Departmental Representative to verify acceptability of corrected work.

1.3 CONTRACTOR'S RESPONSIBILITIES

.1 Provide labour, equipment and facilities to:

.1 Provide access, including boat access, to Work for inspection and testing.

.2 Facilitate inspections and tests.

.3 Make good Work disturbed by inspection and test.

.4 Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.

.2 Notify Departmental Representative 48 hours minimum sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.

.3 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.

.4 Pay costs for uncovering and making good Work that is covered before required inspection or testing is completed and approved by Departmental Representative.

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 ADMINISTRATIVE

.1 Schedule and administer project meetings throughout the progress of the work at the call of Departmental Representative.

.2 Prepare agenda for meetings.

.3 Distribute written notice of each meeting four days in advance of meeting date to Departmental Representative.

.4 Provide physical space and make arrangements for meetings.

.5 Preside at meetings.

.6 Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.

.7 Reproduce and distribute copies of minutes within three days after meetings and transmit to meeting participants and, affected parties not in attendance Departmental Representative.

.8 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

1.2 PRECONSTRUCTION MEETING

.1 Within 5 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.

.2 Departmental Representative, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.

.3 Establish time and location of meeting and notify parties concerned minimum 3 days before meeting.

.4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.

.5 Agenda to include:

.1 Appointment of official representative of participants in the Work.

.2 Schedule of Work: in accordance with Section 01 32 16.19 - Construction Progress Schedule - Bar (GANTT) Chart.

.3 Health and safety in accordance with Section 01 35 29.06.

.4 Work restrictions in accordance with Section 01 14 00 – Work Restrictions.

.5 Schedule of submission of shop drawings, and samples. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.

.6 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00 - Construction Facilities.

.7 Delivery schedule of specified equipment.

.8 Site security in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

.9 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.

.10 Record drawings in accordance with Section 01 33 00 - Submittal Procedures.

.11 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.

.12 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.

.13 Monthly progress claims, administrative procedures, photographs, hold backs.

.14 Appointment of inspection and testing agencies or firms.

.15 Insurances, transcript of policies.

1.3 PROGRESS MEETINGS

.1 During course of Work, schedule progress meetings every two (2) weeks.

.2 Attend additional scheduled meetings as required.

.3 Contractor, major Subcontractors involved in Work and Departmental Representative are to be in attendance.

.4 Notify parties minimum three (3) days prior to meetings.

.5 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within five (5) days after meeting.

.6 Provide written notification of change to meeting schedule established upon contract award twenty-four (24) hours prior to scheduled meeting.

.7 Agenda to include the following:

.1 Review, approval of minutes of previous meeting.

.2 Review of Work progress since previous meeting.

.3 Field observations, problems, conflicts.

.4 Problems which impede construction schedule.

.5 Review of off-site fabrication delivery schedules.

.6 Corrective measures and procedures to regain projected schedule.

.7 Revision to and update of construction schedule.

.8 Progress schedule, during succeeding work period.

.9 Review submittal schedules: expedite as required.

.10 Maintenance of quality standards.

.11 Review proposed changes for effect on construction schedule and on completion date.

.12 Quality control/quality assurance.

.13 Status of submittals.

.14 Environmental issues.

.15 Review of health and safety issues or concerns.

.16 Traffic issues.

.17 Other business.

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 Activity: element of Work performed during course of Project. Activity normally has expected duration and expected cost and expected resource requirements. Activities can be subdivided into tasks.

.2 Bar Chart (GANTT Chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally, Bar Chart should be derived from commercially available computerized project management system.

.3 Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.

.4 Construction Work Week: Monday to Friday, inclusive, will provide five (5) day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.

.5 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.

.6 Master Plan: summary-level schedule that identifies major activities and key milestones.

.7 Milestone: significant event in project, usually completion of major deliverable.

.8 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.

.9 Project Planning, Monitoring and Control System: overall system operated by Departmental Representative to enable monitoring of project work in relation to established milestones.

1.2 REQUIREMENTS

.1 Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.

.2 Plan to complete Work in accordance with prescribed milestones and time frame.

.3 Limit activity durations to maximum of approximately 10 working days, to allow for progress reporting.

.4 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

.5 Refer to Section 01 14 00 – Work Restrictions for scheduling of work restrictions.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit to Departmental Representative within 5 working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring, and reporting of project progress.

.3 Submit Project Schedule to Departmental Representative within 5 working days of receipt of acceptance of Master Plan.

1.4 MASTER PLAN

.1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).

.2 Departmental Representative will review and return revised schedules within 5 working days.

.3 Revise schedule when requested by the Departmental Representative and resubmit within 5 working days.

.4 Accepted revised schedule will become Master Plan and be used as baseline for updates.

1.5 PROJECT SCHEDULE

.1 Develop detailed Project Schedule derived from Master Plan.

.2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:

- .1 Award.
- .2 Shop Drawings, Samples.
- .3 Mobilization.
- .4 Environmental Measures
- .5 Navigation Controls
- .6 Road Closures
- .7 Timber Fender System:
  - .1 Site Measurements
  - .2 Delivery Schedule of Timber
  - .3 Reconstruction
- .8 Pier Rehabilitation:
  - .1 Site Measurements by Contractor
  - .2 Fabrication and Delivery Schedule of Joint Armouring
  - .3 Concrete Removals
  - .4 Concrete Pour
  - .5 Removal of Temporary Traffic Ramps

.9 Pile Jackets:
  .1 Site Measurements by Contractor to verify pile diameters
  .2 Fabrication and Delivery Schedule
  .3 Installation Schedule
.10 Timber Bracing Replacement
.11 Shimming
.12 Replacement of Bent 12
.13 Installation of Additional Stringer on East Approach Span
.14 Replacement of Vertical Truss Ladder
.15 Steel Repairs inside the Drum Girder
.16 Timber Repairs to Timber Cribbing
.17 Installation of Navigation Lights on Piers and Fender System
.18 Demobilization

1.6 PROJECT SCHEDULE REPORTING

.1 Update Project Schedule on weekly basis reflecting activity changes and completions, as well as activities in progress.

.2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays, and impact with possible mitigation.

1.7 PROJECT MEETINGS

.1 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.

.2 Weather related delays with their remedial measures will be discussed. The Contractor must anticipate normal to severe winter conditions.

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 ADMINISTRATIVE

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

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

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

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

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

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

.7 Verify field measurements and affected adjacent Work are coordinated.

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

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

.10 Keep one reviewed copy of each submission on site.

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(s) registered or licensed in the Province of Ontario, Canada.

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

.4 Allow 10 days for Departmental Representative's review of each submission.

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

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

.7 Accompany submissions with transmittal letter, containing:

- .1 Date.
- .2 Project title and number.
- .3 Contractor's name and address.
- .4 Identification and quantity of each shop drawing, product data and sample.
- .5 Other pertinent data.

.8 Submissions include:

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

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

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

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

.12 Submit electronic copies 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 electronic copies 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 electronic copies of manufacturer’s instructions for requirements requested in specification Sections and as requested by Departmental Representative.

.1 Pre-printed material describing installation of product, system or material, including special notices and Safety Data Sheets concerning impedances, hazards and safety precautions.

.15 Submit electronic copies 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 electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.

.18 Delete information not applicable to project.

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

.20 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 the Department Representative is for sole purpose of ascertaining conformance with general concept.

.1 This review shall not mean that the Departmental Representative approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.

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

1.3 SAMPLES

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

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

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

.4 Where colour, pattern or texture is criterion, submit full range of samples.

.5 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.

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

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

1.4 MOCK-UPS

.1 Erect mock-ups in accordance with 01 45 00 - Quality Control.

.2 Erect mock-ups at locations acceptable to Departmental Representative.

.3 Reviewed and accepted mock-ups will become standards of workmanship and material against which installed work will be verified.

1.5 CERTIFICATES AND TRANSCRIPTS

.1 Immediately after award of Contract, submit Workplace Safety and Insurance Board status.

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

1.6 FEES, PERMITS, AND CERTIFICATES

.1 Provide authorities having jurisdiction with information requested.

.2 Pay fees and obtain certificates and permits required.

.3 Furnish certificates and permits.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations

.2 Province of Ontario

.1 Occupational Health and Safety Act and Regulations for Construction Projects, R.S.O. 1990, c.0.1, as amended and O. Reg. 213/91 as amended]- Updated 2005.

.3 Canadian Construction Association, COVID-19 – Standardized Protocols for All Canadian Construction Sites – Version 4 – April 16, 2020

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:

.1 Results of site-specific safety hazard assessment.

.2 Results of safety and health risk or hazard analysis for site tasks and operation.

.3 COVID-19 worksite access policy

.3 Implement, maintain, and enforce Health and Safety Plan for entire duration of Work and until final demobilization from site.

.4 Submit one copy of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative weekly.

.5 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.

.6 Submit copies of incident and accident reports.

.7 Submit WHMIS Safety Data Sheets (SDS).

.8 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 5 days after receipt of comments from Departmental Representative.

.9 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.

.10 Submit revisions and updates made to the Plan during the course of the Work.

.11 Submit building permit, compliance certificates and other permits obtained.

.12 Submit copy of Clearance Certificate from Workplace Safety and Insurance Board:

.1 Submit update of Clearance Certificate whenever expiration date occurs during the period of Work.

.13 Medical Surveillance: where prescribed by legislation, regulation, or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Departmental Representative.

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

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

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

.17 Submit copies of incident, near miss and accident reports, and/or confirmation monthly that no incidents have occurred.

.18 Provide a fire safety plan specific to work location.

1.3 FILING OF NOTICE

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

.2 Contractor shall agree to install proper site separation and identification in order to maintain time and space at all times throughout life of project.

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 work near water and work in the vicinity of a swing bridge. WFN will operate the bridge every second hour on the odd hour between 07:00 AM and 9:00 PM daily (7 days a week). The winter shut down for the navigational opening of the channel is from November 27, 2020 to April 15, 2021.

.2 Known and obvious hazards include but are not limited to:

.1 Working with preservative treated timber.

.2 Mechanical systems.

.3 Rusted metals from structure.

.4 Working underwater.

.5 Work near water.

.6 Work near utilities, including overhead utilities.

.7 Work on the roadway.

.8 Working at heights.

.9 Heavy and moving equipment.

.10 High voltage cables

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.

.3 Relief from or substitution for any portion or provision of minimum Health and Safety standards specified herein or reviewed site-specific Health and Safety Plan shall be submitted to Departmental Representative in writing.

1.9 RESPONSIBILITY

.1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.

.2 Contractor will be responsible and assume the role Constructor as described in the Ontario Occupational Health and Safety Act and Regulations for Construction Projects.

.3 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 COMPLIANCE REQUIREMENTS

.1 Comply with Ontario Occupational Health and Safety Act, R.S.O. 1990, c. 0.1 and Ontario Regulations for Construction Projects, O. Reg. 213/91.

.2 Comply with Canada Labour Code – Part II (entitled Occupational Health and Safety) and the Canada Occupational Safety and Health Regulations as well as any other regulations made pursuant to the Act.

.1 The Canada Labour Code can be viewed at: www.http://laws-lois.justice.gc.ca/eng/acts/L-2 fulltext.html.

.2 Canadian Occupational Health and Safety Regulations can be viewed at: http://laws-lois. justice.gc.ca/eng/regulations/SOR-86-304/ index.html.

.3 A copy may be obtained at: Canadian Government Publishing Public Works & Government Services Canada Ottawa, Ontario, K1A 0S9 Tel: 819-956-4800 or 1-800-635-7943 Publication No. L31-85/2000 (E or F).

.3 Comply with the Canadian Construction Association – Covid-19 - Standardized Protocols for All Canadian Construction Sites

.1 The Standardized Protocol can be viewed at: https://www.cca-acc.com/wp-content/uploads/2020/04/CCA-COVID-19-Standardized-Protocols-for-All-Canadian-Construction-Sites-04-16-20.pdf

.4 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.

.5 Canadian Standards Association (CSA):

.1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.

.6 In case of conflict or discrepancy between above specified requirements, the more stringent is to apply.

.7 Maintain Workers Compensation Coverage in good standing for duration of Contract. Provide proof of clearance through submission of Letter in Good Standing

1.11 UNFORSEEN HAZARDS

.1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Ontario having jurisdiction and advise Departmental Representative verbally and in writing.

1.12 TRAINING

.1 Use only skilled workers on Work Site who are effectively trained in occupational health and safety procedures and practices pertinent to their assigned task.

.2 Maintain employee records and evidence of training received. Make data available to Departmental Representative upon request.

1.13 MINIMUM SITE SAFETY RULES

.1 Notwithstanding requirement to abide by federal and provincial health and safety regulations; ensure the following minimum safety rules are obeyed by persons granted access to Work Site:

.1 Wear appropriate PPE pertinent to the Work or assigned task; minimum being hard hat, safety footwear, safety glasses and hearing protection.

.2 Immediately report unsafe condition at site, near-miss accident, injury, and damage.

.3 Maintain site and storage areas in a tidy condition free of hazards causing injury.

.4 Obey warning signs and safety tags.

.2 Brief persons of disciplinary protocols to be taken for non-compliance.

1.14 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 Ontario having jurisdiction, and in consultation with Departmental Representative.

.2 Post other documents as specified herein, including:

.1 Contractor's Safety Policy.

.2 Contractor's Name.

.3 Notice of Project.

.4 Name, trade, and employer of Health and Safety Representative or Joint Health and Safety Committee members (if applicable).

.5 Ministry of Labour Orders and reports.

.6 Occupational Health and Safety Act and Regulations for 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 Copy of valid certificate of first aider on duty.

.12 WSIB “In Case of Injury at Work” poster

.13 Location of toilet and cleanup facilities.

.14 Any special handling or procedures specific to the site.

1.15 CORRECTION OF NON-COMPLIANCE

.1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.

.2 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.

.3 Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

1.16 BLASTING

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

1.17 HAZARDOUS PRODUCTS

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS).

.2 Keep SDS data sheet for all products delivered to site.

.1 Post on site.

.2 Submit copy to Departmental Representative.

1.18 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.

1.19 SITE RECORDS

.1 Maintain on Work Site copy of safety related documentation and reports stipulated to be produced in compliance with Acts and Regulations of authorities having jurisdiction and of those documents specified herein.

.2 Upon request, make available to Departmental Representative or authorized Safety Officer for inspection.

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 REFERENCE STANDARDS

.1 Canadian Society of Landscape Architects (CSLA) / Canadian Nursery Landscape Association (CNLA)

.1 Canadian Landscape Standard 2016, First Edition

.2 Canadian Nursery Stock Standard 2017, Ninth Edition

.2 United States Environmental Protection Agency (EPA), Office of Water

.1 EPA-833-R-06-004, Developing Your Stormwater Pollution Prevention Plan: A Guide for Construction Sites

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish, and limitations.

.2 Submit WHMIS Safety Data Sheets (SDS).

.3 Submit Environmental Protection Plan (EPP) for review and approval by Departmental Representative before delivering materials to site or commencing construction activities.

.4 EPP shall include comprehensive overview of known or potential environmental issues to be addressed on site during construction.

.5 Address topics at level of detail commensurate with environmental issue and required construction tasks.

.6 Include in Environmental Protection Plan (EPP):

.1 Name(s) of person(s) responsible for ensuring adherence to EPP.

.2 Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from site.

.3 Name(s) and qualifications of person(s) responsible for training site personnel.

.4 Descriptions of environmental protection personnel training program.

.5 Site-specific Erosion and Sediment Control Plan (ESCP) identifying the type and location of erosion and sediment control measures to be provided on site. Include monitoring and reporting requirements to ensure that ESC control measures are in compliance with erosion and sediment control plan, Federal and Provincial regulations, and Municipal by-laws.

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

.7 Submit a site-specific Traffic Control Plan (TCP) including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather.

.1 TCP to include measures to minimize amount of material transported onto paved public roads by vehicles or runoff.

.8 Submit a Site Work Plan (SWP) showing work areas for proposed activities in each portion of area and identifying areas of limited use or non-use.

.1 SWP to include measures for marking limits of use areas and methods for protection of features to be preserved within authorized work areas.

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

.10 Submit a Solid Waste Disposal Plan (SWDP) for non-hazardous solid wastes identifying methods and locations for solid waste disposal including clearing debris.

.11 Submit an Air Pollution Control Plan (APCP) detailing provisions to ensure that dust, debris, materials, and trash, are contained within the project site.

1.4 FIRES

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

1.5 DRAINAGE

.1 Ensure that the ESCP measures are provided and that its recommendations are followed on site, in accordance with the site-specific SPPP, at all times during construction.

.2 Provide temporary drainage and pumping as required to keep excavations on site free of standing water.

.1 Obtain Departmental Representative approval before pumping standing water, which is free of suspended materials, into waterways, sewer, or drainage systems.

.2 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with the site-specific SPPP in compliance with the requirements of authorities having jurisdiction.

1.6 SITE CLEARING AND PLANT PROTECTION

.1 Protect trees and plants on site and adjacent properties as indicated.

.2 Protect trees and shrubs adjacent to construction work, storage areas as indicated.

.3 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage.

.1 Avoid unnecessary traffic, dumping and storage of materials over root zones.

.4 Minimize stripping of topsoil and vegetation.

.5 Restrict tree removal to areas designated by Departmental Representative. Obtain permits before trees removal in accordance with the requirements of the authorities having jurisdiction.

1.7 WORK ADJACENT TO WATERWAYS

.1 Install sediment fences and erosion control structures prior to any work adjacent to waterways.

.2 The Contractor shall employ appropriate sediment retention methods to ensure no sediment is discharged into the watercourse. Turbidity barriers and floating booms shall be located as shown on the Erosion Sediment Control Plan provided by the Contractor. The Contractor is responsible for the design of the turbidity barriers.

.3 Do not use waterway beds for borrow material.

.4 Keep waterways free of excavated fill, waste material and debris.

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

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

1.8 POLLUTION CONTROL

.1 Maintain temporary erosion and pollution control features installed under this Contract in accordance with site-specific SPPP.

.2 Control emissions from equipment and plant in accordance with local authorities' emission requirements. Check with local authorities for any environmental compliance requirements.

.3 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area.

.1 Provide temporary enclosures where indicated Departmental Representative.

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

1.9 NOISE CONTROL

.1 Minimize the noise levels from construction activities by using proper muffling devices, in addition to appropriate timing and location of these activities to reduce or minimize the effects of noise on nearby residents, recreationists, and wildlife.

1.10 SPILL CONTAINMENT

.1 The Contractor shall have a spill containment kit on site and available at all times.

.2 During all operations, such as refueling, the operations shall be completed within a secondary containment system capable of preventing release of spills or leaks into the environment.

1.11 NOTIFICATION

.1 Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial environmental laws and regulations or Municipal environmental bylaws, permits, and other elements of site-specific plans.

.2 Contractor after receipt of such notice, shall inform Departmental Representative of proposed corrective action and take such action to obtain the approval of Departmental Representative.

.1 Take action only after receipt of written approval by Departmental Representative.

.3 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.

.4 No time extensions granted, or equitable adjustments allowed to Contractor for such suspensions.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

1.1 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.

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

.2 Bury rubbish and waste materials on site is nor permitted unless approved in writing by Departmental Representative.

.3 Ensure public waterways remain free of waste and volatile materials disposal.

.4 Proceed with final cleaning upon completion and removal of surplus materials, rubbish, tools, and equipment in accordance with Section 01 74 00 - Cleaning.

.5 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

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

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 This Section references to laws, by laws, ordinances, rules, regulations, codes, orders of Authority Having Jurisdiction, and other legally enforceable requirements applicable to Work and that are; or become, in force during performance of Work.

1.2 REFERENCES TO REGULATORY REQUIREMENTS

.1 CSA S6-19, Canadian Highway Bridge Design Code.

.2 CSA S6.1:19, Commentary on CSA S6:19, Canadian Highway Bridge Design Code.

.3 Meet or exceed requirements of:

.1 Contract documents.

.2 Specified standards, codes and referenced documents.

1.3 HAZARDOUS MATERIAL DISCOVERY

.1 The contractor is advised that the existing timber in the approach timber trestles is preservative treated and the Contractor shall implement all applicable safe work practices associated with the Work specified on the Contract Drawings and in the Contract Documents.

.2 Stop work immediately and notify Departmental Representative if materials which may contain designated substances or PCB's (other than the preservative treated timber), are discovered in course of work.

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 INSPECTION

.1 Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.

.2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative instructions, or law of Place of Work.

.3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections, or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.

.4 Departmental Representative will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Departmental Representative will pay cost of examination and replacement.

1.2 INDEPENDENT INSPECTION AGENCIES

.1 Independent Inspection/Testing Agencies will be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Departmental Representative.

.2 Provide equipment required for executing inspection and testing by appointed agencies.

.3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.

.4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Departmental Representative. Pay costs for retesting and reinspection.

1.3 ACCESS TO WORK

.1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.

.2 Co-operate to provide reasonable facilities for such access.

1.4 PROCEDURES

.1 Notify appropriate agency and Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.

.2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.

.3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.5 REJECTED WORK

.1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

.2 Make good other Contractor's work damaged by such removals or replacements promptly.

.3 If in opinion of Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Departmental Representative will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Departmental Representative.

1.6 REPORTS

.1 Submit 1 electronic copy of inspection and test reports to Departmental Representative.

.2 Provide copies to subcontractor of work being inspected or tested, manufacturer or fabricator of material being inspected or tested.

1.7 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as requested.

.2 Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work will be appraised by Departmental Representative and may be authorized as recoverable.

1.8 MOCK-UPS

.1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.

.2 Construct in locations acceptable to Departmental Representative.

.3 Prepare mock-ups for Departmental Representative review with reasonable promptness and in orderly sequence, to not cause delays in Work.

.4 Failure to prepare mock-ups 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.

.5 If requested, Departmental Representative will assist in preparing schedule fixing dates for preparation.

.6 Remove mock-up at conclusion of Work or when acceptable to Departmental Representative.

1.9 MILL TESTS

.1 Submit mill test certificates as required of specification Sections.

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 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

1.2 INSTALLATION AND REMOVAL

.1 Provide temporary utilities controls in order to execute work expeditiously.

.2 Remove from site all such work after use.

1.3 WATER SUPPLY

.1 Provide continuous supply of potable water for construction use.

.2 Arrange for connection with appropriate utility company and pay costs for installation, maintenance, and removal.

.3 Pay for utility charges at prevailing rates, based on General Conditions of Contract.

1.4 TEMPORARY HEATING AND VENTILATION

.1 Provide temporary heating required during construction period, including attendance, maintenance, and fuel.

.2 Construction heaters used inside building must be vented to outside or be flameless (vent free) type. Solid fuel salamanders are not permitted.

.3 Provide temporary heat and ventilation in enclosed areas as required to:

- .1 Facilitate progress of Work.
- .2 Protect Work and products against dampness and cold.
- .3 Prevent moisture condensation on surfaces.
- .4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
- .5 Provide adequate ventilation to meet health regulations for safe working environment.

.4 Ventilating:

- .1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
- .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
- .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
- .4 Ventilate storage spaces containing hazardous or volatile materials.
- .5 Ventilate temporary sanitary facilities.
- .6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.

.5 Maintain strict supervision of operation of temporary heating and ventilating equipment to:

.1 Conform with applicable codes and standards.

.2 Enforce safe practices.

.3 Prevent abuse of services.

.4 Prevent damage to finishes.

.5 Vent direct-fired combustion units to outside.

.6 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.5 TEMPORARY POWER AND LIGHT

.1 Provide and pay for temporary power during construction for temporary lighting and operating of power tools, to a maximum supply of 230 volts 30 amps.

.2 Arrange for connection with appropriate utility company. Pay costs for installation, maintenance, and removal.

.3 Temporary power for electric cranes and other equipment is responsibility of Contractor based on General Conditions of Contract.

.4 Provide and maintain temporary lighting throughout project.

.5 Electrical power and lighting systems installed under this Contract may be used for construction requirements only with prior approval of Departmental Representative provided that guarantees are not affected.

.1 Repair damage to electrical system caused by use under this Contract.

.2 Replace lamps which have been used for more than 3 months.

1.6 TEMPORARY COMMUNICATION FACILITIES

.1 Provide and pay for temporary telephone, fax, and data hook up, lines and equipment necessary for own use and use of Departmental Representative.

1.7 FIRE PROTECTION

.1 Provide and maintain temporary fire protection equipment during performance of Work required by insurance companies having jurisdiction, governing codes, regulations, and bylaws.

.2 Burning rubbish and construction waste materials is not permitted on Site.

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 REFERENCE STANDARDS

.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.189-00, Exterior Alkyd Primer for Wood.

.2 CGSB-1.59-97, Alkyd Exterior Gloss Enamel.

.2 Canadian Standards Association Group (CSA)

.1 CSA A23.1:19/CSA A23.2:19, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CSA-0121-17, Douglas Fir Plywood.

.3 CAN/CSA-Z797-18, Code of Practice for Access Scaffold

.4 CAN/CSA-Z321-96(R2006), Signs and Symbols for the Occupational Environment.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

1.3 INSTALLATION AND REMOVAL

.1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.

.2 Identify areas which have to be gravelled to prevent tracking of mud.

.3 Indicate use of supplemental or other staging area.

.4 Provide construction facilities in order to execute work expeditiously.

.5 Remove from site all such work after use.

1.4 SCAFFOLDING

.1 Scaffolding in accordance with CAN/CSA-Z797.

.2 Provide and maintain scaffolding, ladders, platforms, and temporary stairs.

1.5 HOISTING

.1 If the Contractor requires the use of hoists, cranes, or barges to complete the work indicated in the Contract Documents, the following requirements shall be met:

.1 Provide, operate, and maintain hoists, cranes, and barges required for moving of workers, materials, and equipment. Make financial arrangements with Subcontractors for their use of hoists.

.2 Hoists, cranes, and barges to be operated by qualified operator.

1.6 SITE STORAGE/LOADING

.1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.

.2 Do not load or permit to load any part of Work with weight or force that will endanger Work.

1.7 CONSTRUCTION PARKING

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

.2 Provide and maintain adequate access to project site.

.3 If authorized to use existing roads for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractors' use of roads.

1.8 OFFICES

.1 Provide office heated to 22 degrees C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.

.2 Provide marked and fully stocked first-aid case in a readily available location.

.3 Subcontractors to provide their own offices as necessary.

.4 Departmental Representative's Site office.

.1 Provide temporary office for Departmental Representative.

.2 Inside dimensions minimum 3.6 m long x 3 m wide x 2.4 m high, with floor 0.3 m above grade, complete with 4 50% opening windows and one lockable door.

.3 Insulate building and provide heating system to maintain 22 degrees C inside temperature at -20 degrees C outside temperature.

.4 Finish inside walls and ceiling with plywood, hardboard or wallboard and paint in selected colours. Finish floor with 19 mm thick plywood.

.5 Install electrical lighting system to provide min 750 lx using surface mounted, shielded commercial fixtures with 10 % upward light component.

.6 Provide private washroom facilities adjacent to office complete with flush or chemical type toilet, lavatory and mirror and maintain supply of paper towels and toilet tissue.

.7 Equip office with 1 x 2 m table, 4 chairs, 6 m of shelving 300 mm wide, one 3 drawer filing cabinet, one plan rack and one coat rack and shelf.

.8 Maintain in clean condition.

1.9 EQUIPMENT, TOOL AND MATERIALS STORAGE

.1 Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.

.2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

1.10 SANITARY FACILITIES

.1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.

.2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.11 CONSTRUCTION SIGNAGE

.1 Provide and erect project sign, within two (2) weeks of signing Contract, in a location designated by Departmental Representative.

.2 Construction sign 1200 x 2400mm, of wood frame and plywood construction painted with exhibit lettering produced by a professional sign painter.

.3 Indicate on sign, project title, project completion date, WFN and Contractor.

.4 No other signs or advertisements, other than warning signs, are permitted on site.

.5 Provide project identification site sign comprising, framing, and two 1200 x 2400 mm signboards as detailed and as described below.

- .1 Framework and battens: SPF, pressure treated minimum 89 x 89 mm.
- .2 Signboard: 19 mm Medium Density Overlaid Douglas Fir Plywood to CSA O121.
- .3 Paint: alkyd enamel to CAN/CGSB-1.59 over exterior alkyd primer to CAN/CGSB-1.189.
- .4 Fasteners: hot-dip galvanized steel nails and carriage bolts.
- .5 Vinyl sign face: printed project identification, self-adhesive, vinyl film overlay.

.6 Locate project identification sign as directed by Departmental Representative.

.7 Direct requests for approval to erect Consultant/Contractor signboard to Departmental Representative. For consideration general appearance of Consultant/Contractor signboard must conform to project identification site sign. Wording in both official languages.

.8 Signs and notices for safety and instruction in both official languages. Graphic symbols to CAN/CSA-Z321.

.9 Maintain approved signs and notices in good condition for duration of project and dispose of off-site on completion of project or earlier if directed by Departmental Representative.

1.12 PROTECTION AND MAINTENANCE OF TRAFFIC

.1 Provide access and temporary relocated roads as necessary to maintain traffic.

.2 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Departmental Representative.

.3 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs

.4 Protect travelling public from damage to person and property.

.5 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.

.6 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.

.7 Construct access and haul roads necessary.

.8 Haul roads: constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided.

.9 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.

.10 Dust control: adequate to ensure safe operation at all times.

.11 Location, grade, width, and alignment of construction and hauling roads: subject to approval by Departmental Representative.

.12 Lighting: to assure full and clear visibility for full width of haul road and work areas during night work operations.

.13 Provide snow removal during period of work.

.14 Remove, upon completion of work, haul roads designated by Departmental Representative.

1.13 CLEAN-UP

.1 Remove construction debris, waste materials, packaging material from work site daily.

.2 Clean dirt or mud tracked onto paved or surfaced roadways.

.3 Store materials resulting from demolition activities that are salvageable.

.4 Stack stored new or salvaged material.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to sediment and erosion control plan, specific to site, that complies with requirements of authorities having jurisdiction, whichever is more stringent.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 Ministry of Transportation, Ontario (MTO)

.1 Ontario Traffic Manual, Book 7: Temporary Conditions - 14.

.2 Province of Ontario

.1 Accessibility for Ontarians with Disabilities Act.

1.2 DESCRIPTION OF WORK

.1 The Contractor shall provide traffic control persons, signs, temporary traffic signs with platforms, TC-54 barrels, barricades and all other required traffic control devices on the Wasauksing Swing Bridge, Rose Point Road, all other surrounding roads, waterways, and in all areas affected by the construction (pathways, sidewalks, parking lots and along the waterway) and as required to complete the work.

.2 The Contractor shall provide all requirements to carry out construction traffic control in accordance with OTM and OHSA.

.3 The Contractor shall provide traffic control persons, blocker trucks, and crash trucks, as required. The Contractor shall provide and maintain signs and barricades as required by Book 7 (Temporary Conditions) of the Ontario Traffic Manual (OTM) and as directed by the Departmental Representative.

.4 Supply of a mechanical sweeper to remove dirt or debris from the areas of the roadway which will be open to traffic as required based on the Contractor's construction procedures.

.5 Remove, salvage, and reinstate permanent signs if required to facilitate the work.

1.3 ACTION AND INFORMATION SUBMITTALS

.1 Submittals in accordance with Section 01 33 00.

.2 The Contractor shall prepare Traffic Control Plan (TCP) for vehicles, cyclists, and pedestrians in accordance with MTO OTM's. The TCP to be signed and sealed by a Professional Engineer, registered or licensed in the Province of Ontario.

.3 The Contractor shall have a copy of the location specific, traffic control plan for the protection of workers and the public on site at all times, as per the Ministry of Labour regulations.

.4 Submit TCP to Departmental Representative ten (10) days in advance of proposed changes to traffic management.

.5 Do not commence any works until Departmental Representative has reviewed and approved the TCP.

.6 Departmental Representative will accept submission of TCP and review it to identify errors, omissions, or improvements as it relates to maintaining public safety and mobility.

.1 Review of TCP by Departmental Representative makes no representation that document is accurate, complete, or compliant with applicable legislation. Errors, omissions, or deficiencies within TCP remain sole responsibility of Contractor. The Contractor shall have no claim for delay of the project or costs incurred as a result of an incomplete application.

.2 Address all comments and resubmit TCP.

.7 Review and modify TCP for errors, omissions, deficiencies, or new hazards and revise and resubmit TCP.

.8 Detail specific traffic control layout necessary for completion of work including vehicular, pedestrian and cyclist movement, required to allow Contractor to fulfill conditions of Contract taking into account organized, systematic safe conduct of the project and to meet Contract requirements. This includes, as applicable, detours, advanced project signs, staging sequences, work, public and emergency vehicles access and egress, public access and separation from hazardous areas, temporary barriers and fences, removal of existing pavement markings and selection of appropriate typical layouts and devices for traffic control.

.9 TCP to include, and not necessarily be limited to:

.1 Monitoring and repair.

.2 Traffic control signs (regulatory, warning, and temporary).

.3 Traffic control delineation.

.4 Traffic control vehicles.

.5 Portable Variable Message Signs (PVMS).

.6 Contract specific work restrictions including operational constraints.

.7 Lane closures and detours.

.8 Nighttime requirements.

.9 Traffic staging and scheduling.

.10 Construction vehicle access and egress.

.11 Public access and egress.

.12 Pedestrian, cyclist, and vehicular safety including barriers, temporary concrete barriers and barricades.

.13 Emergency Vehicle Access.

.14 Removal of existing and provision of temporary pavement markings.

.15 Any other traffic control measures.

1.4 PROTECTION OF PUBLIC TRAFFIC

.1 Comply with requirements of Acts, Regulations and By-Laws in force for regulation of traffic or use of roadways upon or over which it is necessary to carry out Work or haul materials or equipment.

.2 When working on travelled way:

.1 Place equipment in position to minimize interference and hazard to travelling public.

.2 Keep equipment units as close together as working conditions permit and preferably on same side of travelled way.

.3 Do not leave equipment on travelled way overnight.

.3 Keep travelled way graded, free from potholes and of sufficient width for required number of lanes of traffic.

.1 Provide minimum traffic lane widths as indicated.

.4 Provide and maintain road access and egress to property fronting along Work under Contract and in other areas as indicated, except where other means of road access exist that meet approval of Departmental Representative.

1.5 INFORMATIONAL AND WARNING DEVICES

.1 Provide and maintain signs, flashing warning lights and other devices required to indicate construction activities or other temporary and unusual conditions resulting from Project Work which requires road user response.

.2 Supply and erect signs, delineators, barricades, and miscellaneous warning devices in accordance with TCP.

.3 Meet with Departmental Representative prior to commencement of Work to prepare list of signs and other devices required for project.

.4 Incorporate requirements into TCP. If the situation on site changes, revise and resubmit TCP to Departmental Representative.

.5 Supply and erect a Portable Variable Messaging Sign (PVMS) at each end of the crossing during and two weeks prior to the night closures.

.1 Coordinate message to display with Departmental Representative.

.6 Navigable Water:

.1 Signs stating “Bridge Construction Ahead Channel Closed – Do Not Enter” and “Attention – Pont en Construction. Chenal Ferme – Defense d’Entrer” shall be placed and maintained approximately 300 m upstream and 300 m downstream of the work. The size of the signs should be 1.2 m high by 2.4 m wide.

.2 The navigational openings shown on the Contract drawings must remain open and clear at all times during Construction.

.3 Any temporary works(s) that are on, over or across the waterway shall, during all periods of reduced visibility, be marked with yellow flashing lights located on each end of the work(s) and on other locations on the works so that the lights are spaced not more than 30 m apart.

.4 The Contractor must notify the Canadian Coast Guard Vessel Traffic Centre Noteship desk at 613-925-0666 at least 48 hours in advance of any event that may result in the bridge not being fully operational, and again once the bridge has returned to full operating condition. The Contractor must provide the Departmental Representative of proof that this requirement has been fulfilled.

.7 Continually maintain traffic control devices in use:

.1 Check signs daily for legibility, damage, suitability, and location. Clean, repair or replace to ensure clarity and reflectance.

.2 Remove or cover signs which do not apply to conditions existing from day to day.

1.6 CONTROL OF PUBLIC TRAFFIC

.1 Provide competent flag personnel, trained in accordance with, and properly equipped to Ontario Traffic Manual, Book 7: Temporary Conditions for situations as follows:

.1 When public traffic is required to pass working vehicles or equipment that block all or part of travelled roadway.

.2 When it is necessary to institute one-way traffic system through construction area or other blockage where traffic volumes are heavy, approach speeds are high and traffic signal system is not in use.

.3 Where temporary protection is required while other traffic control devices are being erected or taken down.

.4 For emergency protection when other traffic control devices are not readily available.

.5 In situations where complete protection for workers, working equipment and public traffic is not provided by other traffic control devices.

.2 Signage shall be erected 5 days in advance of any planned night closures of the bridge.

1.7 OPERATIONAL REQUIREMENTS

.1 Maintain existing conditions for traffic throughout period of contract except that, when required for construction under contract and when measures have been taken in accordance with the TCP and as specified and approved by Departmental Representative to protect and control public traffic.

.2 Contractor must maintain access for emergency vehicles to cross the bridge at all times.

Part 2 Products

2.1 SIGNAGE

.1 Provide signs for traffic control (including platforms), information, instruction, use of equipment, public safety, etc. in both official languages or by use of commonly understood graphic symbols.

.2 Do not erect advertising signage.

Part 3 Execution

3.1 GENERAL

3.2 The Contractor shall independently verify all traffic requirements indicated in the Contract Documents, such that they comply with OTM Book 7. The Contractor shall be responsible for all requirements in accordance with OTM Book 7, regardless of whether or not they are indicated in the Contract Documents.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.59-97, Alkyd Exterior Gloss Enamel.

.2 CAN/CGSB-1.189-00, Exterior Alkyd Primer for Wood.

.2 CSA Group (CSA)

.1 CSA-O121-17, Douglas Fir Plywood.

1.2 INSTALLATION AND REMOVAL

.1 Provide temporary controls in order to execute Work expeditiously.

.2 Remove from site all such work after use.

1.3 GUARD RAILS AND BARRICADES

.1 Provide secure, rigid guard rails and barricades around work areas such as, but not limited to, deep excavations, open shafts, open stair wells, open edges of floors and roofs, openings due to removal of existing railings/barrier walls, working near the swing span when it is in its open position, and so on.

.2 Provide as required by governing authorities.

1.4 DUST TIGHT SCREENS

.1 Provide dust tight screens or insulated partitions to localize dust generating activities, and for protection of workers, finished areas of Work and public.

.2 Maintain and relocate protection until such work is complete.

1.5 ACCESS TO SITE

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

1.6 PUBLIC TRAFFIC FLOW

.1 Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect public.

1.7 FIRE ROUTES

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

1.8 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

.1 Protect surrounding private and public property from damage during performance of Work.

.2 Be responsible for damage incurred.

1.9 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

.1 Protect surrounding private and public property from damage during performance of Work.

.2 The Contractor shall be responsible for damage incurred.

1.10 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 – Waste Management and Disposal.

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 REFERENCE STANDARDS

.1 Within text of each specifications section, reference may be made to reference standards.

.2 Conform to these reference standards, in whole or in part as specifically requested in specifications.

.3 If there is question as to whether products or systems are in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.

.4 Cost for such testing will be borne by Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.

.5 Conform to latest date of issue of referenced standards in effect on date of submission of Bids, except where specific date or issue is specifically noted.

.6 Ministry of Transportation Ontario (MTO)

.1 Ontario Provincial Standards for Roads & Public Works is available online at http://www.raqsb.mto.gov.on.ca/techpubs/ops.nsf/opshomepage.

.1 The Ontario Provincial Standards include both specifications and drawings.

.2 MTO Designated Source Material List (DSM) is available online at http://www.roadauthority.com/mpl/mpl.asp?MPIShortName=MTO%20DSM

1.2 QUALITY

.1 Products, materials, equipment, and articles incorporated in Work shall be new, not damaged, or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.

.2 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.

.3 Should disputes arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.

.4 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.

.5 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.3 AVAILABILITY

.1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

.2 In event of failure to notify Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Amount or Contract Time.

1.4 METRIC SIZED MATERIALS

.1 SI metric units of measurement are used exclusively on the drawings and in the specifications for this project, with the exception of structural bolts where imperial units are used.

.2 The Contractor is required to provide metric products in the sizes called for in the Contract Documents except where a valid claim can be made that a particular product is not available on the Canadian market.

.3 Claims for exemptions from use of metric sized products to be in writing and fully substantiated with supportive documentation. Promptly submit application to Departmental Representative for consideration and ruling. Non-metric sized products may not be used unless Contractor's application has been approved in writing by the Departmental Representative.

.4 Difficulties caused by the Contractor's lack of planning and effort to obtain modular metric sized products which are available on the Canadian market will not be considered sufficient reasons for claiming that they cannot be provided.

.5 Claims for additional costs due to provision of specified modular metric sized products will not be considered.

1.5 STORAGE, HANDLING AND PROTECTION

.1 Handle and store products in manner to prevent damage, adulteration, deterioration, and soiling and in accordance with manufacturer's instructions when applicable.

.2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.

.3 Store products subject to damage from weather in weatherproof enclosures.

.4 Store cementitious products clear of earth or concrete floors, and away from walls.

.5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.

.6 Store sheet materials, and lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.

.7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.

.8 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.

.9 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.6 TRANSPORTATION

.1 Pay costs of transportation of products required in performance of Work.

1.7 MANUFACTURER'S INSTRUCTIONS

.1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.

.2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative will establish course of action.

.3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Amount or Contract Time.

1.8 QUALITY OF WORK

.1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.

.2 Do not employ anyone unskilled in their required duties. Departmental Representative reserves right to require dismissal from site, workers deemed incompetent or careless.

.3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative, whose decision is final.

1.9 CO-ORDINATION

.1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.

.2 Be responsible for coordination and placement of openings, sleeves, and accessories.

1.10 CONCEALMENT

.1 In finished areas conceal pipes, ducts and wiring in floors, walls, and ceilings, except where indicated otherwise.

.2 Before installation inform Departmental Representative if there is interference. Install as directed by Departmental Representative.

1.11 REMEDIAL WORK

.1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.

.2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.12 LOCATION OF FIXTURES

.1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.

.2 Inform Departmental Representative of conflicting installation. Install as directed.

1.13 FASTENINGS

.1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.

.2 Prevent electrolytic action between dissimilar metals and materials.

.3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.

.4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.

.5 Keep exposed fastenings to a minimum, space evenly and install neatly.

.6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.14 FASTENINGS - EQUIPMENT

.1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.

.2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel for exterior areas.

.3 Bolts may not project more than one diameter beyond nuts.

.4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

1.15 PROTECTION OF WORK IN PROGRESS

.1 Prevent overloading of parts of building. Do not cut, drill, or sleeve load bearing structural member, unless specifically indicated without written approval of Departmental Representative.

1.16 EXISTING UTILITIES

.1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, and pedestrian and vehicular traffic.

.2 Protect, relocate, or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

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 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by other Contractors.

.2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.

.3 Clear snow and ice from access to bridge site, including on the bridge, bank/pile snow in designated areas only or remove from site.

.4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.5 Provide on-site containers for collection of waste materials and debris.

.6 Provide and use marked separate bins for recycling. Refer to Section 01 74 19 - Waste Management and Disposal.

.7 Dispose of waste materials and debris off site.

.8 Store volatile waste in covered metal containers and remove from premises at end of each working day.

.9 Provide adequate ventilation during use of volatile or noxious substances.

.10 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

1.2 FINAL CLEANING

.1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.

.2 Remove waste products and debris other than that caused by others and leave Work clean and suitable for occupancy.

.3 Prior to final review remove surplus products, tools, construction machinery and equipment.

.4 Remove waste products and debris including that caused by other Contractors.

.5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved by Departmental Representative.

.6 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.7 Remove stains, spots, marks and dirt from electrical and mechanical fixtures, and exterior areas of the bridge.

.8 Clean lighting reflectors, lenses, and other lighting surfaces.

.9 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.

.10 Broom clean and wash exterior walks, steps, and surfaces; rake clean other surfaces of grounds.

.11 Remove dirt and other disfiguration from exterior surfaces.

.12 Sweep and wash clean paved areas.

.13 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.

.14 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.

.15 Remove snow and ice from access to building.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

.5 Non toxic: Not poisonous to humans either immediately or after a long period of exposure.

.6 Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.

.7 Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.

.8 Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form; recycling does not include burning, incinerating, or thermally destroying waste.

.9 Return: To give back reusable items or unused products to vendors for credit.

.10 Reuse: To reuse a construction waste material in some manner on the project site.

.11 Salvage: To remove a waste material from the project site to another site for resale or reuse by others.

.12 Sediment: Soil and other debris that has been eroded and transported by storm or well production run off water.

.13 Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

.14 Toxic: Poisonous to humans either immediately or after a long period of exposure.

.15 Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

.16 Volatile Organic Compounds (VOC's): Chemical compounds common in and emitted by many building products over time through outgassing:

.1 Solvents in paints and other coatings;

.2 Wood preservatives; strippers and household cleaners;

.3 Adhesives in particleboard, fiberboard, and some plywood; and foam insulation.

.4 When released, VOC's can contribute to the formation of smog and can cause respiratory tract problems, headaches, eye irritations, nausea, damage to the liver, kidneys, and central nervous system, and possibly cancer.

.17 Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

.18 Construction Waste Management Plan: A project related plan for the collection, transportation, and disposal of the waste generated at the construction site; the purpose of the plan is to ultimately reduce the amount of material being landfilled.

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate waste management requirements with all Divisions of the Work for the project, and ensure that requirements of the Construction Waste Management Plan are followed.

.2 Preconstruction Meeting: Arrange a pre-construction meeting in accordance with Section 01 31 19 - Project Meetings before starting any Work of the Contract attended by the Contractor, affected Subcontractor's and Departmental Representative to discuss the Contractor's Construction Waste Management Plan and to develop mutual understanding of the requirements for a consistent policy towards waste reduction and recycling.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide required information in accordance with Section 01 33 00 - Submittal Procedures.

.2 Action Submittals: Provide the following submittals before starting any work of this Section:

.1 Draft Construction Waste Management Plan (Draft CWM Plan): Submit to Departmental Representative a preliminary analysis of anticipated site generated waste by listing a minimum of five (5) construction or demolition waste streams that have potential to generate the most volume of material indicating methods that will be used to divert construction waste from landfill and source reduction strategies; Departmental Representative will provide commentary before development of Contractor's Construction Waste Management Plan.

.2 Construction Waste Management Plan (CWM Plan): Submit a CWM Plan for this project prior to any waste removal from site and that includes the following information:

.1 Material Streams: Analysis of the proposed jobsite waste being generated, including material types and quantities forming a part of identified material streams in the Draft CWM Plan; materials removed from site destined for alternative daily cover at landfill sites and land clearing debris cannot be considered as contributing to waste diversion and will be included as a component of the total waste generated for the site.

.2 Recycling Haulers and Markets: Investigate local haulers and markets for recyclable materials, and incorporate into CWM Plan.

.3 Alternative Waste Disposal: Prepare a listing of each material proposed to be salvaged, reused, recycled or composted during the course of the project, and the proposed local market for each material.

.4 Landfill Materials: Identify materials that cannot be recycled, reused or composted and provide explanation or justification; energy will be considered as a viable alternative diversion strategy for these materials where facilities exist.

.5 Landfill Options: The name of the landfill where trash will be disposed of; landfill materials will form a part of the total waste generated by the project.

.6 Materials Handling Procedures: A description of the means by which any recycled waste materials will be protected from contamination, and a description of the means to be employed in recycling the above materials consistent with requirements for acceptance by designated facilities.

.7 Transportation: A description of the means of transportation of the recyclable materials, whether materials will be site separated and self hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site, and destination of materials.

1.7 PROJECT CLOSEOUT SUBMISSIONS

.1 Record Documentation: Submit as constructed information in accordance with Section 01 78 00 - Closeout Submittals as follows:

.1 Construction Waste Management Report (CWM Report): Submit a CWM Report for this project in a format acceptable to submittal requirements and that includes the following information:

.1 Accounting: Submit information indicating total waste produced by the project.

.2 Composition: Submit information indicating types of waste material and quantity of each material.

.3 Diversion Rate: Submit information indicating total waste diverted from landfill as a percentage of the total waste produced by the project.

1.8 QUALITY ASSURANCE

.1 Resources for Development of Construction Waste Management Report (CWM Report): The following sources may be useful in developing the Draft Construction Waste Management Plan:

.1 Recycling Haulers and Markets: Investigate local haulers and markets for recyclable materials, and incorporate into CWM Plan.

.2 Waste-to-Energy Systems: Investigate local waste-to-energy incentives where systems for diverting materials from landfill for reuse or recycling are not available.

1.9 DELIVERY, STORAGE AND HANDLING

.1 Storage Requirements: Implement a recycling/reuse program that includes separate collection of waste materials as appropriate to the project waste and the available recycling and reuse programs in the project area.

.2 Handling Requirements: Clean materials that are contaminated before placing in collection containers and ensure that waste destined for landfill does not get mixed in with recycled materials:

.1 Deliver materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to recycling process.

.2 Arrange for collection by or delivery to the appropriate recycling or reuse facility.

.3 Hazardous Waste and Hazardous Materials: Handle in accordance with applicable regulations.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 REUSE OF MATERIAL BY WASAUKSING FIRST NATION

.1 Prior to transportation of the material off site for recycling or disposal, allow a representative from Wasauksing First Nation to inspect the material to determine if any of the material could be used by the reserve.

3.2 CWM PLAN IMPLEMENTATION

.1 Manager: Contractor is responsible for designating an on site party or parties responsible for instructing workers and overseeing and documenting results of the CWM Plan for the project.

.2 Distribution: Distribute copies of the CWM Plan to the job site foreman, each Subcontractor, the Owner, the Departmental Representative and other site personnel as required to maintain CWM Plan.

.3 Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, composting and return methods being used for the project to Subcontractor's at appropriate stages of the project.

.4 Separation Facilities: Lay out and label a specific area to facilitate separation of materials for potential recycling, salvage, reuse, composting and return:

- .1 Recycling and waste bin areas are to be kept neat and clean and clearly marked in order to avoid contamination of materials.
- .2 Hazardous wastes shall be separated, stored, and disposed of in accordance with local regulations.

.5 Progressive Documentation: Submit a monthly summary of waste generated by the project to ensure that waste diversion goals are on track with project requirements:

- .1 Submission of waste summary can coincide with application for progress payment, or similar milestone event as agreed upon between the Owner, Contractor and Departmental Representative.
- .2 Monthly waste summary shall contain the following information:
  - .1 The amount in tonnes or m^3 and location of material landfilled,
  - .2 The amount in tonnes or m^3 and location of materials diverted from landfill, and
  - .3 Indication of progress based on total waste generated by the project with materials diverted from landfill as a percentage.

3.3 SUBCONTRACTOR'S RESPONSIBILITY

.1 Subcontractor's shall cooperate fully with the Contractor to implement the CWM Plan.

.2 Failure to cooperate may result in the Owner not achieving their environmental goals, and may result in penalties being assessed by the Contractor to the responsible Subcontractor's.

3.4 SAMPLE CONSTRUCTION WASTE MANAGEMENT FORMS

.1 Sample waste tracking form below can be used by the Contractor to establish their own forms for recording management of construction waste:

SAMPLE WASTE MANAGEMENT FORM

Material Stream		**Diverted Waste by Report Date**				**Total**	**Units**
		Sept	**Oct**	**Nov**	**Dec**		
Material Streams Contributing to Credit	Plastic	1.25	2.5	10	5	18.75	m^3
	Carpet	2.5	2.5	2.5	0	7.5	m^3
	Paper/Cardboard	5	2.5	2.5	5	15	m^3
	Clean Wood	0	25	0	1.25	26.25	m^3
	Metal	1.25	2.5	5.5	7	16.25	m^3
	Gypsum Board	2.5	2.5	4	5	14	m^3
	Brick/Concrete	10.5	2.5	5.5	8.75	27.25	m^3
	Asphalt Shingles	10	0	0	0	10	m^3
Total Diverted Waste						135	m^3
Material Streams not Contributing to Credit	Landfill	10.75	7.5	15	10	43.25	m^3
	Screen Fines (ADC)	5	1.25	0	2.5	8.75	m^3
	150 mm Minus (ADC	1.25	1.25	5	5.5	13	m^3
Total Landfill/ADC Waste						65	m^3
Total Waste						200	m^3
Percent Diverted						67.5	%

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE REQUIREMENTS

.1 Acceptance of Work Procedures:

.1 Contractor's Inspection: Contractor to conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.

.1 Notify Departmental Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.

.2 Request Departmental Representative's inspection.

.2 Departmental Representative Inspection:

.1 Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.

.2 Contractor to correct Work as directed.

.3 Completion Tasks: submit written certificates in English that tasks have been performed as follows:

.1 Work: completed and inspected for compliance with Contract Documents.

.2 Defects: corrected and deficiencies completed.

.3 Equipment and systems: tested, adjusted, and balanced and fully operational.

.4 Certificates required by Utility companies: submitted.

.5 Operation of systems: demonstrated to Owner's personnel.

.6 Closeout submittals have been provided in accordance with Section 01 78 00 – Closeout Submittals.

.7 Work: complete and ready for final inspection.

.4 Final Inspection:

.1 When completion tasks are done, request final inspection of Work by Departmental Representative, and Contractor.

.2 When Work incomplete according to Departmental Representative, complete outstanding items and request re-inspection.

.5 Declaration of Substantial Performance: when Departmental Representative considers deficiencies and defects corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance.

1.2 FINAL CLEANING

.1 Clean in accordance with Section 01 74 00 - Cleaning.

.1 Remove surplus materials, excess materials, rubbish, tools, and equipment.

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 –Waste Management and Disposal.

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 ADMINISTRATIVE REQUIREMENTS

.1 Pre-warranty Meeting:

.1 Convene meeting one week prior to contract completion with contractor's representative and Departmental Representative, in accordance with Section 01 31 19 - Project Meetings to:

.1 Verify Project requirements.

.2 Review manufacturer's installation instructions and warranty requirements.

.2 Departmental Representative to establish communication procedures for:

.1 Notifying construction warranty defects.

.2 Determine priorities for type of defects.

.3 Determine reasonable response time.

.3 Contact information for bonded and licensed company for warranty work action: provide name, telephone number and address of company authorized for construction warranty work action.

.4 Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Prepare instructions and data using personnel experienced in maintenance and operation of described products.

.1 A copy will be returned after final inspection, with Departmental Representative’s comments.

.2 Revise content of documents as required prior to final submittal

.3 Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, four final copies of operating and maintenance manuals in English and French.

.3 Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.

.4 Provide evidence, if requested, for type, source and quality of products supplied.

.5 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.

.6 Pay costs of transportation.

1.3 FORMAT

.1 Organize data as instructional manual.

.2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.

.3 When multiple binders are used correlate data into related consistent groupings.

.1 Identify contents of each binder on spine.

.4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.

.5 Arrange content by systems, under Section numbers and sequence of Table of Contents.

.6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

.7 Text: manufacturer's printed data, or typewritten data.

.8 Drawings: provide with reinforced punched binder tab.

.1 Bind in with text, fold larger drawings to size of text pages.

.9 Provide 1:1 scaled CAD files in dwg format on CD in accordance with PSPC Standards.

1.4 CONTENTS - PROJECT RECORD DOCUMENTS

.1 Table of Contents for Each Volume: provide title of project.

.1 Date of submission; names.

.2 Addresses, and telephone numbers of Consultant and Contractor with name of responsible parties.

.3 Schedule of products and systems indexed to content of volume.

.2 For each product or system:

.1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

.3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.

.4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

.5 Typewritten Text: as required to supplement product data.

.1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.

1.5 AS -BUILT DOCUMENTS AND SAMPLES

.1 Maintain, in addition to requirements in General Conditions, at site for Departmental Representative one record copy of:

.1 Contract Drawings.

.2 Specifications.

.3 Addenda.

.4 Change Orders and other modifications to Contract.

.5 Reviewed shop drawings, product data, and samples.

.6 Field test records.

.7 Inspection certificates.

.8 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction.

.1 Provide files, racks, and secure storage.

.3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual.

.1 Label each document "PROJECT RECORD" in neat, large, printed letters.

.4 Maintain record documents in clean, dry, and legible condition.

.1 Do not use record documents for construction purposes.

.5 Keep record documents and samples available for inspection by Departmental Representative.

.6 Turn one set, paper copy and electronic copy, of “AS-BUILT” drawings and specifications over to Departmental Representative on completion of work.

1.6 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

.1 Record information on set of black line opaque drawings, and in copy of Project Manual, provided by Departmental Representative.

.2 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.

.3 Record information concurrently with construction progress.

.1 Do not conceal Work until required information is recorded.

.4 Contract Drawings and shop drawings: mark each item to record actual construction, including:

.1 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

.2 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.

.3 Field changes of dimension and detail.

.4 Changes made by change orders.

.5 Details not on original Contract Drawings.

.6 Referenced Standards to related shop drawings and modifications.

.5 Specifications: mark each item to record actual construction, including:

.1 Manufacturer, trade name, and catalogue number of each product installed, particularly optional items and substitute items.

.2 Changes made by Addenda and change orders.

.6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

.7 Provide digital photos, if requested, for site records.

.8 At completion of project, provide all recorded information on print drawings or alternatively transfer to CAD files in DWG format. Submit DWG files, also with electronic files in PDF format as part of the Closeout Submittals.

1.7 FINAL SURVEY

.1 Submit final site survey certificate, certifying that elevations and locations of completed Work are in conformance, or non-conformance with Contract Documents.

1.8 EQUIPMENT AND SYSTEMS

.1 For each item of equipment and each system include description of unit or system, and component parts.

.1 Give function, normal operation characteristics and limiting conditions.

.2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

.2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.

.3 Include installed colour coded wiring diagrams.

.4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.

.1 Include regulation, control, stopping, shut-down, and emergency instructions.

.2 Include summer, winter, and any special operating instructions.

.5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

.6 Provide servicing and lubrication schedule, and list of lubricants required.

.7 Include manufacturer's printed operation and maintenance instructions.

.8 Include sequence of operation by controls manufacturer.

.9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

.10 Provide installed control diagrams by controls manufacturer.

.11 Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.

.12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

.13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

.14 Include test and balancing reports as specified in Section 01 45 00 - Quality Control.

.15 Additional requirements: as specified in individual specification sections.

1.9 MATERIALS AND FINISHES

.1 Building products, applied materials, and finishes: include product data, with catalogue number, size, composition, and colour and texture designations.

.1 Provide information for re-ordering custom manufactured products.

.2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.3 Moisture-protection and weather-exposed products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.4 Additional requirements: as specified in individual specifications sections.

1.10 MAINTENANCE MATERIALS

.1 Spare Parts:

.1 Provide spare parts, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to location as directed, place and store.

.4 Receive and catalogue items.

.1 Submit inventory listing to Departmental Representative.

.2 Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

.2 Extra Stock Materials:

.1 Provide maintenance and extra materials, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to location as directed, place and store.

.4 Receive and catalogue items.

.1 Submit inventory listing to Departmental Representative.

.2 Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

.3 Special Tools:

.1 Provide special tools, in quantities specified in individual specification section.

.2 Provide items with tags identifying their associated function and equipment.

.3 Deliver to location as directed, place and store.

.4 Receive and catalogue items.

.1 Submit inventory listing to Departmental Representative.

.2 Include approved listings in Maintenance Manual.

1.11 DELIVERY, STORAGE AND HANDLING

.1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.

.2 Store in original and undamaged condition with manufacturer's seal and labels intact.

.3 Store components subject to damage from weather in weatherproof enclosures.

.4 Store paints and freezable materials in a heated and ventilated room.

.5 Remove and replace damaged products at own expense and for review by Departmental Representative.

1.12 WARRANTIES

.1 Develop warranty management plan to contain information relevant to Warranties.

.2 Submit warranty management plan, 30 days before planned pre-warranty conference, to Departmental Representative approval.

.3 Warranty management plan to include required actions and documents to assure that Departmental Representative receives warranties to which it is entitled.

.4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.

.5 Submit, warranty information made available during construction phase, to Departmental Representative for approval prior to each monthly pay estimate.

.6 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:

.1 Separate each warranty with index tab sheets keyed to Table of Contents listing.

.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

.3 Obtain warranties executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.

.4 Verify that documents are in proper form, contain full information, and are notarized.

.5 Co-execute submittals when required.

.6 Retain warranties until time specified for submittal.

.7 Except for items put into use with Departmental Representative’s permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.

.8 Conduct joint 12-month warranty inspection, measured from time of acceptance, by Departmental Representative.

.9 Include information contained in warranty management plan as follows:

.1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers, or suppliers involved.

.2 Provide list for each warranted equipment, item, feature of construction or system indicating:

.1 Name of item.

.2 Model and serial numbers.

.3 Location where installed.

.4 Name and phone numbers of manufacturers or suppliers.

.5 Names, addresses and telephone numbers of sources of spare parts.

.6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.

.7 Cross-reference to warranty certificates as applicable.

.8 Starting point and duration of warranty period.

.9 Summary of maintenance procedures required to continue warranty in force.

.10 Cross-Reference to specific pertinent Operation and Maintenance manuals.

.11 Organization, names, and phone numbers of persons to call for warranty service.

.12 Typical response time and repair time expected for various warranted equipment.

.3 Contractor's plans for attendance at 12-month post-construction warranty inspections.

.4 Procedure and status of tagging of equipment covered by extended warranties.

.5 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

.10 Respond in timely manner to oral or written notification of required construction warranty repair work.

.11 Written verification to follow oral instructions.

.1 Failure to respond will be cause for the Departmental Representative to proceed with action against Contractor.

1.13 WARRANTY TAGS

.1 Tag, at time of installation, each warranted item. Provide durable, oil and water-resistant tag approved by Departmental Representative.

.2 Attach tags with copper wire and spray with waterproof silicone coating.

.3 Leave date of acceptance until project is accepted for occupancy.

.4 Indicate following information on tag:

.1 Type of product/material.

.2 Model number.

.3 Serial number.

.4 Contract number.

.5 Warranty period.

.6 Inspector's signature.

.7 Construction Contractor.

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 Reference Standards:

- .1 Canadian Environmental Protection Act (CEPA)
  - .1 CCME PN 1326-2008, Environmental Code of Practice for Aboveground and Underground Storage Tank Systems for Petroleum Products and Allied Petroleum Products.
- .2 CSA Group (CSA)
  - .1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.
- .3 Department of Justice Canada (Jus)
  - .1 Canadian Environmental Assessment Act (CEAA), 2012.
  - .2 Canadian Environmental Protection Act (CEPA), 2012.
    - .1 SOR/2003-2, On-Road Vehicle and Engine Emission Regulations.
    - .2 SOR/2006-268, Regulations Amending the On-Road Vehicle and Engine Emission Regulations.
    - .3 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.
    - .4 Motor Vehicle Safety Act (MVSA), 1995
    - .5 Hazardous Substances Information Review Act, 1985
- .4 Underwriters' Laboratories of Canada (ULC)
  - .1 CAN/ULC-S660-08, Standard for Nonmetallic Underground Piping for Flammable and Combustible Liquids.
  - .2 ULC/ORD-C58.15-1992, Overfill Protection Devices for Flammable Liquid Storage Tanks.
  - .3 ULC/ORD-C58.19-1992, Spill Containment Devices for Underground Flammable Liquid Storage Tanks.
- .5 U.S. Environmental Protection Agency (EPA)
  - .1 EPA CFR 86.098-10, Emission standards for 1998 and later model year Otto-cycle heavy-duty engines and vehicles.
  - .2 EPA CFR 86.098-11, Emission standards for 1998 and later model year diesel heavy-duty engines and vehicles.
  - .3 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.
- .6 Health Canada/Workplace Hazardous Materials Information System (WHMIS).
  - .1 Safety Data Sheets (SDS).
- .7 Transport Canada (TC).
  - .1 Transportation of Dangerous Goods Act, 1992 (TDGA), c. 34.
- .8 Ontario Provincial Standard Specifications, Ontario Ministry of Transportation.

1.2 DEFINITIONS

.1 Construction Waste Management Plan (CWM Plan): Written plan addressing opportunities for reduction, reuse, or recycling of materials prepared in accordance with Section 01 74 19 - Waste Management and Disposal.

.2 Construction Waste Management Report (CWM Report): Written report identifying actual materials that formed CWM Plan for reduction, reuse, or recycling of materials prepared in accordance with Section 01 74 19 - Waste Management and Disposal.

.3 Deconstruction: systematic dismantling of structure in a manner that achieves safe removal/disposal of hazardous materials and maximum salvage/recycling of materials.

.1 Ultimate objective is to recover potentially valuable resources while diverting from landfill what has traditionally been significant portion of waste system.

.4 Demolition: rapid destruction of structure following removal of Hazardous Substances.

.5 Disassembly: physical detachment of materials from structure: prying, pulling, cutting, unscrewing.

.6 Draft Construction Waste Management Plan (Draft CWM Plan): Detailed inventory of materials in building indicating estimated quantities of reuse, recycling and landfill, prepared in accordance with Section 01 74 19 - Construction Waste Management and Disposal and as follows:

.1 Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project

.7 Hauler: company (possessing appropriate and valid Certificate of Approval) contracted to transport waste, reusable or recyclable materials off site to designated facility, user or receiving organization.

.8 Hazardous Substances: asbestos PCB's, CFC's, HCFC's poisons, corrosive agents, flammable substances, lead, mercury, ammunition, explosives, radioactive substances, or other material that can endanger human health or wellbeing or environment if handled improperly as defined by the Federal Hazardous Products Act (RSC 1985) including latest amendments.

.9 Processing: tasks which are subsequent to disassembly and may include: moving materials, denailing, cleaning, separating and stacking.

.10 Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse by others.

.11 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.

.12 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form.

.1 Recycling does not include burning, incinerating, or thermally destroying waste.

.13 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:

.1 Salvaging reusable materials from remodelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.

.2 Returning reusable items including pallets or unused products to vendors.

.14 Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.

.15 Source Separation: acts of keeping different types of waste materials separate, beginning from first time they became waste.

.16 Used Bridge Material Receipt: receipt issued at end destination for materials designated for alternate disposal.

.17 Waste Audit (WA): detailed inventory of materials in bridge. Involves quantifying (by volume or weight) amounts of materials and wastes generated during deconstruction. Indicates quantities of reuse, recycling and landfill.

.18 Waste Management Coordinator (WMC): contractor representative responsible for supervising waste management activities as well as coordinating related, required submittal and reporting requirements.

.19 Waste Reduction Workplan (WRW): written report which outlines actions to be taken to reduce, reuse and recycle materials during course of deconstruction. Actions based on finding of the Waste Audit (WA).

.20 Weigh Bill: receipt received from recycling facility indicating weight and content of each load/bin of material.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate with Departmental Representative for the material ownership as follows:

.1 Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Departmental Representative's property, demolished materials shall become Contractor's property and shall be removed from Project site.

.2 Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Departmental Representative that may be encountered during demolition remain Departmental Representative’s property:

.1 Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Departmental Representative.

.2 Coordinate with Departmental Representative, who will establish special procedures for removal and salvage operations.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures and Section 01 74 19 - Waste Management and Disposal.

.2 WMC is responsible for fulfilment of reporting requirements.

.3 Waste Reduction Workplan: prior to beginning of Work on site submit detailed Waste Reduction Workplan in accordance with Section 01 74 19 – Waste Management and Disposal and indicate:

.1 Descriptions of and anticipated quantities in percentages of materials to be salvaged reused, recycled and landfilled.

.2 Schedule of selective demolition.

.3 Number and location of dumpsters.

.4 Anticipated frequency of tippage.

.5 Name and address of haulers, waste facilities, and/or waste receiving organizations.

.4 Submit 1 copy of certified weigh bills from authorized disposal sites and reuse and recycling facilities for material removed from site on a weekly basis or upon request of Departmental Representative.

.1 Written authorization from Departmental Representative is required to deviate from facilities or receiving organizations listed in Waste Reduction Workplan.

1.5 QUALITY ASSURANCE

.1 Regulatory Requirements: Ensure Work is performed in compliance with CEPA, CEAA, TDGA, and applicable Provincial/Territorial and Municipal regulations.

1.6 SITE CONDITIONS

.1 Environmental protection:

.1 Ensure Work is done in accordance with Section 01 35 43 - Environmental Procedures.

.2 Ensure Work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.

.3 Fires and burning of waste or materials is not permitted on site.

.4 Do not bury rubbish waste materials.

.5 Do not dispose of waste or volatile materials including but not limited to: mineral spirits, oil, petroleum-based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers.

.1 Ensure proper disposal procedures are maintained throughout project.

.6 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers, or onto adjacent properties.

.7 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with authorities having jurisdiction as directed by the Departmental Representative.

.8 Protect trees, plants and foliage on site and adjacent properties where indicated.

.9 Prevent extraneous materials from contaminating air beyond application area, by providing temporary enclosures during demolition work.

.10 Cover or wet down dry materials and waste to prevent blowing dust and debris. Control dust on all temporary roads.

1.7 EXISTING CONDITIONS

.1 Discovery of Hazardous Substances: Immediately notify Departmental Representative if materials suspected of containing hazardous substances are encountered and perform the following activities:

.1 Hazardous substances will be as defined in the Hazardous Products Act.

.2 Stop work in the area of the suspected hazardous substances.

.3 Take preventative measures to limit users' and workers' exposure, provide barriers and other safety devices and do not disturb.

Part 2 Products

2.1 EQUIPMENT

.1 Equipment and heavy machinery:

.1 On-road vehicles to: CEPA-SOR/2003-2, On-Road Vehicle and Engine Emission Regulations and CEPA-SOR/2006-268, Regulations Amending the On-Road Vehicle and Engine Emission Regulations.

.2 Off-road vehicles to: EPA CFR 86.098-10 and EPA CFR 86.098-11.

.2 Leave machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.

2.2 TEMPORARY SUPPORT STRUCTURES

.1 Design temporary support structures required for demolition work and underpinning and other foundation supports necessary for the project using a qualified professional engineer registered or licensed in Province of the Work.

Part 3 Execution

3.1 EXAMINATION

.1 Survey existing conditions and correlate with requirements indicated to determine extent of structure demolition required.

.2 Review Project Record Documents of existing construction provided by Departmental Representative.

.3 Departmental Representative does not guarantee that existing conditions are the same as those indicated in Project Record Documents.

.4 Inventory and record the condition of items being removed and salvaged.

.5 When unanticipated mechanical, electrical, or structural elements are encountered, investigate and measure the nature and extent of the element.

.6 Promptly submit a written report to Departmental Representative.

.7 Engage a professional engineer to perform an engineering survey of condition of bridge to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during structure demolition operations.

.8 Verify that Hazardous Substances have been remediated before proceeding with structure demolition operations.

3.2 PREPARATION

.1 Inspect site with the Departmental Representative and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.

.2 Temporary Erosion and Sedimentation Control:

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to: sediment and erosion control plan, specific to site, that complies with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during demolition.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal after completion of demolition work.

.3 Protection of in-place conditions:

.1 Work in accordance with Section 01 35 43 - Environmental Procedures and Erosion and Sedimentation Control Plan.

.2 Prevent movement, settlement or damage of adjacent structures, services, walks, paving, trees, landscaping, adjacent grades, properties, and parts of existing building to remain.

.1 Provide bracing and shoring as required.

.2 Repair damage caused by demolition as directed by Departmental Representative.

.3 Support affected structures and, if safety of structure being deconstructed, adjacent structures, or services appears to be endangered, take preventative measures, stop Work and immediately notify Departmental Representative.

.4 Prevent debris from blocking surface drainage system, and electrical systems which must remain in operation.

.4 Remove contaminated or dangerous materials defined by authorities having jurisdiction, relating to environmental protection, from site and dispose of in safe manner to minimize danger at site or during disposal.

.5 Locate and protect utilities. Do not disrupt active or energized utilities traversing premises and designated to remain undisturbed.

.6 Remove rodent and vermin as required by Departmental Representative.

3.3 DISASSEMBLY OF EXISTING BRIDGE COMPONENTS

.1 Remove parts of structure and items as indicated on contract drawings.

.2 Do not disturb items designated to remain in place.

.3 Square up adjacent surfaces to remain in place by saw cutting or other method approved by the Departmental Representative.

.4 Prevent contamination with base course aggregates, when removing asphalt pavement for subsequent incorporation into hot mix asphalt concrete paving.

.5 Protect demolition work in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

.6 Ensure Work is done in accordance with Section 01 35 43 - Environmental Procedures.

.7 Blasting operations are not permitted.

.8 Prior to start of Work remove contaminated or hazardous materials as defined by authorities having jurisdiction from site and dispose of at designated disposal facilities in safe manner and in accordance with TDGA and other applicable requirements.

.9 Materials removed from designated structure are property of Contractor.

.10 Throughout course of disassembly pay close attention to connections and material assemblies. Employ workmanship procedures which maintain control of the deconstruction process.

.11 Ensure workers and subcontractors are trained to carry out work in accordance with appropriate deconstruction techniques.

.12 At end of each day's work, leave Work in safe and stable condition.

.13 Deconstruct in accordance with CSA S350 or other applicable safety standards.

.14 At all times ensure the stability and integrity of the structure or any part of the structure at each stage of its deconstruction.

.15 Project supervisor with previous deconstruction experience must be present on site throughout project.

.16 Take measures to minimize dusting. Keep materials wetted as directed by Departmental Representative.

.17 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

.18 Separate from waste stream, material designated for alternate disposal in condition suitable for reuse and/or recycling.

.19 Remove and store materials to be salvaged, in manner to prevent damage.

.1 Store and protect in accordance with requirements for maximum preservation of material.

.2 Handle salvaged materials as new materials.

.20 Source separate for recycling materials that cannot be salvaged for reuse including wood, metal, concrete, brick and asphalt.

.21 Only dispose of material specified by selected alternative disposal option as directed by Departmental Representative.

.22 Ensure that these materials will not be disposed of in landfill or waste stream destined for landfill.

.23 Remove and dispose of deconstructed materials except where noted otherwise and in accordance with authorities having jurisdiction.

.24 Notify the Departmental Representative prior to removing the utility services to ensure that there is no disruption to the surrounding services.

.25 Contain fibrous materials to minimize release of airborne fibres while being transported within facility.

.26 Dispose of materials not designated for salvage or reuse on site as instructed by the Departmental Representative at authorized facilities approved in Waste Reduction Workplan.

.27 Use natural lighting to do Work where possible.

.1 Shut off lighting except those required for security purposes at end of each day.

3.4 REPAIRS

.1 General: Promptly repair damage to adjacent construction caused by structure demolition operations.

.2 Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.

.3 Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.

3.5 CLEANING

.1 Develop Construction Waste Management Plan and Waste Reduction Workplan related to Work of this Section

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

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

.3 Divert excess materials from landfill to site approved by Departmental Representative.

.4 Designate appropriate security resources / measures to prevent vandalism, damage and theft.

.5 Stockpile materials designated for alternate disposal in location which facilitates removal from site and examination by potential end markets, and which does not impede disassembly, processing, or hauling procedures.

.1 Label stockpiles, indicating material type and quantity.

.6 Separate from general waste stream each of following materials. Stockpile materials in neat and orderly fashion in location and as directed by Departmental Representative for alternate disposal. Stockpile materials in accordance with applicable fire and safety regulations.

.1 Wiring and conduit.

.2 Outlets/switches.

.3 Miscellaneous metals.

.7 Supply separate, clearly marked disposal bins for categories of waste material. Do not remove bins from site until inspected and approved by Departmental Representative. Please notify Departmental Representative prior to removal of bins from site.

.8 Remove stockpiled material as directed by Departmental Representative, when it interferes with operations of project.

.9 Remove stockpiles of like materials by alternate disposal option once collection of materials is complete.

.10 Remove debris, trim surfaces and leave work site clean, upon completion of Work.

.11 Use cleaning solutions and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

.12 Transport material designated for alternate disposal using approved haulers, facilities, and receiving organizations listed in Waste Reduction Workplan and in accordance with applicable regulations.

.1 Written authorization from Departmental Representative is required to deviate from haulers, facilities, and receiving organizations listed in Waste Reduction Workplan.

.13 Dispose of materials not designated for alternate disposal in accordance with applicable regulations.

.1 Disposal facilities must be those approved of and listed in Waste Reduction Workplan.

.2 Written authorization from Departmental Representative is required to deviate from disposal facilities listed in Waste Reduction Workplan.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 03 20 00 – Concrete Reinforcing

.2 Section 03 30 00 – Cast-In-Place Concrete

1.2 REFERENCE STANDARDS

.1 CSA Group (CSA)

.1 CSA A23.1:19/A23.2:19, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.2 CSA O86:19, Engineering Design in Wood.

.3 CSA O121-08(R2013), Douglas Fir Plywood.

.4 CSA S269.1-16, Falsework and Formwork.

.2 American Society for Testing and Materials (ASTM)

.1 ASTM C578-19 – Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Pre-installation Meetings: in accordance with Section 01 31 19 - Project Meetings, convene pre-installation meeting one week prior to beginning concrete works.

.1 Ensure key personnel, site supervisor, Departmental Representative, specialty contractor - finishing, forming, concrete producer, and testing laboratories attend.

.1 Verify project requirements.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for proprietary materials used in formwork liners and coatings and include product characteristics, performance criteria, physical size, finish, and limitations.

.2 Submit 1 electronic copy of WHMIS SDS in accordance with Section 01 35 29.06 - Health and Safety Requirements and 01 35 43 - Environmental Procedures.

.3 Submit shop drawings for formwork and falsework.

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Ontario, Canada.

.2 Prepare Shop Drawings in accordance with CSA S269.1 for formwork and falsework.

.3 Indicate formwork design data: permissible rate of concrete placement, and temperature of concrete, in forms.

.4 Indicate sequence of erection and removal of formwork/falsework as directed by Departmental Representative.

.5 When slip forming and flying forms are used, submit details of equipment and procedures for review by Departmental Representative.

.6 Indicate method and schedule of construction, shoring, stripping, and re-shoring procedures, materials, arrangement of joints, special architectural exposed finishes, ties, liners, and locations of temporary embedded parts.

.7 Indicate sequence of erection and removal of formwork and falsework.

.8 Include the following information on falsework Shop Drawings:

.1 Longitudinal, lateral, vertical, dead, live and impact loads used in design.

.2 Safe bearing capacity of soil underneath mud sills.

.3 Maximum column, post, and support loads.

.4 Deflection diagrams for beams with deflection of 10 mm or more.

.5 Deflection diagrams indicating initial and final elevation of deck surfaces, roofs, and soffits.

.6 Grade of structural steel.

.7 Indicate steel posts, girders, beams, connections, bracing and welding, providing sufficient detail for safe performance of falsework.

.8 Fully detailed steel frame shoring.

.9 Species, grades, and sizes of wood.

.10 Type and weight of equipment (moving or stationary) supported by falsework.

.11 Sequence, methods, and rate of concrete placement.

.12 Proprietary equipment, adequately identified for checking purposes.

1.5 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.

.2 Retain a professional engineer registered or licensed in Ontario, Canada, with experience in formwork and falsework design of comparable complexity and scope, to perform following services as part of Work of this Section:

.1 Design of formwork and falsework:

.2 Review, stamp, and sign fabrication and erection Shop Drawings, design calculations and amendments.

.3 Conduct on-site inspections and prepare and submit inspection reports verifying this part of Work is in accordance with Contract Documents and reviewed Shop Drawings.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store, and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

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

.3 Storage and Handling Requirements:

.1 Store materials off ground, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect formwork from damages.

.4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 19 – Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS

.1 Formwork materials:

.1 For concrete without special architectural features, use wood and wood product formwork materials to CSA O121 and CSA O86.

.2 For concrete with special architectural features, use formwork materials to CSA A23.1/A23.2.

.3 Rigid insulation board: to ASTM C578.

.2 Tubular column forms: round, steel, internally treated with release material.

.3 Form ties:

.1 For concrete not designated 'Architectural': removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes minimum 25 mm diameter in concrete surface.

.2 For Architectural concrete; snap ties complete with plastic cones and light grey concrete plugs.

.4 Form liner:

.1 Plywood: Douglas Fir to CSA O121.

.5 Form release agent: Proprietary, non volatile material not to stain concrete or impair subsequent application of finishes or coatings to surface of concrete, derived from agricultural sources, non petroleum containing, non-toxic, biodegradable, low VOC.

.6 Falsework materials: to CSA S269.1.

Part 3 Execution

3.1 FABRICATION AND ERECTION

.1 Verify lines, levels, and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.

.2 Fabricate and erect falsework in accordance with CSA S269.1.

.3 Refer to architectural drawings for concrete members requiring architectural exposed finishes.

.4 Do not place shores and mud sills on frozen ground.

.5 Provide site drainage to prevent washout of soil supporting mud sills and shores.

.6 Fabricate and erect formwork in accordance with CSA S269.1 to produce finished concrete conforming to shape, dimensions, locations, and levels indicated within tolerances required by CSA A23.1/A23.2.

.7 Align form joints and make watertight.

.1 Keep form joints to minimum.

.8 Use 20 mm chamfer strips on external corners and 20 mm fillets at interior corners, joints, unless specified otherwise.

.9 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.

.10 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections.

.1 Ensure that anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.

.11 Treat forms and panels with form release agent prior to placing the reinforcing steel.

.12 Constructed forms devoid of warp and defects in order to achieve a face alignment free from distortion. This is to apply to all panel forms including prefabricated boards, plywood, and steel panels

.13 Clean formwork in accordance with CSA A23.1/A23.2, before placing concrete.

3.2 REMOVAL AND RESHORING

.1 Leave formwork in place for following minimum periods of time after placing concrete.

.1 7 days for concrete subject to cold weather, concrete cured with curing compound, and high-performance concrete.

.1 Curing compound shall only be permitted for non-structural elements.

.2 4 days for all other concrete.

.2 Remove formwork when concrete has reached 75% of its design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.

.3 Provide necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.

.4 Space reshoring in each principal direction at not more than 3000 mm apart.

.5 Re-use formwork and falsework subject to requirements of CSA A23.1/A23.2.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools, and equipment in accordance with Section 01 74 00 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

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

3.4 QUALITY OF FINISH

.1 Grinding of the surfaces to achieve proper alignment and tolerance will generally not be accepted and the work must conform to the lines and be smooth when the forms are removed.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 03 10 00 – Concrete Forming and Accessories.

.2 Section 03 30 00 – Cast-in-Place Concrete.

1.2 REFERENCE STANDARDS

.1 American Concrete Institute (ACI)

.1 SP-66-04, ACI Detailing Manual 2004.

.2 MNL-66-04, ACI Detailing Manual 2004.

.2 ASTM International (ASTM)

.1 ASTM A123/A123M - 17 Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.2 ASTM A143/A143M-07(2020), Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.

.3 ASTM A641/A641M-19, Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.

.4 ASTM A775/A775M-19, Standard Specification for Epoxy-Coated Reinforcing Steel Bars.

.5 ASTM A884/A884M-19e1, Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement.

.6 ASTM A1064/A1064M-18a, Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

.3 CSA Group (CSA)

.1 CSA A23.1-19/A23.2-19, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.2 CSA A23.3:19, Design of Concrete Structures.

.3 CSA G30.18-09(R2019), Carbon Steel Bars for Concrete Reinforcement.

.4 CSA G40.20-13/G40.21-13(R2018), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.5 CSA W186-M1990(R2016), Welding of Reinforcing Bars in Reinforced Concrete Construction.

.4 Reinforcing Steel Institute of Canada (RSIC)

.1 RSIC-2018, Reinforcing Steel Manual of Standard Practice.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Pre-installation Meetings: in accordance with Section 01 31 19 - Project Meetings, convene pre-installation meeting one week prior to beginning concrete works.

.1 Ensure key personnel, site supervisor, Departmental Representative, specialty contractor - finishing, forming, concrete producer, and testing laboratories attend.

.1 Verify project requirements.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for proprietary materials used in Cast-In-Place Concrete and additives and include product characteristics, performance criteria, physical size, finish, and limitations.

.2 Submit 1 electronic copy of WHMIS Safety Data Sheet (SDS) in accordance with Section 01 35 29.06 - Health and Safety Requirements and 01 35 43 - Environmental Procedures.

.3 Shop Drawings:

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

.1 Prepare reinforcement drawings in accordance with RSIC Manual of Standard Practice and SP-66.

.2 Indicate placing of reinforcement and:

.3 Detail lap lengths and bar development lengths to CSA A23.3, unless otherwise indicated. Provide Class B tension lap splices unless otherwise indicated.

.4 Indicate position and size of openings in slabs and walls. Coordinate with trades requiring openings.

.4 Quality Assurance Submittals:

.1 Submit in accordance with Section 01 45 00 - Quality Control and as described in PART 2 - SOURCE QUALITY CONTROL.

.2 Mill Test Report: Submit to Departmental Representative certified copy of mill test report of reinforcing steel, minimum 4 weeks prior to beginning reinforcing work.

.3 Upon request submit in writing to Departmental Representative proposed source of reinforcement material.

.4 Upon request submit to Departmental Representative epoxy coating applicator certificates identified in Quality Assurance.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

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

.3 Storage and Handling Requirements:

.1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

.4 Keep reinforcing steel and accessories clean of all mud, oil, and other deleterious materials.

.5 Handle and support reinforcing steel to prevent excessive deformation

Part 2 Products

2.1 MATERIALS

.1 Substitute different size bars only if permitted in writing by Departmental Representative.

.2 Reinforcing steel: billet steel, grade 400W, deformed bars to CSA G30.18, unless indicated otherwise.

.3 Cold-drawn annealed steel wire ties: to ASTM A1064/A1064M.

.4 Welded steel wire fabric:

.1 Plain in accordance ASTM A1064/A1064M, fabricated from as drawn steel wire into flat sheets; sizes as indicated on Drawings.

.2 Finish:

.1 Galvanized: Hot dip galvanized after welding having Class A coating in accordance with ASTM A641/A641M.

.5 Galvanizing of non-prestressed reinforcement: to ASTM A123/A123M, Coating Grade 85, minimum zinc coating 610 g/m^2.

.1 Protect galvanized reinforcing steel with chromate treatment to prevent reaction with Portland cement paste.

.2 If chromate treatment carried out immediately after galvanizing, soak steel in aqueous solution containing minimum 0.2% by weight sodium dichromate or 0.2% chromic acid.

.1 Temperature of solution minimum 32 degrees and galvanized steels immersed for minimum 20 seconds.

.3 If galvanized steels at ambient temperature, add sulphuric acid as bonding agent at concentration of 0.5% to 1%.

.1 No restriction applies to temperature of solution.

.4 Chromate solution sold for this purpose may replace solution described above, provided if of equivalent effectiveness.

.1 Provide product description as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.6 Chairs, bolsters, bar supports, spacers: to CSA A23.1/A23.2.

.7 Mechanical splices: subject to approval of Departmental Representative.

.8 Plain round bars: to CSA G40.20/G40.21.

.9 Epoxy adhesive: Shall be injectable hybrid mortar suitable for cracked and uncracked concrete.

2.2 FABRICATION

.1 Fabricate reinforcing steel in accordance with CSA A23.1/A23.2 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.

.2 Obtain Departmental Representative's written approval for locations of reinforcement splices other than those shown on placing drawings.

.3 Upon approval of Departmental Representative, weld reinforcement in accordance with CSA W186.

.4 Ship bundles of bar reinforcement, clearly identified in accordance with bar bending details and lists.

2.3 SOURCE QUALITY CONTROL

.1 Provide Departmental Representative with certified copy of mill test report of reinforcing steel, showing physical and chemical analysis, minimum 4 weeks prior to beginning reinforcing work.

.2 Inform Departmental Representative of proposed source of supplied material.

Part 3 Execution

3.1 PREPARATION

.1 Galvanizing to include chromate treatment.

.1 Duration of treatment 1 hour per 25 mm of bar diameter.

.2 Galvanize reinforcing steel prior to bending. Touch-up any flaking or cracking of the galvanized coating with two coats of zinc-rich paint.

.3 Conduct bending tests to verify galvanized bar fragility in accordance with ASTM A143/A143M.

3.2 FIELD BENDING

.1 Do not field bend or field weld reinforcement except where indicated or authorized by Departmental Representative.

.2 When field bending authorized, bend without heat, applying slow and steady pressure.

.3 Replace bars, which develop cracks or splits.

3.3 CUTTING

.1 The cutting of reinforcing steel bars and splice bars by oxyacetylene torch may be carried out only where permitted in writing by the Departmental Representative.

.2 Do not cross contaminate saw blades when cutting different types of reinforcing steel.

3.4 ABRASIVE BLAST CLEANING

.1 The following surfaces shall be abrasive blast cleaned:

- .1 All existing steel reinforcement that shall be incorporated into the rehabilitation of a concrete structure component.
- .2 All surfaces of existing structural steel against which new concrete shall be placed for the rehabilitation of a concrete structure component.
- .3 All new or existing concrete surfaces against which new concrete shall be placed.

3.5 BONDING AGENT

.1 A bonding agent shall be used for:

- .1 Vertical surfaces of concrete against which new concrete is to be placed.
- .2 Blockouts in concrete for installation and modification of deck joint assemblies.
- .3 A thin uniform coating of bonding agent shall be brushed onto the prepared surface immediately before placing fresh concrete. Bonding agents shall be mixed by means of a mixer. Any bonding agent not used within 30 minutes of mixing shall be discarded. Bonding agent that has dried shall be removed and replaced prior to placing concrete against it.

3.6 DOWEL INSTALLATION

.1 The Contractor shall drill holes to the required dimensions, clean holes, place dowel adhesive, and properly position the dowels as specified in the Contract Documents. Core drilling of the dowel holes shall not be permitted.

.2 Steel reinforcement and other existing embedments shall not be cut or damaged by the drilling process. Prior to drilling holes, the Contractor shall locate existing steel reinforcement using a covermeter, Utility ducts, post tensioning hardware, and any unsound concrete in the vicinity of the dowel locations. If any of the above is encountered during drilling operations, the Departmental Representative shall be notified immediately.

.3 The Contractor’s operations shall not cause spalling, cracking, or other damage to the surrounding concrete. Concrete spalled or otherwise damaged by the Contractor’s operations shall be repaired to original condition.

.4 The Contractor shall clean the holes using compressed air to remove all deleterious material, including dust and debris, and shall dry them prior to placing the dowel adhesive. Holes that are started but not completed shall be cleaned and filled with a proprietary patching material.

.5 The handling and placement of the dowel adhesive shall conform to the manufacturer’s written instructions. All excess dowel adhesive shall be struck-off flush with the concrete surface and removed from the surrounding concrete surface area.

- .1 Dowel adhesive shall be in accordance with Section 03 30 00 Cast-In-Place Concrete.

.6 Dowels shall be clean and free of deleterious material.

.7 The Contractor shall maintain dowels in the proper position during the setting of the dowel adhesive and shall prevent the loss of dowel adhesive from the holes.

.8 The Contractor shall not install formwork or attach anything to the dowels such as steel reinforcement and Utility ducts until the pull tests have been completed and the dowels are accepted into the work.

3.7 PLACING REINFORCEMENT

.1 Cutting or puncturing vapour retarder is not permitted; repair damage and reseal vapour retarder before placing concrete.

.2 Place reinforcing steel as indicated on placing drawings in accordance with CSA A23.1/A23.2.

.3 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.

.4 Maintain cover to reinforcement during concrete pour.

.5 Protect coated portions of bars with covering during transportation and handling.

3.8 FIELD TOUCH-UP

.1 Touch up damaged and cut ends of epoxy coated or galvanized reinforcing steel with compatible finish to provide continuous coating.

.2 Store, handle, mix, apply and cure zinc-rich paint in accordance with the manufacturer’s instructions.

3.9 FIELD QUALITY CONTROL

.1 Site tests: conduct tests as follows in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.1 Reinforcing steel and welded wire fabric.

.2 Inspection and testing of reinforcing and reinforcing materials carried out by testing laboratory designated by Departmental Representative for review to CSA A23.1/A23.2.

.1 Ensure testing laboratory certified to CSA A283.

.3 Ensure test results distributed for discussion at pre-pouring concrete meeting between testing laboratory and Departmental Representative.

3.10 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools, and equipment in accordance with Section 01 74 00 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 –Waste Management and Disposal.

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

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 03 10 00 – Concrete Forming and Accessories

.2 Section 03 20 00 – Concrete Reinforcing

1.2 REFERENCE STANDARDS

.1 ASTM International (ASTM)

.1 ASTM C260/C260M-10a (2016), Standard Specification for Air-Entraining Admixtures for Concrete.

.2 ASTM C309-19, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

.3 ASTM C494/C494M-19, Standard Specification for Chemical Admixtures for Concrete.

.4 ASTM C881/C881M-20a, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.

.5 ASTM C1017/C1017M-13e1, Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.

.6 ASTM C1059/C1059M-13, Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete.

.7 ASTM D412-16, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.

.8 ASTM D624-00 (2020), Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomer.

.9 ASTM D1751-18, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

.10 ASTM D1752-18, Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

.2 CSA Group (CSA)

.1 CSA A23.1:19/A23.2:19, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CSA A283:19, Qualification Code for Concrete Testing Laboratories.

.3 CSA A3000-18, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005),

.3 Ministry of Transportation Ontario (MTO)

.1 Ontario Provincial Standard Specification (OPSS), Municipal-Oriented

.1 904 – Concrete Specification for Structures

.2 920 – Construction Specification for Deck Joint Assemblies, Preformed Seals, Joint Fillers, Joint Seals, Joint Sealing Compounds, and Waterstops – Structures

.3 1315 - Material Specification for White Pigmented Curing Compounds for Concrete

.4 1350 – Material Specification for Concrete – Materials and Production

.2 Designated Source Material (DSM) List

1.3 ABBREVIATIONS AND ACRONYMS

.1 Portland Cement: hydraulic cement, blended hydraulic cement (XXb - b denotes blended) and Portland-limestone cement types:

.1 GU, GUb and GUL - General use cement.

.2 MS and MSb - Moderate sulphate-resistant cement.

.3 MH, MHb and MHL - Moderate heat of hydration cement.

.4 HE, HEb and HEL - High early-strength cement.

.5 LH, LHb and LHL - Low heat of hydration cement.

.6 HS and HSb - High sulphate-resistant cement.

.2 Fly ash types:

.1 F - with CaO content maximum 8%.

.2 CI - with CaO content 15 to 20%.

.3 CH - with CaO minimum 20%.

.3 GGBFS - Ground, granulated blast-furnace slag.

.4 SF - Silica fume with high silicon dioxide (SiO2) content

.5 N - Natural pozzolans

1.4 DEFINITIONS

.1 **Cold Weather:** means those conditions when the ambient air temperature is at or below 5 °C. It is also considered to exist when the ambient air temperature is at or is likely to fall below 5 °C within 96 hours after completion of concrete placement. Temperature refers to shade temperature.

.2 **Hot Weather:** when the air temperature is at or above 27˚C or is likely to raise above 27˚C within 24 hours of concrete placement.

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Pre-installation Meetings: in accordance with Section 01 31 19 - Project Meetings, convene pre-installation meeting one week prior to beginning concrete works.

.1 Ensure key personnel, site supervisor, Departmental Representative, specialty contractor - finishing, forming, concrete producer, and testing laboratories attend.

.1 Verify project requirements.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Provide copy of ticket for each truck load of concrete to Departmental Representative.

.3 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for proprietary materials used in Cast-In-Place Concrete and additives and include product characteristics, performance criteria, physical size, finish, and limitations.

.2 Submit 1 electronic copy of WHMIS SDS in accordance with Section 01 35 29.06 - Health and Safety Requirements and 01 35 43 - Environmental Procedures.

.4 Site Quality Control Submittals:

.1 Provide testing and inspection results and reports for review by Departmental Representative and do not proceed without written approval when deviations from mix design or parameters found.

.2 Concrete pours: provide accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken as described in PART 3 - FIELD QUALITY CONTROL.

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

.5 Provide Temperature Control Plan to Departmental Representative a minimum of one week prior to commencement of placing concrete that requires temperature control.

.1 Plan to include methods for monitoring and controlling concrete temperature and the temperature difference prior to, during, and after placement for concrete subject to cold weather, high performance concrete, bridge decks and large concrete components where the smallest dimension is 1.5 metres.

.2 For concrete subject to cold weather, include the type of insulation, R value and number of layers, including test data verifying the R value in the temperature control plan.

.3 For concrete subject to cold weather, include the type and layout of heaters and extent of housing

1.7 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.

.2 Provide Departmental Representative, minimum 4 weeks prior to starting concrete work, with valid and recognized certificate from plant delivering concrete.

.1 Provide test data and certification by qualified independent inspection and testing laboratory that materials and mix designs used in concrete mixture meet specified requirements.

.3 Minimum 4 weeks prior to starting concrete work, provide proposed quality control procedures for review by Departmental Representative on following items:

.1 Falsework erection.

.2 Hot weather concrete.

.3 Cold weather concrete.

.4 Curing.

.5 Finishes.

.6 Formwork removal.

.7 Joints.

.4 Quality Control Plan: provide written report to Departmental Representative verifying compliance that concrete in place meets performance requirements of concrete as established in PART 2 - PRODUCTS.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements:

.2 Concrete hauling time: deliver to site of Work and discharged within 120 minutes maximum after batching.

.1 Modifying maximum time limit without receipt of prior written agreement from Departmental Representative and concrete producer as described in CSA A23.1/A23.2. is prohibited.

.2 Deviations submitted for review by Departmental Representative.

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

.3 All materials to be delivered to site in original sealed containers, clearly marked with the manufacturer's name, brand name, type of materials, batch number and date of manufacture.

.4 Deliver, store, handle, and apply products in accordance with the manufacturer's written instructions.

.5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials in accordance with Section 01 74 19 - Waste Management and Disposal.

1.9 SITE CONDITIONS

.1 Placing concrete during rain or weather events that could damage concrete is prohibited.

.2 Protect newly placed concrete from rain or weather events in accordance with CSA A23.1/A23.2.

.3 Cold weather protection:

.1 Maintain protection equipment, in readiness on Site.

.2 Use such equipment when ambient temperature below 5°C, or when temperature may fall below 5°C before concrete cured.

.3 Placing concrete upon or against surface at temperature below 5°C is prohibited.

.4 Hot weather protection:

.1 Protect concrete from direct sunlight when ambient temperature above 27°C.

.2 Prevent forms of getting too hot before concrete placed. Apply accepted methods of cooling not to affect concrete adversely.

.5 Protect from drying.

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 Portland Cement: in accordance with CSA A3000, Type GU.

.1 Supplementary cementing materials: a portion of the Portland cement may be replaced with supplementary cementing materials. Supplementary cementing materials to be fly ash and/or silica fume. The Departmental Representative reserves the right to limit their proportions to 20% and 10% respectively in the mix.

.1 The supplier of the Portland limestone cement shall be from the MTO Designated Sources for Material list. Concrete made with Portland cement and Portland limestone cement shall not be used in the same component. Portland limestone cement shall not be used in combination with limestone filler.

.2 Portland limestone cement or limestone filler shall not be used in concrete exposed to a sulphate environment.

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

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

.4 Admixtures:

.1 Air entraining admixture: to ASTM C260/C260M.

.2 Chemical admixture: to ASTM C494/C494M or ASTM C1017/C1017M. Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.

.3 The Contractor shall ensure that the chemical admixtures to be used are compatible with each other and that the performance of the concrete will not be negatively affected.

.4 The Contractor shall use only chemical admixtures specified in the Contract Documents. Specialty chemical admixtures may be used when approved by the Departmental Representative.

.5 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents to CSA A23.1/A23.2.

.1 Compressive strength: 45 MPa at 28 days.

.6 Curing compound: to CSA A23.1/A23.2 white and ASTM C309.

.7 Premoulded joint fillers:

.1 Bituminous impregnated fibre board: to ASTM D1751.

.2 Bonding agent: Portland cement, Type GU, and sand in the ratio of 1:1 by volume and sufficient water to produce a consistency so that it can be applied with a stiff brush to the existing concrete in a thin even coating that will not run or puddle.

.8 Polyethylene film: minimum 100 µm thickness.

.9 Proprietary patch materials for partial depth concrete repairs:

.1 Must be an approved product from the MTO Designated Source Material List.

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 in Quality Control Plan.

.2 Provide concrete mix to meet following plastic state requirements:

.1 For joint end dams:

1. Compressive Strength at 28 days: 35MPa
2. Aggregate size: 13.2mm maximum.
3. Superplasticizer: Used in expansion joints with cross slopes of 4% or less.
4. Initial slump: 40mm ± 20mm
    1. Superplasticizer will be added on-site according to the written manufacturer's instructions.
    2. After the addition of the superplasticizer, the air content will be 8.0% ± 1.5% and the slump be 150 mm ± 30mm.
5. Exposure Class: C-1.
6. Or proprietary material approved by the Departmental Representative.

.3 Provide quality management plan to ensure verification of concrete quality to specified performance.

.4 Concrete supplier's certification: both batch plant and materials meet CSA A23.1/A23.2 requirements.

Part 3 Execution

3.1 PREPARATION

.1 Remove all sawdust, chips, construction debris and other deleterious materials from the interior of forms.

.2 Remove all snow and ice from any surface against which new concrete is to be placed.

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

.4 Abrasive blast-clean existing concrete surfaces, clean with compressed air, and establish saturated-surface-dry (SSD) substrate conditions prior to placing new concrete on it.

3.2 INSTALLATION/APPLICATION

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

.2 Anchor bolts:

.1 Grout anchor bolts in preformed holes or holes drilled after concrete has set only after receipt of written approval from Departmental Representative.

.1 Drilled holes: 25 mm minimum diameter larger than bolts used.

.2 Protect anchor bolt holes from water accumulations, snow, and ice build-ups.

.3 Set bolts and fill holes with epoxy grout, if required, that is approved by the Ministry of Transportation Ontario. Notify the Departmental Representative in writing which product will be used at least 72 hours prior to installation

.4 Locate anchor bolts used in connection with expansion shoes, rollers, and rockers with due regard to ambient temperature at time of erection.

.3 Grout under base plates using procedures in accordance with manufacturer's recommendations which result in 100 % contact over grouted area.

.4 Joint fillers:

.1 Furnish filler for each joint in single piece for depth and width required for joint, unless otherwise authorized by Departmental Representative.

.2 When more than one piece required for joint, fasten abutting ends and hold securely to shape by stapling or other positive fastening.

.3 Locate and form construction joints as indicated.

.4 Install joint filler.

.5 Use 12 mm thick joint filler to separate slabs-on-grade from vertical surfaces and extend joint filler from bottom of slab to within 12 mm of finished slab surface unless indicated otherwise.

3.3 FINISHING

.1 Finish concrete to CSA A23.1/A23.2.

.2 Use procedures as reviewed by Departmental Representative or those noted in CSA A23.1/A23.2 to remove excess bleed water. Ensure surface not damaged.

.3 All formed surfaces to receive the basic treatment and all exposed surfaces to receive a smooth form finish.

.4 Basic treatment:

.1 Upon removal of the forms, fill all cavities, honeycomb, surface voids, bugholes (greater than 6 mm in diameter) and other deficiencies as identified by the Departmental Representative with a sand cement mortar of the same composition as that used in the concrete or an approved proprietary patch repair product.

.2 Remove all bolts, ties, nails, or other metal not specifically required for construction purposes, or cut back to a depth of 25 mm from the surface of the concrete unless otherwise directed by the Departmental Representative. Fill the depressions with a grout or proprietary patch repair product.

.3 Fins, unsightly ridges, or other imperfections to be chipped or rubbed off flush with the surface.

.4 Patches in excess of 25 mm to be applied in layers not exceeding 25 mm with a 30-minute interval between the placing of layers. The surface of the patch to be textured equivalent to the adjacent concrete.

.5 Do not repair honeycomb areas or cavities exceeding 25 mm in diameter until inspected by the Departmental Representative.

.6 Where honeycombing has occurred in non-structural elements, remove the affected area, and fill with mortar or proprietary patch repair product.

.7 Where honeycombing has occurred in structural elements, carry out the corrective method of treatment as directed by the Departmental Representative.

.8 Maintain concrete saturated for one hour prior to the application of the repair product.

.5 Smooth form finish:

.1 Smooth form finish to be high quality concrete which has been homogeneously placed and thoroughly compacted. Smooth form finish to be uniform in colour, pattern and texture.

.2 Elements to have smooth form finish include curbs, sidewalks, parapet walls, abutments, piers, and any other surfaces designated by the Departmental Representative.

.3 Perform the basic treatment as previously described. Remove stains, rust marks, or other blemishes.

.4 If the concrete, after stripping the forms and performing the basic treatment, does not exhibit a smooth form finish, perform corrective measures as directed by the Departmental Representative.

.5 Leave concrete surfaces against which new concrete is to be placed with a rough surface finish.

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

.7 Do not treat concrete surface with cement slurry or paste.

.8 Select proprietary patch repair products to achieve uniformity of colour and appearance.

.9 Prevent contamination by oil or other deleterious substances.

3.4 CURING

.1 Protect and cure in accordance with CSA A23.1/A23.2.

.2 Begin curing immediately after concrete finishing without damaging the surface.

.3 Cure to be achieved by one or more of the following:

.1 Burlap:

.1 Pre-soak burlap by immersing it in water for a period of at least 24 hours prior to placing concrete.

.2 Prevent burlap from freezing during cold weather.

.3 Carefully lay 2 layers of burlap on the surface as soon as the concrete has sufficiently set to support the burlap.

.4 Do not allow water to drip, flow, or puddle on the concrete surface.

.5 Strips to be overlapped 150 mm, secured to the surface, and kept continuously wet during the curing period.

.6 Cover with a moisture vapour barrier immediately following the placement of the burlap.

.7 Water used for curing to be clean and free from any material which could cause staining or discoloration of the concrete.

.8 Burlap to be free from holes, clay or other substances which would have a deleterious effect on concrete.

.2 Moisture vapour barrier:

.1 Provide an effective vapour barrier and prevent any flow of air between it and the concrete surface.

.2 Overlap sheets by 150 mm and secure the vapour barrier to the surface without damaging the concrete.

.3 Curing compound:

.1 Curing compound may be approved by the Departmental Representative in circumstances where it is impracticable to wet cure and where curing compounds will not affect the appearance of the concrete.

.2 Curing compound only permitted on non-structural elements.

.3 Do not use curing compound where a bond is required for additional concrete.

.4 Apply curing compounds as per the manufacturer's recommended rate.

.5 Do not apply curing compounds on construction joints, surfaces requiring waterproofing sealants or deck sections.

.4 Curing formed surfaces:

.1 Remove forms for barrier walls and curb on deck no later than 24 hours after concrete placement and cure concrete with burlap and water for the remainder of the curing period.

.2 When ambient temperature 5°C or less, forms for barrier walls and curb on deck may be left in place for the duration of the curing period for all concrete other than high performance concrete.

.3 Other formed surfaces require no additional curing where the formwork is left in place for the minimum specified curing period. Where the formwork is removed prior to the curing period is completed, formed surfaces are to be cured with burlap and water for the remainder of the minimum curing period.

.5 Protect all freshly placed concrete from the elements and from defacement due to construction operations, traffic, and vandals.

3.5 COLD WEATHER CONCRETING

.1 Cold weather: conditions when the ambient air temperature is at or below 5 °C. It is also considered to exist when the ambient air temperature is at or is likely to fall below 5 °C within 96 hours after completion of concrete placement. Temperature refers to shade temperature.

.2 Employ special measures detailed in CSA A23.1/A23.2 and this specification when temperature is at or below 5˚C or is likely to fall below 5˚C within 24 hours of concrete placement.

.3 Do not place concrete against any surface which is at a temperature less than 5˚C.

.4 Do not use calcium chloride or other de-icing chemicals as a de-icing agent in the forms.

.5 If heating of the mix water and/or aggregates is specified, alter the charging cycle to prevent flash setting of the concrete. Do not heat water or aggregates above 80˚C. Water and/or aggregates heated to a temperature in excess of 40˚C, to be batched in the mixer first to reduce the temperature of the combination below 40˚C, prior to the addition of the cementing materials.

.6 Provide the following methods of protection, depending on the outside temperature. Heating of the mix water and/or aggregates is required for all classes of protection.

.1 Special protection:

.1 When the outside temperature is below 5˚C and above 0˚C, provide adequate covering of all surfaces with tarpaulins or polyethylene sheets.

.2 Special protection with insulation:

.1 When the outside temperature is below 0˚C and above -5˚C, cover all surfaces with an approved insulating material, over which tarpaulins or polyethylene sheets are placed.

.3 Complete housing with heat:

.1 When the outside temperature during placing or during the protection period may fall below -5˚C, a complete housing of the concrete, together with supplementary heat, is to be provided.

.2 Ensure heat is uniformly supplied to the concrete.

.3 For mass concrete, defined as minimum section dimension in excess of 2 metres, the temperature gradient is to not exceed 20˚C/m from the interior of the element to the exterior face.

.4 In thin sections, less than 2 m, the temperature differential from the interior to the exterior is not exceed 20˚C.

.5 Steam or hot air blowers may be used, but a means of maintaining relative humidity of not less than 95% is to be provided.

.6 When dry heat is used, hot air is not be permitted to flow directly onto the concrete surface.

.7 Vent exhaust fumes.

.4 Maintain the concrete above 10˚C for 5 consecutive days after placing concrete.

.5 Maintain the concrete above 0˚C for a total period of 14 days

3.6 SURFACE TOLERANCE

.1 Formed and unformed surfaces to be such that when tested with a 3 metre long straight edge placed anywhere in any direction on the surface, there is no gap greater than 6 mm between the bottom of the straight edge and the surface of the concrete. When the straight edge is placed across a construction joint, the gap between the straight edge and the surface of the concrete is not be greater than 3 mm.

3.7 FIELD QUALITY CONTROL

.1 Site tests: conduct tests as follows in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.1 Concrete pours.

.2 Slump.

.3 Air content.

.4 Compressive strength at 7 and 28 days.

.5 Air and concrete temperature.

.2 Inspection and testing of concrete and concrete materials carried out by testing laboratory designated by Departmental Representative for review to CSA A23.1/A23.2.

.1 Ensure testing laboratory certified to CSA A283.

.3 Ensure test results are distributed for discussion at pre-pouring concrete meeting between testing laboratory and Departmental Representative.

.4 Departmental Representative will take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.

.5 Non-Destructive Methods for Testing Concrete: to CSA A23.1/A23.2.

.6 Inspection or testing by Consultant not to augment or replace Contractor quality control nor relieve Contractor of contractual responsibility.

.7 For the purpose of concrete acceptance on the basis of concrete strength, cylinders shall be made and cured according to CSA A23.1/A23.2-3C, under standard moisture and temperature conditions, and tested according to CSA A23.1/A23.2-9C.

.1 A compressive strength test result is the average strength of two standard 100 x 200 mm or 150 x 300 mm concrete cylinders that are representative of concrete taken from one batch of concrete.

3.8 CLEANING

.1 Clean in accordance with Section 01 74 00 - Cleaning.

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 – Waste Management and Disposal.

.1 Divert unused concrete materials from landfill to local 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 unused admixtures and additive materials (pigments, fibres) from landfill to official hazardous material collections site as approved by Departmental Representative.

.4 Disposal of unused admixtures and additive materials into sewer systems, into lakes, streams, onto ground or in other location to pose health or environmental hazard is prohibited.

.5 Prevent admixtures and additive materials from entering drinking water supplies or streams.

.6 Using appropriate safety precautions, collect liquid or solidify liquid with inert, noncombustible material and remove for disposal.

.7 Dispose of waste in accordance with applicable local, Provincial/Territorial, and National regulations.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 13 34 10 – Pile Structural Repair.

.2 Section 31 53 13 – Timber Cribwork.

1.2 REFERENCE STANDARDS

.1 American Concrete Institute (ACI)

.1 ACI 304R-00 (R2009), Guide for Measuring, Mixing, Transporting and Placing Concrete.

.2 CSA Group (CSA)

.1 CSA A23.1:19/A23.2:19, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.3 ASTM International (ASTM)

.1 ASTM C109/C109M-20b, Standard Method for Compressive Strength of Hydraulic Cement Mortars.

.2 ASTM C307-18, Standard Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacings.

.3 ASTM C494/C494M-19, Standard Specification for Chemical Admixture for Concrete.

.4 ASTM C496/C496M-17, Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens.

.5 ASTM C579-18, Standard Test Methods for Compressive Strength of Chemical Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.

.6 ASTM C827/C827M-16, Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures.

.7 ASTM C1090/C1090M-15, Standard Test Method for Measuring Changes in Height of Cylindrical Specimens of Hydraulic-Cement Grout

1.3 DEFINITIONS

.1 Tremie concrete: concrete placed underwater through tube called tremie pipe.

.2 Tremie pipe: pipe has hopper at upper end and may be open ended or may have foot valve, plug or travelling plug to control flow of concrete. Pipe has diameter of 200 mm minimum, constructed from sections with flange couplings fitted with gaskets.

.1 Concrete is placed in hopper and sufficient head of concrete is maintained in tremie pipe to provide desired rate of flow.

.3 Pumped concrete method: method of placing concrete underwater uses concrete pump with discharge line used in similar manner to tremie pipe.

.4 Bottom-dump bucket method: method of placing concrete underwater requires use of bucket designed to discharge from bottom after it has contacted foundation or surface of previously placed concrete.

.5 Bagged concrete method: method of placing underwater concrete consists of diver placing bags partially filled with dry concrete mix.

.6 Grout Tube Method: method of placing underwater grout by providing water-tight grout tube sized to provide free flow of grout.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Concrete pre-placement meeting; conduct pre-placement meeting 2 weeks minimum before tremie operation.

.1 Ensure meeting includes as minimum attendees as follows:

.1 General contractor.

.2 Ready-mix concrete supplier.

.3 Admixture supplier.

.4 Placing/formwork sub-contractor.

.5 Reinforcing sub-contractor.

.6 Testing agency representative.

.7 Structural engineer.

.8 Owners representative.

.2 Distribute minutes to attendees including copies of concrete mix designs, aggregate physical properties, placing schedule, rate of delivery, testing program, and, contingency plan for delay and breakdown.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for concrete and include product characteristics, performance criteria, physical size, finish, and limitations.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and 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 Store and protect concrete and grout from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 GROUT MIXES

.1 28-Day strength of 40 MPa when tested to ASTM C109/C109M.

.2 Volume change at 14 days of + 0.04% to + 0.08% when tested to ASTM C1090/C1090M.

.3 Grout shall have an anti-washout admixture and be capable of being placed by Tremie Methods.

.4 Grout shall have shrinkage compensating admixtures to provide a non-shrink grout.

.5 Grout can be a ready-mix grout meeting the specified requirements or a proprietary product.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for concrete placement installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.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 PREPARATION

.1 Where concrete must bond to existing surfaces, clean surfaces before starting concrete placement.

.1 Use water jets, mechanical scrapers, or other means, as approved by Departmental Representative.

3.3 INSTALLATION

.1 Do concrete and grout work in accordance with Section and to CSA A23.1/A23.2. Testing for concrete to CSA A23.1/A23.2. Testing for grout to ASTM C109/C109M and C1090.

.2 Where concrete placement extends above water surface, protect concrete from direct contact with air at temperature below 5 degrees C for 7 days.

.3 Place concrete in one continuous operation to full depth required.

.1 Supply complete equipment for every phase of operation.

.2 Provide sufficient supply of concrete to complete pour without interruption.

.4 Tremie method:

.1 Provide water-tight tremie pipe sized to allow free flow of concrete. Diameter of tremie pipe to be minimum eight times maximum size of coarse aggregate.

.2 Provide hopper at top of tremie pipe and means to raise and lower tremie pipe.

.3 Provide plug or foot valve at bottom of tremie pipe to permit filling pipe with concrete initially.

.4 Do not move tremie pipes laterally through concrete.

.5 Start placement with tremie pipe full of concrete. Keep bottom of pipe buried minimum 300 mm in freshly placed concrete.

.6 If seal is lost, allowing water to enter pipe, withdraw pipe immediately. Refill pipe and continue placing as specified.

.7 If tremie operation is interrupted so that horizontal construction joint has to be made, cut surface laitance by jetting, within 24 hours and remove loose material by pumping or air lifting before placing next lift.

.8 Do not place concrete in flowing water when current exceeds 3 m/min. Do not vibrate, disturb, or puddle concrete after placement.

.5 Pumped concrete method:

.1 Follow procedures as for tremie method in placing concrete using discharge line from concrete pump as tremie pipe.

.2 Pump discharge line diameter: 125 mm minimum.

.6 Grout Tube method:

.1 Provide water-tight grout tube sized to provide free flow of grout.

.2 The size, number and locations or grout tubes is to be designed by the Contractor.

.3 Construction joints are only permitted at locations indicated on the Contract Drawings or as approved by the Departmental Representative.

.4 Grout shall be placed between construction joints in a continuous manner.

.5 Do not vibrate, distribute, or puddle grout after placement.

3.4 STEEL PLATE ANCHORING

.1 Following installation of steel plate and anchorage into concrete cap, core holes through timber and ballast behind.

.2 Seal around steel plate to prevent washout of grout.

.3 Fill holes with underwater grout with anti-washout mixture until hole is full and place threaded rod.

.4 It is anticipated that 0.1 cubic metres of underwater grout will be required for each anchor. If placement of grout exceeds 0.1 cubic metres obtain approval from Departmental Representative before continuing with grouting operation.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools, and equipment in accordance with Section 01 74 00 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 – Waste Management and Disposal.

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

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 03 37 26 – Underwater Placed Concrete and Grout

1.2 REFERENCES

.1 ASTM International

- .1 ASTM A27/A27M-20, Specification for Steel Castings, Carbon, for General Applications.
- .2 ASTM A53/A53M-20, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
- .3 ASTM A108-18, Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
- .4 ASTM A123/A123M-17, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .5 ASTM A307-14e1, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.
- .6 ASTM A314-19, Standard Specification for Stainless Steel Billets and Bars for Forging.
- .7 ASTM A449-14, Standard Specification for Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use
- .8 ASTM A588/A558M-19, Standard Specification for High Strength Low-Alloy Structural Steel, up to 50 ksi [345 MPa] Minimum Yield Point, with Atmospheric Corrosion Resistance
- .9 ASTM A780/A780M-20, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
- .10 ASTM B117-19, Standard Practice for Operating Salt Spray (Fog) Apparatus
- .11 ASTM D4541-17, Test Methods for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
- .12 ASTM B695-04 (2016), Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.
- .13 ASTM F3125/F3125M-19e1, Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040MPa Minimum Tensile Strength

.2 CSA International

- .1 CSA G40.20-13/G40.21-13 (R2018), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel, Includes Update No. 1 (2014).
- .2 CSA S16-19, Design of Steel Structures.
- .3 CSA W47.1:19, Certification of Companies for Fusion Welding of Steel.

.4 CSA W48-18, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).

.5 CSA W59-18, Welded Steel Construction.

.3 Environmental Choice Program

.1 CCD-047-98(R2005), Architectural Surface Coatings.

.2 CCD-048-98(R2006), Surface Coatings - Recycled Water-borne.

.4 Federal Standard (FS).

.1 FED-STD-595C.

.5 Green Seal Environmental Standards (GS)

.1 GS-11-2015, Edition 3.2, Paints and Coatings.

.6 Health Canada / Workplace Hazardous Materials Information System (WHMIS)

.1 Safety Data Sheets (SDS).

.7 National Standards of Canada:

.1 CAN/CGSB-1.181-M92, Ready-Mixed Organic Zinc-Rich Coating.

.8 The Master Painters Institute (MPI)

.1 Architectural Painting Specification Manual – 2020 plus amendments.

.9 The Society for Protective Coatings (SSPC)

.1 SSPC-SP 1-82(R2004), Solvent Cleaning.

.2 SSPC-SP 11, Power Tool Cleaning to Bare Metal.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for sections, plates, pipe, tubing and bolts and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit two copies of WHMIS SDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.1 For finishes, coatings, primers, and paints applied on site: indicate VOC concentration in g/L.

.3 Shop Drawings:

.1 At least two weeks prior to commencement of fabrication, submit to the Departmental Representative, drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario, Canada.

.2 Do not begin fabrication until receiving reviewed and approved signed and sealed shop drawings from the Departmental Representative.

.3 Where multi-discipline engineering work is depicted on the same shop drawing and a single Engineer is unable to seal and sign the shop drawing for all aspects

of the work, the drawing is to be sealed and signed by as many additional Engineers as necessary.

.4 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

.5 Maintain a signed and sealed copy of the shop drawings on site prior to and during installation of the railings and other metal components.

.4 As built drawings:

.1 Prepare as built drawings as follows:

.1 For all work incorporated in the completed structure that required the submission of working drawings.

.2 For all changes from the original Contract requirements.

.2 The as built drawings are to be submitted to the Departmental Representative in a reproducible format such as a Mylar prior to final acceptance of the work.

.3 As built drawings to bear the seal and signature of an Engineer licensed in the province of Ontario, Canada.

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 Section 01 61 00 - Common Product Requirements and 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 Protect components from damage during handling, transportation, storage, and installation.

.4 Storage and Handling Requirements:

.1 Store materials off ground, in a dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

.5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials.

Part 2 Products

2.1 MATERIALS

.1 Joint armouring:

.1 Steel plates: to CSA G40.20/G40.21 300W

.2 Anchoring studs: to ASTM A108

.2 Ladder and Protective Cage: to CSA G40.20/G40.21 300W

.3 Haul Block: to CSA G40.20/G40.21 300W.

.4 Structural Steel Plates: to CSA G40.20/G40.21 300W

.5 Bolts, anchor studs, plates, washers, and nuts shall be hot dip galvanized. Lock nuts shall be zinc plated according to ASTM-B695.

.6 Welding materials: to CSA W59.

.7 Welding electrodes: to CSA W48 Series.

.8 Grout: non-staining, non-shrink cement based grout or non-staining, non-shrink epoxy based grout and as specified in the Contract Documents.

.9 Epoxy Resin: injectable and suitable for underwater applications.

.10 Paint to be as specified in the Contract Documents.

.11 Zinc-rich paint: To be according to CAN/CGSB-1.181.

.12 Anchorage assembly:

.1 Anchorage assemblies to be as specified in the Contract Documents.

.2 The anchorage assembly to be supplied with the bolts installed in a template.

2.2 FABRICATION

.1 Fabricated steel components according to the shop drawings. Only perform field modifications if approved by the Departmental Representative.

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

.3 Use self-tapping shake-proof flat headed screws on items requiring assembly by screws or as indicated.

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

.5 Grind or file exposed welds and steel sections smooth.

.6 Shop fabricate components in sections as large and complete as practicable.

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

.8 Where welding is required, fabricator is to be certified according to Division 2.1 of CSA W47.1.

.9 All flame cut edges to be as smooth and regular as those produced by edge planing and be free of slag.

2.3 FINISHES

.1 Galvanizing: hot dipped galvanizing to ASTM 123/123M. All steel surfaces to be hot dipped galvanized.

2.4 SHOP PAINTING

.1 Apply one shop coat of primer to metal items, with exception of galvanized or concrete encased items.

.2 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 degrees C.

.3 Clean surfaces to be field welded; do not paint.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections are acceptable for metal fabrications installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of the Departmental Representative.

.2 Inform the 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 ERECTION

.1 Do welding work in accordance with CSA W59 unless specified otherwise.

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

.3 Provide suitable means of anchorage acceptable to Departmental Representative such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.

.4 Exposed fastening devices to match finish and be compatible with material through which they pass.

.5 Supply components for work by other trades in accordance with shop drawings and schedule.

.6 Make field connections with bolts to CSA S16.

.7 Deliver items over for casting into concrete together with setting templates to appropriate location and construction personnel.

.8 Touch-up field welds, bolts and burnt or scratched surfaces with primer after completion of:

.1 Primer: maximum VOC limit 250 g/L to GS-11.

.9 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.

.1 Primer: maximum VOC limit 250 g/L to GS-11.

3.3 ANCHORAGES

.1 Anchorage assemblies shall be installed as specified in the Contract Documents.

.2 Anchorages installed before concrete placement:

.1 When specified in the Contract Documents, anchorage components are to be installed prior to placing concrete and be securely tied to reinforcing steel. Anchorage assemblies to be positioned with templates and installed securely in the formwork to maintain the position of the anchors during placement of concrete.

.3 Anchorages installed after concrete placement:

.1 When specified in the Contract Document, anchorages are to be installed after concrete placement. Holes are to be core drilled or galvanized grout cans installed as indicated on the Contract Drawings, anchoring grout placed, and anchors properly positioned at locations specified. The placement of the anchoring agent and the anchors are to be according to the manufacturer's recommendations, except as modified herein. The holes are to be free of dust and debris immediately prior to placement of the anchoring agent. When the anchoring agent fails to fill the hole after insertion of the anchor, additional anchoring agent is to be immediately added to fill the hole.

.2 When a cement based grout is used as the anchoring agent, the holes are to be pre-dampened for a period of 1 hour and any free water is to be removed prior to the application of the cement based grout.

.3 When an epoxy grout is specified as the anchoring agent, the inside surface of the holes is to be roughened and dry prior to the application of the epoxy grout.

.4 Where anchors are inserted into horizontal or inclined holes in a vertical face, the anchors are to be maintained in position during the setting of the anchoring agent. Prevent loss of anchoring agent from the holes.

3.4 GALVANIZED COATING REPAIR

.1 Coating system to be approved by the Departmental Representative.

.2 Structural coating material to be low volatile organic compounds (VOC).

.3 All paint coating materials for repair to be brush applied according to manufacturer’s product data sheets.

3.5 QUALITY CONTROL

.1 A completed Certificate of Conformance to be submitted to the Departmental Representative upon completion of the work signed and sealed by an Engineer licensed in the Province of Ontario confirming that the following are in general conformance with the requirements of the Contract Documents:

.1 Materials

.2 Fabrication

.3 Installation and adjustments

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools, and equipment in accordance with Section 01 74 00 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling.

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

3.7 PROTECTION

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

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

END OF SECTION

Part 1 GENERAL

1.1 REFERENCES

.1 ASTM International:

.1 ASTM A123/A123M-17, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.2 ASTM A307-14e1, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60000 PSI Tensile Strength.

.2 American Wood Protection Association (AWPA):

.1 AWPA M4-15, Standard for the Care of Preservative-Treated Wood Products.

.2 AWPA P5-15, Standard for Waterborne Preservatives.

.3 AWPA P8-14, Standard for Oil-borne Preservatives.

.3 CSA International:

.1 CSA B111-1974 (R2003), Wire Nails, Spikes and Staples.

.2 CAN/CSA-O80 Series-15 (R2020), Wood Preservation.

.3 CSA O86:19, Engineering Design in Wood

.4 CSA 0141:05 (R2019), Softwood Lumber

.4 SAE International:

.1 SAE_J995 (R201707), Mechanical and Material Requirements for Steel Nuts.

.5 Forest Stewardship Council:

.1 FSC-STD-CAN-1-2018 EN V1-0, FSC National Forest Stewardship Standard of Canada

.2 FSC-STD-20-002-2009, Structure and Content of Forest Stewardship Standards V3-0

.3 FSC Accredited Certified Bodies.

.6 National Lumber Grades Authority (NLGA):

.1 Standard Grading Rules for Canadian Lumber 2017.

.7 Sustainable Forestry Initiative:

.1 SFI-2010-2014 Standard.

.8 International Organization for Standardization (ISO):

.1 ISO 898-1:2013, Mechanical properties of fasteners made of carbon steel and alloy steel.

1.2 QUALITY ASSURANCE

.1 All lumber shall be Spruce Pine Fir (SPF) SS.

.2 Lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

.3 All wood with preservative treatment shall be marked using a certification mark authorized by the Canadian Wood Preservers Bureau (CWPB).

.4 Splits and checks in all treated wood shall not exceed the following limits:

.1 The width of splits and checks at the surface shall not exceed 6 mm.

.2 Splits shall not exceed in length any of the following:

.1 Twice the member thickness.

.2 One and one half times the member width.

.3 One quarter of the member length.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Handling and storage of wood shall be according to CSA 080 Series.

.2 Wood shall be free of dirt and stored in a location which will not create an excessive increase in temperature resulting in rapid drying of the material. Wood shall be stored in a manner which will prevent ponding or trapping of excess moisture between surfaces where it cannot dry readily.

.3 When oil treatment is used, the wood shall be given three coats of creosote oil to repair all cuts, abrasions, and holes after the initial preservative treatment. Each coat shall be dry before the next coat is applied.

.4 Repair of cuts, abrasions, and holes in material treated with water-borne preservatives shall be according to CSA 080 Series.

.5 Replace defective or damaged materials with new.

Part 2 PRODUCTS

2.1 MATERIALS

.1 Wood:

.1 All wood shall be new and conform to the grade, species, size, and surface finish specified.

.2 Wood to be kiln dried.

.3 All wood shall be sourced in accordance with Forest Stewardship Council of Canada Guidelines.

.2 Preservative: chromated copper arsenate (CCA) to AWPA P5 as amended by CSA 080 Series

2.2 ACCESSORIES

.1 Fasteners: All fasteners, nuts, washers, and plate washers called for on the drawings shall conform to the applicable standard and shall be galvanized.

.2 Nails, spikes, and staples to CSA B111.

.3 Threaded rod: 19 mm diameter unless indicated otherwise, complete with nuts and washers to ASTM A307.

.4 Steel splice plates: to CSA G40.20/G40.21, grade, and types 300W.

.5 Drift pins: 19 mm diameter unless indicated otherwise, in accordance with ASTMA307.

.6 Shims: To be hardwood timber wedges, cut to fit and driven tight at locations indicated on the Contract Drawings. Shims shall be installed over full width of stringers and shall secured with two wood screws per shim.

2.3 FINISHES

.1 Galvanizing: to ASTM A123/A123M, use galvanized fasteners for all work.

Part 3 EXECUTION

3.1 PRESERVATIVE

.1 All wood to be pressure preservative treated.

.2 Wood treated using oil borne preservatives shall be subjected to a vacuum expansion bath at a treatment plant according to CSA 080 Series to produce a material that is free of excessive surface oil. Wood treated using water borne preservatives shall have an average moisture content not exceeding 25% at 25 mm depth below the surface prior to preservative treatment.

3.2 PREPARATION

.1 Re-treat surfaces exposed by cutting, trimming, or boring with liberal brush application of preservative before installation.

.2 Holes shall be prebored as specified in the Contract Documents. Holes shall be aligned, and the threaded rods / drift pins shall be driven, with a hammer not larger than 1.0 kg, in order to make the connection.

.3 Holes for drift pins shall be prebored not less than 0.8 mm nor more than 1.0 mm smaller than the drift pin diameter.

.4 Holes for threaded rod shall be prebored not less than 1.0 mm nor more than 2.0 mm larger than the threaded rod diameter.

3.3 INSTALLATION

.1 Treat surfaces of pressured treated wood which are cut or bored after pressure treatment with field applied wood preservative.

.2 Install members true to line, levels, and elevations, square and plumb to a tolerance of 1:600 and rigidly secure in place.

.3 Washers shall be placed under all threaded rod nuts. Fastenings shall be tightened sufficiently to bring the faces of connected members into close contact without deformation. Excess threaded rod lengths of more than 50 mm shall be cut off to a level where at least 5 threads are still extending beyond the nut. The cut ends of galvanized threaded rod shall receive 2 coats of zinc rich paint. After final tightening, all nuts shall

be checked, and threads burred effectively with a pointing tool to prevent loosening. Field cuts or damaged surfaces shall be touched-up with a zinc rich paint within 10 hours of exposure.

3.4 PROTECTION

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

.2 Repair damage to adjacent materials caused by rough carpentry installation.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Ontario Provincial Standard Specification

- .1 OPSS.PROV 911 Construction Specification for Coating Structural Steel Systems, November 2014
- .2 OPSS.PROV 1704 Material Specification for Paint Coating Systems for Structural Steel, November 2014

.2 Ministry of Transportation (MTO) Designated Sources List DSM # 9.20.39, Structural Coatings – Low VOC.

.3 The Society for Protective Coatings (SSPC)

- .1 SSPC-SP 1, Solvent Cleaning.
- .2 SSPC-SP 2, Hand Tool Cleaning.
- .3 SSPC-SP 3, Power Tool Cleaning.
- .4 SSPC-SP 10/NACE No.2, Near White Metal Blast Cleaning
- .5 SSCP-SP 11, Power Tool Cleaning to Bare Metal
- .6 SSPC-V-3, Guide and Reference Photographs for Steel Surfaces Prepared By Power and Hand Tool Cleaning
- .7 SSPC-PA 2, Procedure for Determining Conformance to Dry Coating Thickness Requirements.
- .8 SSPC Good Painting Practice, Volume 1, 5th Edition.
- .9 Manufacture’s current product data sheets must be used in conjunction with, and form part of, this specification. Where contradictions occur, the most stringent requirement that will produce the best quality and durability of the coating system as judged by the Departmental Representative, thus protecting the structure, shall be used.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00

.2 Submit painting plan designating the locations and order of painting as well as locations of laps in coating system layers.

.3 Product Data:

- .1 Submit manufacturer's instructions, printed product literature and data sheets for painting exterior metal surfaces and galvanized coating touch-ups and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit copies of WHMIS SDS.

.4 Samples:

- .1 Submit for review and acceptance 1 L of each unit to the Department Representative for analysis and acceptance prior to commencing work.

.2 Mark samples with name of project, its location, paint manufacturer's name and address, name of paint and manufacturers paint code number.

.3 Enable Departmental Representative to take 1 L samples of each paint delivered to site, one sample from manufacturer's containers and one sample from painters' pot.

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

.6 Test Reports

1.3 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.

1.4 QUALITY ASSURANCE

.1 Preconstruction Testing:

.1 Provide suitable facilities and cooperate with Departmental Representative in carrying out inspection and tests required.

Part 2 Products

2.1 MATERIALS

.1 Paint components shall comprise a coating system from a single manufacturer, suitable for application to steel surfaces.

.2 Paint for existing and new steel shall be comprised of the following coating system components known to be compatible with the existing bridge coating system. Other products equivalent to those listed could be accepted by Departmental Representative if proved to be compatible with existing system:

.1 Two Coats: Bar-Rust 233H

.3 Colours: Match existing paint colour where painting affected steel work. Colours to be approved by Departmental Representative.

.4 All materials must be applied in a climate controlled environment which is in accordance with the manufacturer’s recommendations and this specification.

2.2 ALTERNATIVES

.1 Due to compatibility issues, alternatives to specified paint system will not be considered.

2.3 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for structural steel installation in accordance with manufacturer's written instructions.

Part 3 Execution

3.1 PREPARATION

.1 Remove existing loose and rusted paint from exterior metal surfaces.

.2 Metal surfaces to be repainted in the field:

.1 Clean surfaces by removing loose, cracked, brittle or non-adherent paint, rust, loose mill scale, welding slag, dirt, oil, grease, existing paint on faying surfaces of new connections and other foreign substances. Existing surfaces within the bolt pattern of new steel elements and a distance of 50 mm beyond the new metal shall be cleaned to requirements of SSPC-SP 11 Power Tool Cleaning to Bare Metal with a Bristle Blaster (MBX) or other equivalent tool approved at the sole discretion of the Departmental Representative. Clean existing coating within 300 mm of the edge of the new coating by power washing using potable water to remove all contaminants. The edges of the existing coating shall be feathered into areas cleaned to bare steel so that at least 4 mm of each coat of the existing coating is exposed.

.2 Solvent cleaning to SSPC-SP 1 shall be used to remove grease and oil prior to power tool cleaning.

.3 Scrape edges of old paint back to sound material where remaining paint doesn't show signs of debonding and feather exposed edges.

.3 Metal surfaces to be painted in the shop: comply with OPSS.PROV 911.

.1 Solvent cleaning to SSPC-SP 1.

.2 Near white blast cleaning to SSPC-SP 10

.4 Solvent cleaning shall be used to remove grease and oil prior to abrasive blast cleaning.

.5 Galvanized coating repair in the field:

.1 Clean surfaces of all weld slag, rust, dirt, oils, dust or other deleterious substances in accordance with the following:

.1 Power Tool Cleaning to Bare Metal to SSPC-SP 11 or in accordance with the manufacturers written instructions.

.2 Solvent cleaning to SSPC-SP 1.

.2 Solvent cleaning shall be used to remove grease and oil prior to power tool cleaning.

.6 Compressed air to be free of water and oil before reaching nozzle.

.7 Remove traces of loose paint after cleaning from surfaces, pockets and corners to be painted by: brushing with clean brushes, by blowing with clean dry compressed air, or by vacuum cleaning.

.8 Apply paint after prepared surfaces have been accepted by Departmental Representative.

.9 Prior to starting paint application ensure degree of cleanliness of surfaces is to SSPC-Vis3 for field painting.

.1 Apply one coat after surface has been cleaned and before deterioration of surface occurs.

.2 Clean surfaces again if rusting occurs after completion of surface preparation.

.10 Mixing paint:

.1 Follow manufacturer's instructions for mixing, straining, and thinning paint. In addition to the manufacturer's instruction:

.1 Do not dilute or thin paint for brush application.

.2 Mix ingredients in container before and during use and ensure breaking up of lumps, complete dispersion of settled pigment, and uniform composition.

.3 Do not mix or keep paint in suspension by means of air bubbling through paint.

.4 Thin paint for spraying according to manufacturer's written instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Departmental Representative.

.11 Number of paint coats (field painting):

.1 One primer coat to minimum dry film thickness of 100 µm and to a maximum of 150 µm.

.2 One top coat to a minimum dry film thickness of 100 µm.

.3 Follow the written manufacturer's recommendations if the dry film thickness differ from those given above.

.12 For the paint system submitted the optimum dry film thickness and the manufacturer's acceptable range for each layer shall be submitted for review as part of the review process. The Departmental Representative reserves the right to reduce the range and require stricter control if it is deemed that the range is too large compared to the range of other manufacturers products and to require the Contractor to come closer to the optimum thickness.

3.2 APPLICATION

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

.2 Apply paint by brushing or spraying. Use sheepskins or daubers when no other method is practical in places of difficult access.

.3 Use dipping or roller coating method of application when specifically authorized by Departmental Representative in writing.

.4 The Contractor shall provide enclosures and indirect (dry) heat to maintain air and surface temperatures within the manufacturer's prescribed limits during painting and curing operations both to maintain adequate conditions for coating / curing and to ensure curing is completed within the available working time as required.

.5 Do not apply paint when:

.1 Air temperature is below 5 degrees C or when temperature is expected to drop to 0 degrees C before paint has dried.

.2 Temperature of surface is over 50 degrees C unless paint is specifically formulated for application at high temperatures.

.3 Fog or mist occurs at site; it is raining or snowing; there is danger of rain or snow; relative humidity is above 85%.

.4 Surface is wet, damp, frosted, or contaminated with dirt or chlorides.

.5 Previous coat is not dry.

.6 Adequate ventilation shall be provided to ensure proper curing and a safe working environment.

.7 Supply cover when paint must be applied in damp or cold weather. Shelter or heat surface and surrounding air to comply with temperature and humidity conditions specified. Protect until paint is dry or until weather conditions are suitable in accordance with Manufacturer's specifications.

.8 Remove paint from areas which have been exposed to freezing, rain, snow or condensation. Prepare surface again and repaint.

.9 Apply each coat of paint as continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.10 Brush application:

.1 Work paint into cracks, crevices and corners and paint surfaces not accessible to brushes by spray, daubers or sheepskins.

.2 Brush out runs and sags.

.3 Remove runs, sags and brush marks from finished work and repaint.

.11 Shop Painting:

.1 Paint 3 coats in shop according to requirements of OPSS.PROV 911. Paint faying surfaces with primer coat only.

.12 Field Painting:

.1 Touch up metal which has been shop coated with same type of paint and to same thickness as shop coat. This touch-up to include cleaning and painting of field connections, welds, rivets, nuts, washers, bolts, and damaged or defective paint and rusted areas.

.2 Field paint surfaces (other than faying surfaces) which are accessible before erection but which are not to be accessible after erection.

.3 The surface within the bolt pattern and for a distance of 50 mm beyond the new metal shall receive only the prime coat of paint prior to assembly. Prime coated surfaces that are exposed after assembly shall receive the second and third coats of the paint system after cleaning of the surfaces according to the manufacturer's recommendations.

.4 Where painting does not meet with requirements of specifications, and when so directed by Departmental Representative remove defective paint, thoroughly clean affected surfaces and repaint in accordance with these specifications.

.13 Handling painted metal:

.1 Handle painted metal after paint has dried, or when necessary for handling for painting or stacking for drying.

.2 Scrape off and touch up paint which is damaged in handling, with same number of coats and kinds of paint as were previously applied to metal.

3.3 FIELD QUALITY CONTROL

.1 Site Tests, Inspections:

.1 Upon completion of the painting procedures test for dry film reading and evaluate the results as per SSPC-PA 2. Submit results to the Department Representative within 72 hours.

.2 Departmental Representative may engage the services of a coating inspector for quality control purposes.

3.4 CLEANING

.1 Progress Cleaning:

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

.2 Remove debris, trim surfaces and leave work site clean, upon completion of Work

.3 Use cleaning solutions and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00.

.3 Waste Management: separate waste materials for reuse, recycling in accordance with Section 01 74 19.

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

3.5 PROTECTION

.1 Protect painted surfaces from damage during construction.

.2 Protection of surfaces:

.1 Protect surfaces not to receive paint.

.2 Prevent contamination of cleaned surfaces by salts, acids, alkalis, corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats of paint. Remove contaminants from surface and apply paint immediately.

.3 Protect cleaned and freshly painted surfaces from dust to approval of Departmental Representative.

.4 Take preventive actions to prevent pealing or damage to existing paint system outside areas to be repainted for steel repairs. Such actions might include physical protection, careful planning and execution of cleaning operations, etc. All costs associated with repairing existing paint damaged during repairs will be borne by the Contractor.

.3 Repair damage to adjacent materials caused by painting exterior metal surface application installation.

END OF SECTION

Part 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 03 37 26 – Underwater Placed Concrete and Grout

1.2 REFERENCES

.1 ASTM International:

.1 ASTM A123/A123M-17, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.2 ASTM A153/153M-16a, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

.3 ASTM C109/C109M-20b, Standard Method for Compressive Strength of Hydraulic Cement Mortars

.4 ASTM C307-18, Standard Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacings.

.5 ASTM C496/C496M-17, Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens.

.6 ASTM C579-18, Standard Test Methods for Compressive Strength of Chemical Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.

.7 ASTM C827/C827M-16, Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures.

.8 ASTM C882/C882M-20, Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear.

.9 ASTM C1090/C1090M-15, Standard Test Method for Measuring Changes in Height of Cylindrical Specimens of Hydraulic-Cement Grout.

.10 ASTM D25-12(2017), Standard Specification for Round Timber Piles.

.11 ASTM D570-98(2018), Standard Test Method for Water Absorption of Plastics.

.12 ASTM D580/D580M-15, Standard Specification for Greige Woven Glass Tapes and Webbings.

.13 ASTM D638-14, Standard Test Method for Tensile Properties of Plastics.

.14 ASTM D695-15, Standard Test Method for Compressive Properties of Rigid Plastics.

.15 ASTM D790-17, Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulting Materials.

.16 ASTM D1761-20, Standard Test Methods for Mechanical Fasteners in Wood and Wood-Based Material.

.17 ASTM D2583-13a, Standard Test Method for Indentation Hardness of Rigid Plastics by means of a Barcol Impressor.

.2 CSA International:

.1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.

1.3 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit data sheets, specifications, and instructions by manufacturer for products used in the repair.

.3 Provide shop drawings for the repair one week prior to commencement of work.

1.4 QUALITY ASSURANCE

.1 Submerged jackets must be installed and sealed by certified professional divers.

.2 Surface conditions and temperature shall be verified by the Departmental Representative.

1.5 DELIVERY, STORAGE AND HANDLING

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

Part 2 PRODUCTS

2.1 SUBSTITUTION

.1 Substitution of the specified products for the pile jackets will be considered by the Departmental Representative providing the Contractor requests the use of the alternative products in writing and such request includes a certificate of compliance stamped by a Professional Engineer licensed in the Province of Ontario that confirms the proposed substitution meets or exceeds the performance characteristics of the specified products.

2.2 MATERIALS

.1 Fiber-reinforced polymer (FRP) pile jackets:

.1 Water Absorption to ASTM D570: 1% Maximum

.2 Ultimate Tensile Strength to ASTM D638: 100 MPa Minimum

.3 Flexural Strength to ASTM D790: 170MPa Minimum

.4 Flexural Modulus of Elasticity to ASTM D790: 4825MPa Minimum

.5 Barcol Hardness to ASTM D2583: 45 +/- 7.

.2 Tubular column forms for land-based piles: round, internally treated with release material.

.3 Marine epoxy grout:

.1 Compressive Strength to ASTM C579: 65MPa at 28 days

.2 Flexural Strength to ASTM C580: 20MPa

.3 Tensile Strength to ASTM C307: 11.0MPa at 7 days

.4 Bond Strength to Concrete to ASTM C882: 17.0MPa at 7 days

.4 Cementitious underwater grout shall be non-shrink, non-segregating, non-metallic, non-corrosive, and without chlorides:

.1 Compressive Strength to ASTM C109: 40MPa at 28 days

.2 Splitting Tensile Strength to ASTM C496: 4.1MPa at 28 days

.3 Volume Change to ASTM C827: Less than 0.5% expansion

.4 Bond Strength to ASTM C882M: 20.5MPa at 28 days.

.5 Cementitious grout for land-based pile jackets shall be free-flowing non-shrink, and non-metallic:

.1 Compressive Strength to ASTM C109: 30MPa at 28 days

.2 Splitting Tensile Strength to ASTM C496: 3.0MPa at 28 days

.3 Expansion to ASTM C109: Less than 0.5% expansion

.4 Bond Strength to ASTM C882: 13.0 MPa at 28 days

.6 Epoxy according to the requirements of ASTM D638, ASTM D695 and ASTM C882.

2.3 ACCESSORIES

.1 Fasteners: All fasteners, nuts, washers, and plate washers called for on the drawings shall conform to the applicable standard and shall be galvanized.

.2 Nails, spikes, and staples to CSA B111.

.3 Threaded rod: 19 mm diameter unless indicated otherwise, complete with nuts and washers to ASTM A307.

.4 New steel plate washers to be hot dip galvanized and fabricated in accordance with Section 05 50 00.

.5 Pumping ports used to fill FRP jackets or alternative method as approved by the Departmental Representative.

2.4 FINISHES

.1 Galvanizing: to ASTM A123/A123M and ASTM A153/153M, use galvanized fasteners for all work.

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 PREPARATION

.1 Deteriorated and loose wood shall be removed from all surfaces prior to installation of pile jackets as approved by the Departmental Representative.

.2 All surfaces must be thoroughly cleaned of marine growth, oil, grease, dirt, debris, or any other material that would prevent bonding prior to covering piles with jackets.

.3 Surface must be prepared by high-pressure water blasting or other means as approved by the Departmental Representative to achieve sound surface free of contaminants.

.4 Surface must be at least 4℃ prior to application or as recommended by the product manufacturer.

.5 The inside surface of the FRP jackets must be clean and free of contaminants prior to installation on the pile.

3.3 INSTALLATION

.1 Water-Based Pile Jackets

.1 Installation procedure according to manufacturer instructions and recommendations

.2 Install temporary supports for the FRP jackets.

.3 Install FRP jackets around deteriorated pile. Ensure jacket extends above and below the deteriorated area by at least 600mm and as shown on the Contract Drawings.

.4 Provide spacers to maintain the gap required for the strengthening sleeve and lock FRP jacket with epoxy or another approved equivalent.

.5 Secure FRP jacket with ratchet straps or other means as approved by Departmental Representative prior to epoxy/grout applications.

.6 Install bottom seal at base of jacket.

.7 Secure jacket locking groove with self-tapping stainless-steel screws at 150mm spacing.

.8 Fill the bottom 150mm of the jacket with marine epoxy grout to form the bottom seal. Allow to cure at least 24 hours or as recommended by manufacture before placing the second layer.

.9 Place the cementitious underwater grout in the FRP jacket allowing water to be displaced until the grout reaches 100 mm below the top of the jacket. Use approved method of pumping or pouring as recommended by the manufacturer and as approved by the Departmental Representative. Allow the filler grout to cure over night before proceeding with the repair.

.10 Fill the remaining 100mm in the top of jacket with epoxy grout and allow to set over night before proceeding with the repair.

.11 Construct bevel with epoxy at top of FRP Jacking sloping away from the repaired pile.

.2 Land-Based Pile Jackets

.1 Excavate to 200mm below deteriorated timber.

.2 Installation procedure according to manufacturer instructions and recommendations

.3 Install temporary supports as required for tubular form or approved equivalent.

.4 Install tubular form or approved equivalent around deteriorated pile. Ensure jacket extends above and below the deteriorated area by at least 200mm and as shown on the Contract Drawings.

.5 Provide spacers to maintain the gap required by the strengthening sleeve.

.6 Secure tubular form with self-tapping stainless-steel screws at 150mm spacing.

.7 Secure tubular tube with ratchet straps or other means as approved by Departmental Representative prior to grout applications.

.8 Fill tubular form with free-flowing cementitious grout and bevel the top.

.9 Allow grout to cure for at least 24 hours before formwork removal.

.10 Reinstate excavated fill around piles following completion of work.

3.4 COMPLETION OF THE WORK

.1 Remove any ratchet straps or temporary supports installed.

.2 Clean the exterior surfaces of the jacket from any filler or deleterious materials.

END OF SECTION

Part 1 GENERAL

1.1 ELECTRICAL WORK DESCRIPTION

.1 This section includes general requirements for supply, service, delivery, storage, installation, testing and commissioning of navigation lighting work under the scope of the contract.

.2 Provide supervision and labor as a part of this Contract. Follow specified procedures and instructions provided by the departmental representatives.

.3 The specified navigation lighting shall be integrated into the bridge operating system to form a functional and operational system.

1.2 RELATED REQUIREMENTS

.1 All Section specifications defined herein for the navigation lighting work.

1.3 RELATED SECTIONS

.1 Section 26 05 21 – Wires and Cables (0-1000v)

.2 Section 26 05 26 – Grounding and Bonding for Electrical Systems

.3 Section 26 56 20 – Navigation Lights

1.4 REFERENCES

.1 Definitions:

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

.2 The navigation lighting units shall be engineered, manufactured and installed in accordance with the Canadian Electrical Code. The design and engineering of the electrical installation shall satisfy all statutory requirements of the national and/or local authorities of the country in which the electrical installation will be located. The electrical installation shall be suitable for the site conditions as specified. Where necessary, special attention shall be paid to the selection and installation of electrical installation material and mounting suitable for prevailing seismic conditions. Where relevant, the specific publications are referenced herein.

.3 The following reference standards documents form part of the specification to the extent stated. Where differences exist between codes and standards, the one affording the greatest protection shall apply. Unless otherwise noted, the referenced standard edition is the current one at the time of commencement of the work.

.2 Reference Standards:

.1 CSA Group

.1 CSA C22.1,2018 Canadian Electrical Code, Part 1 (24th Edition), Safety Standard for Electrical Installations.

.2 CAN/CSA-C22.2 NO. 0-10 (R2015) - General requirements - Canadian electrical code, part II

.3 CSA C22.2 NO. 227.2.1-19 - Liquid-tight flexible non-metallic conduit (Bi-national standard with UL 1660)

.4 CSA C22.2 NO. 0.3-09 (R2019) - Test methods for electrical wires and cables

.5 CSA C22.2 NO. 2420-09 (R2019) – Below ground reinforced thermosetting resin conduit (RTRC) and fittings (Bi-national standard, with UL 2420)

.6 SC C22.2 NO. 248.8-11 (R2020) - Low-voltage fuses - Part 8: Class J fuses (Tri-national standard, with UL 248-8 and NMX-J-009/248/8-ANCE)

.7 CSA C22.3 No.7-15, Underground Systems, except where otherwise specified.

.8 CAN/CSA-S6-19, Canadian Highway Bridge Design Code

.9 CAN/CSA-Z462-18, Workplace Electrical Safety.

.2 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)

.1 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

.3 Electrical and Electronic Manufacturer's Association of Canada (EEMAC)

.4 Heath Canada/ Workplace Hazardous materials Information System (WHMIS).

.1 Material Safety Data Sheets (MSDS).

.5 American Society for Testing and Materials (ASTM)

.1 ASTM D149 – 09 (2020) -Standard Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies

.6 National Electrical Contractor Association (NECA)

.1 NECA 1-2015 - Standard Practice of Good Workmanship in Electrical Contracting.

.7 National Fire Protection Agency (NFPA)

.1 NFPA 79-2018 – Electrical Standard for Industrial Machinery.

.8 The Ontario Electrical Safety Code 2018, and all bulletins (Ontario)

.9 Ontario provincial Standard Specifications

.1 OPSS 106 – General Specification for Electrical Work

.2 OPSS 602(Nov 2017) – Construction Specification for Installation of Electrical Chambers

.3 OPSS 603 (Nov 2017)- Construction Specification for Installation of Duct

.4 OPSS 604(Nov 2017) - Construction Specification for Installation of Cable

.5 OPSS 609(Nov 2019) – Construction Specification for Grounding

.6 OPSS 610(Nov 2016) – Removal of Electrical Equipment

1.5 ACTION AND INFORMATION SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Preconstruction Submittals:

.1 Health and safety plan

.2 Work plan

.3 Quality Control (QC) plan

.4 Schedule of submittal items with dates

.3 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for all items described in these specifications and include product characteristics, performance criteria, physical size, finish and limitations.

.4 Shop drawings:

.1 The Contractor shall submit copies of producer or manufacturer data for materials, navigation lighting fixtures, devices and subsystems or standard or proprietary products. These shall include installation shop drawings, catalog cuts, specifications, and installation instructions for the specified navigation lighting installation but not excluding other items or materials not specifically mentioned herein.

.2 The substantially completed installation shop drawings shall include layout/installation drawings of navigation lighting, components terminal boxes and terminations drawings, with cable tags and termination identification for field installation.

.3 The Contractor shall identify any constructability issues or conflicts between contract documents (drawings and specification) and actual field conditions. The Contractor shall also identify variations between Contract Documents and product or system limitations or functionality that may be detrimental to the successful performance or operation of the completed work. The Contractor shall submit proposed resolutions for review and approval by the Departmental Representative.

.4 Submit six (6) copies of 600 x 600 mm minimum size drawings and product data to Departmental Representative.

.5 If changes are required, notify Departmental Representative of these changes before they are made.

.6 Conduct field surveys to obtain or to verify existing dimensions shown on the plans, prior to development of submittals. Identify field verified dimensions on submittals. Conduct field measurements and surveys as required to supplement the information provided in the plans and to provide a complete and satisfactory fitting and operational installation.

.5 Certificates:

.1 Provide CSA certified equipment and material.

.2 Where CSA certified equipment and/or material is not available, submit such equipment and/or material to authority having jurisdiction for special approval before delivery to site.

.6 Sustainable Design Submittals:

.1 Construction Waste Management:

.1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 50% of construction wastes were recycled or salvaged.

.2 Building Energy Consumption: submit Measurement and Verification Plan following IPMVP for monitoring end-uses as follows:

.1 Lighting systems and controls.

.3 Recycled Content:

.1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-industrial content, and total cost of materials for project.

.4 Regional Materials: submit evidence that project incorporates required percentage 50% of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.

1.6 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

1.7 QUALITY ASSURANCE

.1 Contractor Review and Acceptance of Shop Drawings

.2 The Contractor shall provide a Quality Assurance process for all shop drawings that are submitted. The review shall indicate completeness of the submittal and compliance with the design. Provide a cover sheet listing the preparer(s) and checker(s) name, initials, and content responsibility. The preparer and checker shall initial each sheet to establish their content responsibility. The preparer and checker shall not be the same individual.

.3 Regulatory requirements: Perform electrical construction in accordance with industry acceptable practice and complies with applicable country, region and local codes.

.4 Electrical work shall comply with the requirements of the CSA C22.1, Canadian Electrical Code, Part 1 (24th Edition), Safety Standard for Electrical Installations and CAN/CSA-Z462-18, Workplace Electrical Safety.

.5 Electrical work shall be performed by qualified personnel. Installer shall be skilled in trade and shall have thorough knowledge of products and equipment specified to perform the installation in a safe professional manner.

.6 All partially outdoor or outdoor electrical equipment enclosure construction, material and protective treatment shall be listed as suitable for installation in humid, salt-laden air environment.

.7 Electrical components, navigation lighting fixtures and systems shall satisfactorily pass all applicable factory and field tests in accordance with the relevant industry standards. Copies of all test certificates and supporting documentation shall be supplied to the Department as part of submittal requirements or as requested by the Departmental Representative.

.8 Manufacturer of the navigation lighting fixtures specified shall be recognized in industry for normally supplying this type of equipment. Manufacturer shall be ISO certified.

.9 Materials and navigation lights furnished for permanent installation shall be new, unused, and undamaged. Provide the standard cataloged materials and equipment of manufacturers regularly engaged in the manufacture of the products. For material, and fixture lists submittals, show manufacturer's style or catalog numbers, specification and drawing reference numbers and warranty information. All equipment and materials shall be in accordance with the technical specification and other relevant industry standards.

.10 Service conditions: Provide navigation light fixtures and material suitable for intended service and installation at location indicated.

.11 Parts shall be manufactured to industry standard sizes to facilitate maintenance and interchangeability.

.12 Material and workmanship shall conform to the requirements of the specifications. Contractor shall ensure material and workmanship quality conformed to the requirement of Specification Section 01 45 00.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 and 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 Provide climate-controlled environment for the storage for navigation lighting fixtures and associated installation material during construction. Replace defective or damaged materials with new at no cost to the Departmental Representative.

.4 Develop Construction Waste Management Plan related to the Work of this Section.

.5 Packaging Waste Management: remove for reuse and return of pallets, crates, padding, packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 19.

Part 2 Products

2.1 DESIGN REQUIREMENTS

.1 Operating voltages: to CAN3-C235.

.2 Navigation lighting to operate satisfactorily at 60 Hz within normal operating limits established by above standard.

.1 Navigation lighting to operate in extreme operating conditions established in above standard without damage to equipment.

2.2 MATERIALS AND EQUIPMENT

.1 Provide material and equipment in accordance with Section 01 61 00.

.2 Substitution: Electrical material and equipment specified constitute the basis of design material and equipment. The Contractor may provide product that meet or exceed the quality, functions and performance specified from reputable and qualified manufacturers with the understanding that all methods of installation changes required by the substitution shall be made by the Contractor at no additional cost to the contract. Product acceptability shall be determined at the sole discretion of the Departmental Representative and may be based on one or more of the following: quality, function, ease of maintenance, physical size, reliability, value, electrical load capacity, durability, standardized components, availability and other criteria as deemed appropriate by the Departmental Representative.

.3 Material and equipment to be CSA certified. Where CSA certified material and equipment are not available, obtain special approval from authority having jurisdiction before delivery to site and submit such approval as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

2.3 CONDUIT RACEWAY

.1 Provide conduit raceways as indicated on the contract drawings and/or as specified. Where conduit size is not indicated, provide minimum conduit size in accordance with requirements of CEC.

.2 Provide conduit type per the applicable locations:

.1 Indoor Applications:

.1 Exposed non-corrosive environment: Rigid Galvanized Steel Conduit (RGS) or as specified on the contract drawings.

.2 Exposed corrosive environment: Reinforced Thermosetting Resin Conduit (RTRC) or Fiberglass Conduit or as specified on the contract drawings.

.3 Above grade and concealed inside wall: IMC or RGS Conduit or as specified on the contract drawings.

.4 Embedded in concrete: PVC Schedule 40 PVC

.5 Connection to electrical equipment subject to vibrations: Liquid-tight Flexible Metallic Conduit

.6 Conduit stub-up: Rigid Galvanized Steel Conduit (RGS)

.2 Partially Exposed to Outdoor or Outdoor Applications:

.1 Exposed non-corrosive environment: Rigid Galvanized Steel Conduit (RGS)

.2 Exposed corrosive environment (petrochemical, wastewater, chemical, pulp and paper, bridges, tunnels, docks, piers, and cooling tower and vicinity): PVC Coated-Rigid Galvanized Steel Conduit (PVC-RGS). Installer shall be certified by manufacturer to install PVC coated conduit.

.3 Direct Buried: PVC Schedule 80

.4 Embedded in concrete: PVC Schedule 40 PVC

.5 Under Roadway: Steel Reinforced, concrete encased duct bank, PVC Schedule 40 PVC ducts

.6 Conduit stub-up: Rigid Galvanized Steel Conduit (RGS)

.3 Submersible Applications:

.1 Flexible fiberglass composite underwater duct with design pressure strength of three time the pressure of the installed water depth minimum.

.3 Rigid Metal Conduit

.1 Rigid metal conduit shall be construct of mild steel tube with continuous welded seam in accordance with ANSI C80.1, and UL 6.

.2 Exterior and Interior of conduit shall have protective coating consisting of Metallic zinc applied by hot-dip galvanizing or electro-galvanizing with a final coat of transparent zinc chromate to exterior. Exterior and interior coatings applied to conduit shall afford sufficient flexibility to permit field bending without cracking or flaking.

.3 Thread pitch shall conform to ANSI/ASME B1.20.1. Taper shall be 3/4”/ft. (62.5 mm/m).

.4 Each length of conduit shall have UL listing label.

.5 Couplings, unions, and fittings: Threaded-type, galvanized steel. Covers shall have solid gaskets and captive screw fasteners.

.6 Size of conduits shall be as indicated on contract drawing or as specified herein. Where size is not indicated, it shall be in accordance with the fill requirements as defined in the CEC. Unless otherwise indicated, the minimum size conduit shall be 3/4 mm.

.7 The RGS conduits shall be hot dipped galvanized inside and out with hot dipped galvanized threads.

.8 Each underground joint shall be sealed and made liquid tight.

.9 Stainless steel screws shall be furnished and used to attach the covers to the conduit fittings. All coated material shall be installed, patched according to the manufacturer’s latest printed recommended installation and patching instructions, and as approved by the Departmental Representative.

.10 All conduits shall be secured to outlet boxes, junction boxes or cabinets.

.11 All conduit terminations shall be equipped with insulating bushings.

.12 Couplings, connectors and fittings used for the installation shall be of a type specifically designed and manufactured for use with the supplied plastic-coated conduit. Flexible liquid-tight conduit and connectors shall be used where final connection to equipment with rigid conduit is not practicable, such as to

equipment with adjustable mountings or subject to vibration as specified above. Where used the flexible conduit runs shall be no less than 500mm in length or as approved by the Departmental Representative.

.13 Use solid gaskets. Ensure conduit fittings with blank covers have gaskets, except in clean, dry areas or at the lowest point of a conduit run where drainage is required.

.4 PVC-Coated Rigid Galvanized Steel Conduit

.1 PVC-coated raceway shall be installed as a system, which means the fittings, conduit bodies, straps, hangers, boxes, etc., are also coated.

.2 Exterior coating shall be a minimum of 40-mil, polyvinyl chloride (PVC) coating over exterior and apply urethane coating uniform and consistent to interior of conduit. Internal coating shall be nominal 2 mil thickness. Conduit threads shall be protected by urethane coating.

.3 Use manufacturer acceptable method when threading the PVC coated conduit.

.4 The integrity of PVC coating shall be maintained at the threaded connection.

.5 Reinforced Thermosetting Resin Conduit (RTRC)

.1 Reinforced Thermosetting Resin Conduit shall be an epoxy-based resin system using anhydride-curing agent. RTRC shall be meets CSA C22.2 NO. 2420-09 (R2019) standards.

.2 Conduit shall consist of continuous E-glass roving. Additives for increasing flame spread and lowering smoke density shall be halogen free.

.3 The conduit shall be rounded and shall be free from all defects including indentations, delamination, pinholes, foreign inclusions, and resin-starved areas. The bore of the conduit shall be smooth and uniform.

.4 Carbon black shall be used as ultraviolet inhibitor to protect conduit and fittings.

.5 Dielectric strength shall exceed 400 volts/mil when tested in accordance with ASTM D149.

.6 All elbows and fittings shall be manufactured from the same process, methods and chemicals as the conduit. Fittings, elbows, joints and accessories shall be as recommended by manufacturer to maintain UL listing of components and system.

.7 Conduit bodies shall be manufactured using compression molding process using vinylester resin with reinforcement glass. Bodies shall be fire resistant in accordance with CSA C22.2 NO. 2420-09 (R2019) and be halogen free.

.8 Minimum wall thickness of 0.09 mm for normal size 50mm -100mm (2”-4”) for general application. Extra heavy wall with minimum wall thickness of 0.25 mm for normal size 76mm -203mm (3”-8”) for heavy loading, long span, and/or under water crossing applications.

.6 Liquid tight Flexible Metallic Conduit (LFMC)

.1 Conduits to motors and other electrical vibrating equipment shall terminate in conduit fittings on the motors and equipment, the final connection being made with liquid-tight flexible conduit and suitable liquid-tight connectors.

.2 Flexible conduit shall be as short as possible and in no case shall not exceed a conduit run of 2m.

.3 Provide liquid-tight flexible metallic conduit with a protective jacket of PVC extruded over a flexible interlocked galvanized steel core to protect wiring against moisture, oil, chemicals, and corrosive fumes.

.4 All fittings used for flexible metallic conduit shall be specifically designed for such conduit.

.5 Liquid-tight unions shall be installed where standard threaded couplings cannot be used.

.7 Rigid Non-metallic Conduit

.1 Ensure rigid non-metallic conduit complies with NEMA TC 2 and NEMA TC 3 with wall thickness not less than Schedule 40.

.8 Deflection/Expansion Fitting

.1 Provide deflection/expansion conduit fittings at conduit crossing between two structures at location with deflection, vibration from vehicular traffic and/or expansion. Deflection/expansion conduit fittings shall be UL listed and CSA Certified.

2.4 ENCLOSURE, JUNCTION BOXES, AND TERMINAL CABINETS

.1 In general, all electrical equipment shall be in enclosures. Enclosures, junction boxes, and terminal cabinets located in exposed or semi-exposed locations shall be stainless steel, NEMA 4X (or IEC type IP56 rated) as a minimum.

.2 General purpose enclosures, boxes, and cabinets subject to submersion shall be NEMA 6P rated.

.3 Enclosures and boxes in wet locations or subject to condensation shall include a minimum 6 mm drain hole at the low point of the enclosure.

.4 General purpose enclosures, boxes, and cabinets installed indoors in unconditioned space shall be NEMA 12 rated.

.5 Junction boxes pull boxes and electrical enclosures larger than 4” (100 mm) trade size in any dimension shall be of adequate strength to support mounted components without deflection during shipment and installation.

.6 Underground boxes shall be specifically design and construct for intended installed location and be either pre-formed concrete or high strength fiberglass. Body and Cover shall be capable of withstanding, without failure, type of traffic in general area.

.7 Outdoor electrical enclosures with ventilating openings shall be provided with fine mesh filters and stainless-steel bug screens.

2.5 HARDWARE

.1 Provide hardware including, but not limited to, anchor bolts, nuts, washers, expansion anchors, wire nuts needed for installation.

.2 Provide corrosive resistance hardware suitable for the environment and compatible with the electrical equipment construction and degree of environment and ingress protection.

.3 For outdoor installation of electrical equipment, provide stainless-steel hardware such as, but not limited to, anchors, bolts, braces, boxes, bodies, clamps, fittings, guards, nuts, pins, rods, shims, thimbles, washers, and miscellaneous hardware.

.4 Hardware smaller than 3/4” (19 mm) shall match NEMA standard size bolt holes on motors and electrical equipment.

2.6 FUSES

.1 Fuses shall comply with CAN/CSA-C22.2 No.248.8

2.7 WARNING SIGNS

.1 Warning Signs: in accordance with requirements of the electrical codes.

.2 Porcelain enamel signs, minimum size 175 x 250 mm.

.3 Electrical equipment Arc Flash and Short Circuit Current to CSA C22.1.

2.8 WIRING TERMINATION

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

2.9 WIRING IDENTIFICATION

.1 Identify wiring with permanent indelible identifying markings, numbered coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.

.2 Maintain phase sequence and colour coding throughout.

.3 Colour coding: to CSA C22.1.

2.10 FINISHES

.1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.

.1 Paint outdoor electrical equipment "equipment green" finish.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that existing conditions are acceptable for the specified navigation lighting installation in accordance with manufacturer's written instructions.

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

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

3.2 INSTALLATION

.1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.

.2 Do overhead and underground systems in accordance with CAN/CSA-C22.3 No.1 except where otherwise specified.

3.3 NAMEPLATES AND LABELS

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

3.4 CONDUIT AND CABLE INSTALLATION

.1 Install conduit and sleeves prior to pouring of concrete.

.2 Sleeves through concrete: plastic, sized for free passage of conduit, and protruding 50 mm.

.3 During the construction phase, all open ends of the conduit termination shall be plugged with approved conduit stopping plugs to prevent ingress of moisture, water, and construction debris and/or aggregate.

.4 Conduits shall be installed in practical alignment with the structure, with uniform pitch draining toward boxes with properly formed bends and securely attached to the bridge structure and/or fender system.

.5 Provide deflection/expansion conduit fittings at conduit crossing between two structures at location with deflection, vibration from vehicular traffic and/or expansion. Install deflection/expansion conduit fittings per manufacturer instruction and recommendation.

.6 Surface mounted shall be supported throughout the entire route at regular intervals. The spacing between adjacent support points shall not exceed the manufacturer recommendation for their respective conduit sizes.

.7 Where rigid steel conduit crosses an expansion joint or where significant temperature differentials are anticipated (such as outdoor raceway spans between structurers, attached to bridges, etc.) expansion fittings shall be provided to allow relative movement to occur on either side of the expansion joint. A separate circuit protective conductor shall be installed to maintain an effective electrical continuity across the expansion joint. Provide factory installed packing ring, designed to prevent the entrance of moisture, and a pressure ring. Include a Grounding ring or a Grounding conductor for metallic expansion couplings.

.8 An adequate number of suitably sized electrical pull boxes/junction boxes shall be provided in all conduit runs to facilitate circuit wiring installation without damage. electrical pull boxes/junction boxes shall be provided immediately after every two bends, or after a bend plus a maximum straight run of 10m, or after a maximum straight run of 15m.

.9 Provide required penetrations in floors or walls as required. Penetrations shall be as small as possible and installed in a neat manner. Repair of the surrounding surfaces damaged during installation of penetrations shall be included as part of this work. Where a conduit passes through fire resistant structural elements, such as walls and floors designated as fire barriers, the penetration openings shall be properly sealed according to the appropriate degree of fire resistance of the penetrated wall and/or floor to prevent the spread of fire and smoke from one area migrating into another. In addition, where a conduit is installed in a channel, duct, ducting or shaft which pass through such elements, suitable fire-resistant barriers shall also be provided to prevent the spread of fire.

.10 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.

.11 Install cables, conduits and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.

3.5 FIELD QUALITY CONTROL

.1 General Electrical Test Requirements

.1 Inspection and testing shall be performed on the new navigation lighting installations and alterations to existing installation in accordance with the requirements of this Section. The International Electrical Testing Association (NETA) shall be referred and adopted where appropriate. In the event of any test indicating failure to comply, that test and those preceding, the results of which may have been influenced by the fault indicated, shall be repeated after the fault has been rectified. Provide all necessary test equipment, labor, and personnel to perform the tests, as herein specified.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

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

END OF SECTION

Part 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 This section includes general requirements for supply, service, delivery, storage, installation, testing and commissioning of wires and cables.

.2 The requirements contained in other sections of project specification shall also apply for installation and coordination of work.

1.2 RELATED SECTIONS

.1 Section 26 05 00 – Common Work Results for Electrical.

1.3 REFERENCES

.1 CSA C22.2 No. 131 Type TECK 90 Cables.

.2 CSA C22.2 No. 38 Thermoset Insulated Wires and Cables.

.3 CSA C22.2 No. 174 Cables and Cable Glands for use in Hazardous Locations.

.4 CSA C68.3 Power Cables with Thermoset Insulation.

.5 CSA C21.1 600 V Control Cable.

.6 CSA C21.2 300 V Control Cable

.7 ANSI/NEMA WC70/ICEA S-95-658-2009 (14 AWG & larger) – Power Cables Rated 2,000 Volts or Less for the Distribution of Electrical Energy.

.8 ASTM B172-17 Standard Specification for Rope-Lay-Stranded Copper Conductors Having Bunch-Stranded Members, for Electrical Conductors.

.9 ASTM B174-17 Standard Specification for Bunch-Stranded Copper Conductors for Electrical Conductors.

.10 ICEA S-73-532/NEMA WC 57-2014 (22-16 AWG) - Standard for Control, Thermocouple Extension, and Instrumentation Cables.

.11 ICEA T-27-581/NEMA WC 53-2016 – Standard Test Methods for Extruded Dielectric Power, Control, Instrumentation, and Portable Cables for Test.

1.4 ACTION AND INFORMATION SUBMITTALS

.1 Provide product data in accordance with Section 01 33 00 - Submittal Procedures.

1.5 QUALITY ASSURANCE

.1 Regulatory requirements: Perform electrical construction in accordance with applicable country, region, and local codes.

.2 Products shall be tested, approved, and labeled/listed by Underwriters Laboratories, Inc., or by a nationally recognized testing laboratory (NRTL).

.3 Electrical equipment and materials shall be new and within one year of manufacture date.

.4 Electrical work shall comply with the requirements of the CSA C22.1, Canadian Electrical Code, Part 1 (23rd Edition), Safety Standard for Electrical Installations and CAN/CSA-Z462-18, Workplace Electrical Safety.

.5 Material and workmanship shall conform to the requirements of the specifications. Contractor shall ensure material and workmanship quality and provide Certificates of Conformance per the requirement of Specification Section 01 45 00 Quality Control.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, packaging materials in accordance with Section 01 74 19 - Waste Management and Disposal.

Part 2 Products

2.1 LOW VOLTAGE UNARMOURED WIRE AND CABLE (1000v AND BELOW)

.1 Construction: Stranded, annealed copper conductors, 1000 V, rating RWU90 cross-linked polyethylene (XLPE) insulation for all cables outside of buildings and RW90 cross-linked polyethylene (XLPE) insulation for cables within the building unless noted otherwise.

.2 Direct buried installations or installation in direct buried polyethylene pipe: Cross-linked polyethylene (XLPE), RWU90 insulation, 1000 V minimum rating.

.3 Standard: CSA C22.2 No. 38.

.4 Minimum conductor sizes: Unless otherwise indicated, #12 AWG for power and current transformer circuit.

.5 Multi-conductor cables: PVC flame retardant jacket overall, flame test rated.

2.2 LOW VOLTAGE UNARMOURED WIRE AND CABLE (600v AND BELOW)

.1 Construction: Stranded, annealed copper conductors, 600 V rating, UL1015-105°C PVC insulation for indoor applications.

.2 Standard: CSA.

.3 Minimum conductor sizes: Unless otherwise indicated, #12 AWG for power and current transformer circuit.

.4 Multi-conductor cables: PVC flame retardant jacket overall, flame test rated.

2.3 LOW VOLTAGE ARMOURED WIRE AND CABLE (1000v AND BELOW)

.1 Construction: Stranded, annealed copper conductors, 1000 V rating, RW90 cross-linked polyethylene (XLPE) insulation.

.2 Power cabling: TECK construction.

.3 Control cabling: TECK construction.

.4 Minimum conductor size: Unless otherwise indicated, #12 AWG for power and current transformer circuits and #14 AWG for control and fire alarm circuits.

.5 Grounding conductor: Stranded, soft, bare copper conductor in multiconductor cables, concentric copper wires over insulation in single conductor cable.

.6 Multi-conductor cables: With inner PVC jacket.

.7 Interlocking armour: Flexible, galvanized steel or aluminum for multi-conductor cables and aluminum for single conductors, spirally wound over inner jacket.

.8 Outer jacket: PVC, flame-retardant, FT4 flame test rated, low acid gas evolution, outer jacket extruded over the armour.

.9 Hazardous area installations: Where indicated, TECK cables and fittings accepted for the application. Stamp outer jacket, “HL”.

.10 Fastenings:

- .1 One-hole malleable iron straps to secure surface cables 50 mm and smaller. Two-hole steel straps for cables larger than 50 mm.
- .2 Channel type supports for two or more cables at 500 mm centers.
- .3 Threaded rods: 6 mm diameter to support suspended channels.

.11 Connectors: Watertight approved for TECK cable.

2.4 LOW VOLTAGE ARMOURED CABLE FOR VFD APPLICATION

.1 Designed to reduce high frequency noise interference with data and controls signals.

.2 Three bonding conductors - soft bare copper.

.3 Cross-linked Polyethylene RW90 insulation on main conductors.

.4 Continuously corrugated, corrosion resistant aluminum sheath with matching connectors.

.5 With overall PVC jacket rated FT4.

2.5 WIRING ACCESSORIES

.1 Wire Markers: Identify all wiring with heat shrinkable slip-on markers c/w type written tag numbers, black letters on white background.

.2 Cable markers: For cables or conductors greater than 13 mm diameter, strap-on type,

.3 Terminal blocks: 600 V, 25 A minimum rating, modular, 35 mm DIN rail mounted, provision for circuit number labelling, individually removable, sized to accommodate conductor size and circuit current.

.4 Field wiring terminations: Where screw-type terminal blocks are provided, supply insulated fork tongue terminals.

.5 Splice connectors for equipment pig-tail and lighting circuits: For wire sizes #12 and #10 AWG inclusive, twist-on compression spring type.

.6 Moisture and waterproofing: In wet locations, with Liquid Tape.

.7 Cables ties: Nylon, one-piece, self-locking type.

.8 TECK cable connectors in wet or outdoor areas: Watertight type.

.9 Cable grips: To accommodate type and geometry of cable supported, single weave, variable mesh design.

.10 Cable pulling lubricant: Compatible with cable covering and not to cause damage or corrosion to conduits or ducts.

Part 3 Execution

3.1 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Perform tests using method appropriate to site conditions and to approval of Departmental Representative and local authority having jurisdiction over installation.

.3 Perform tests before energizing electrical system.

3.2 GENERAL CABLE INSTALLATION

.1 Cables shall be installed per manufacturer recommendations and instructions and comply with the applicable codes and standards.

.2 Conductor length for parallel feeders to be identical.

.3 Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.

.4 Wiring in walls: typically drop or loop vertically from above to better facilitate future renovations. Generally wiring from below and horizontal wiring in walls to be avoided unless indicated.

.5 Provide numbered wire collars for control wiring. Numbers to correspond to control shop drawing legend. Obtain wiring diagram for control wiring.

.6 Limit pulling tension and minimum bending radii to those recommended by manufacturer.

.7 Pull cable into ducts, conduits, and cable trays in accordance with cable manufacturer's recommendations. Use patented cable grips suitable for cable type, or pulling eyes fastened directly onto cable conductors.

.8 Prevent damage to cable jackets by utilizing adequate lubricant when pulling cables through ducts and conduits.

.9 Connect cables to electrical boxes and equipment enclosures located in wet or sprinkled areas with watertight cable connectors.

.10 Provide cable grips for vertical, horizontal, and aerial cable suspension installations to reduce cable tension at connectors and at cable bends.

.11 Install through wiring in junctions and pull boxes having no connection within the box. Leave 150 mm minimum of slack inside box.

.12 Provide mechanical protection for cables within 1500 mm of the floor in buildings and within 2000 mm above grade outdoors.

.13 Identify each cable by attaching a cable marker at each end, in all intermediate manholes, junction boxes and pull boxes.

.14 Install cables to conserve headroom in exposed locations and to cause minimum interference in spaces through which they pass.

.15 Do not install horizontal runs in hollow masonry walls. Passage through any structural member or precast slab must be approved by the Department's Representative.

.16 Where exposed, install raceways and cables parallel with building lines and group neatly.

.17 Maintain the integrity of all fire separations by sealing around all cables where they pass through any fire barriers. Generally, this includes all floors ceilings and concrete and masonry walls.

.18 As far as is practicable, all feeder wiring shall be continuous from origin to termination without running splices in intermediate pull boxes or splicing chambers. Sufficient slack shall be left at the termination point to make proper connections to the equipment.

.19 Circuit Cable Installation Around Structure Movable Joints

.1 Contractor shall utilize droop or flexible cables around structural movable joints. Install cables so tension, including that from the weight of the cables, won't be transmitted to the conductor terminals. Strain-relief fittings shall be utilized.

.2 Liquid-tight flexible metal conduit or liquid-tight flexible non-metallic conduit may be used, as long as the length is limited to 2m.

.3 Provide bushings or fittings to protect cords where they pass through holes in covers, outlet boxes, or similar enclosures.

.4 Transition from rigid conduit to liquid-tight conduit or flexible cable shall be made through a NEMA 4X termination junction boxes.

.5 The circuit cables shall securely be kept away from any pinch points.

3.3 WIRING IDENTIFICATION

.1 Colour code power, feeder, and branch conductors at both ends with coloured plastic tapes. Tapes are not required where conductors are identified by jacket colour. Maintain phase and colour sequence throughout.

.2 Identify each conductor, including spares, with a unique alphanumeric designation to facilitate troubleshooting and maintenance.

END OF SECTION

Part 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 This section includes general requirements for supply, service, delivery, storage, installation, testing and commissioning of grounding system for the bridge navigation lighting installation.

.2 The requirements contained in other sections of project specification shall also apply for installation and coordination of work.

1.2 RELATED SECTIONS

.1 Section 26 05 00 – Common Work Results for Electrical.

1.3 REFERENCES

.1 CSA Group

.1 CSA C22.1, Canadian Electrical Code, Part 1 (24th Edition), Safety Standard for Electrical Installations.

.2 CAN/CSA-C22.2 No.41-13 (R2017)-Grounding and Bonding Equipment

.3 CAN/CSA-C22.2 No.04-04 (R2009)-Bonding Electrical Equipment (Protective Grounding)

.4 CAN/CSA-C22.2 No.41-13 (R2017)-Grounding and Bonding Equipment

.2 American National Standards Institute /Institute of Electrical and Electronics Engineers (ANSI/IEEE)

.1 ANSI/IEEE 837-2014, IEEE Standard for Qualifying Permanent Connections Used in Substation Grounding.

.3 CSA International

.1 CSA Z32-15, Electrical Safety and Essential Electrical Systems in Health Care Facilities.

1.4 ACTION AND INFORMATION SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for grounding equipment and include product characteristics, performance criteria, physical size, finish, and limitations.

.3 Sustainable Design Submittals:

.1 Construction Waste Management:

.1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 50% of construction wastes were recycled or salvaged.

.2 Recycled Content:

.1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-industrial content, and total cost of materials for project.

.3 Regional materials: submit evidence that project incorporates required percentage 50% of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.

1.5 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for grounding equipment for incorporation into manual.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

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

.3 Storage and Handling Requirements:

.1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect grounding equipment from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Develop a Construction Waste Management Plan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse of pallets, crates, padding, packaging materials as specified in the Construction Waste Management Plan in accordance with Section 01 74 19 - Waste Management and Disposal.

Part 2 Products

2.1 GROUNDING AND BONDING CONDUCTORS

.1 Equipment grounding conductors shall be insulated stranded copper, except that sizes No. 10 AWG and smaller shall be solid copper. Insulation color shall be identified per CSA C22.1, Canadian Electrical Code, Part 1 (24th Edition), Safety Standard for Electrical Installations.

.2 Bonding conductors where indicated on the contract drawings shall be bare stranded copper, except that sizes No. 10 AWG and smaller shall be bare solid copper.

.3 Grounding conductor sizes shall not be less than shown on the contract drawings, and not be less than grounding conductors sizing requirements in accordance with CAN/CSA-C22.2 No. 0., whichever is greater.

.4 Insulation: XLPE shall be used for isolated power systems.

2.2 GROUND CONNECTIONS

.1 Below Grade and Inaccessible Locations:

.1 Exothermic-welded type connectors.

.2 Above Grade:

.1 Bonding Jumpers: Listed for use with aluminum and copper conductors.

.2 For wire size smaller than No. 8 AWG, use mechanical type lugs. For wire sizes No. 8 AWG and larger, use compression-type connectors. Connectors or lugs shall use zinc-plated or cadmium-plated, steel bolts, nuts, and washers as appropriate for the application.

.3 Connection to Building Steel: Exothermic-welded type connectors.

.4 Bolts shall be torqued to the values recommended by the manufacturer.

Part 3 Execution

3.1 INSTALLATION GENERAL

.1 Install complete permanent, continuous grounding and bonding system including, conductors, connectors, accessories.

.2 Install connectors in accordance with manufacturer's instructions and in accordance with the CSA C22.1, Canadian Electrical Code, Part 1 (24th Edition), Safety Standard for Electrical Installations.

3.2 SYSTEM GROUNDING

.1 Electrical system grounding type (i.e. solidly grounded and/or resistively grounded) shall be as indicated on the design drawings.

3.3 EQUIPMENT GROUNDING

.1 Metallic piping, electrical enclosures, raceways, junction boxes, and other conductive items in close proximity with electrical circuits, shall be bonded and grounded.

.2 Grounding for navigation lighting fixtures shall be by dedicated grounding conductors run in each conduit and raceway from each navigation lighting unit back to the system ground bus or panelboard ground bus.

.3 Conduit and raceways shall not be utilized as the sole grounding means for the navigation lighting.

3.4 RACEWAY

.1 Conduit Systems:

.1 Ground all metallic conduit systems. All metallic conduit systems shall contain an equipment grounding conductor.

.2 Non-metallic conduit systems shall contain an equipment grounding conductor.

.3 Metallic conduit that only contains a grounding conductor, and is provided for its mechanical protection, shall be bonded to that conductor at the entrance and exit from the conduit.

.4 Metallic conduits which terminate without mechanical connection to an electrical equipment housing by means of locknut and bushings or adapters, shall be provided with grounding bushings. Connect bushings with an equipment grounding conductor to the equipment ground bus.

.2 Feeders and Branch Circuits: Install equipment grounding conductors with all navigation lighting branch circuits.

.3 Boxes:

.1 Bond the equipment grounding conductor to each pullbox, junction box, device box, and navigation lighting enclosures through which the conductor passes.

.2 Provide lugs in each box and enclosure for equipment grounding conductor termination.

.4 Wireway Systems:

.1 Bond the metallic structures of wireway to provide electrical continuity throughout the wireway system, by connecting a No. 6 AWG bonding jumper at all intermediate metallic enclosures and across all section junctions.

.2 Use insulated No. 6 AWG bonding jumpers to ground or bond metallic wireway at each end for all intermediate metallic enclosures and across all section junctions.

.5 Ground navigation lighting fixtures to the equipment grounding conductor of the wiring system. Fixtures connected with flexible conduit shall have a green ground wire included with the power wires from the fixture through the flexible conduit to the first outlet box.

3.5 CORROSION INHIBITORS

.1 When making grounding and bonding connections, apply a corrosion inhibitor to all contact surfaces. Use corrosion inhibitor appropriate for protecting a connection between the metals used.

3.6 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of Department's Representative and local authority having jurisdiction over installation.

.3 Perform tests before energizing electrical system.

.4 Disconnect ground fault indicator during tests.

3.7 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.

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

.3 Final Cleaning: upon completion remove surplus materials, rubbish, tools, and equipment in accordance with Section 01 74 00 - Cleaning.

.4 Waste Management: separate waste materials for reuse in accordance with Section 01 74 19 - Waste Management and Disposal.

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

END OF SECTION

Part 1 GENERAL

1.1 DESCRIPTION

.1 Furnish and install navigation lighting systems, including all wiring, conduit, wiring devices, transformers, enclosures, grounding system, controls, protective devices, lights, etc., as shown in the Plans and in compliance with Canadian Coast Guard (CCG) Publication “Canadian Aid to Navigation System” and the Canadian Highway Bridge Design Code (CSA-S6-19). Navigation lights must operate from sunset to sunrise and during periods of low visibility.

1.2 RELATED REQUIREMENTS

.1 The requirements contained in other sections of project specification shall also apply for installation and coordination of work.

1.3 RELATED SECTIONS

.1 Section 26 05 00 – Common Work Results for Electrical.

.2 Section 26 05 21 – Wires and Cables (0-1000v)

.3 Section 26 05 26 – Grounding and Bonding for Electrical Systems

1.4 REFERENCES

.1 CSA Group

.1 CSA C22.2 No.206-2017, Lighting Poles.

.2 CAN/CSA-ISO 9000 16 (R2020)-Quality Management Quality Assurance Standards for selection and use.

.3 CAN/CSA-S6-19, Canadian Highway Bridge Design Code.

1.5 ACTION AND INFORMATION SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for navigation lights and include product characteristics, performance criteria, physical size, finish, and limitations.

.3 Sustainable Design Submittals:

.1 Construction Waste Management:

.1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

.2 Recycled Content:

.1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing

their costs and percentages of post-industrial content, and total cost of materials for project.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and 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 door, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect light fixtures from damage.

.3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 19 - Waste Management and Disposal.

1.7 QUALITY ASSURANCE

.1 Regulatory requirements: Perform electrical construction in accordance with industry acceptable practice and complies with applicable country, region, and local codes.

.2 Products shall be tested, approved, and labeled/listed by Underwriters Laboratories, Inc., or by a nationally recognized testing laboratory (NRTL).

.3 Electrical equipment and materials shall be new and within one year of manufacture date.

.4 Electrical work shall comply with the requirements of the CSA C22.1, Canadian Electrical Code, Part 1 (24th Edition), Safety Standard for Electrical Installations and CAN/CSA-Z462-2018, Workplace Electrical Safety.

.5 Material and workmanship shall conform to the requirements of the specifications. Contractor shall ensure material and workmanship quality and provide Certificates of Conformance per the requirement of Specification Section 01 45 00 Quality Control.

Part 2 Products

2.1 GENERAL DESCRIPTION

.1 Navigation lights shall be furnished and installed as indicated on the Contract Drawings.

.2 The navigation lights shall conform to the requirements and be in accordance with the rule and regulations of the Canadian Coast Guard.

.3 The navigation lights shall be swing span type lights.

2.2 NAVIGATION BRIDGE SWING SPAN PIVOT PIER AND ABUTMENT LIGHTS

.1 Fixed span and protection pier type light located on the pivot pier and abutments shall be 180˚ red and mounted on a vertical surface as indicated on the Contract Drawing.

.2 The housing shall be of cast silicon bronze. Casting alloy used shall be suitable for marine environment. Construction shall be rain-tight and fully gasketed. The light assembly shall be designed for heavy duty, long life service. Design shall provide ready access for lamp service.

.3 Lens shall be tempered fresnel glass. Lens colours shall meet Canadian Coast Guard standards. Inside lens diameter shall measure approximately 175mm. Outside lens diameter shall measure approximately 205mm.

.4 Lamps, dual lamps per section, shall be medium base, 120V, 100,000-hour LED lamps provided in a colour to match the lens. Medium base receptacles shall be rated for 250V, 660W and shall be porcelain with a nickel-plated brass shell to resist lamp freezing. The dual lamp arrangement shall be provided with an automatic transfer relay shall switch power to the backup lamp upon failure of the primary lamp. The relay shall provide a second independent contact for remote signaling of “primary lamp failure” status. Transfer relay components shall be contained in a cast box of the same material as the fixture head.

.5 Lamp fixture head and base shall be mounted on a 51mm schedule 40 pipe, 60mm O.D. Pipe material shall be stainless pipe used with bronze castings. Standard dimension from the light base to the focal plane of the lower lens shall be 356mm.

.6 Base shall be cast of the same material as the fixture head silicon bronze and be suitable for wall mount. Light assembly shall mount via four 13mm diameter bolts through the base, provided by the Contractor to suit installation.

.7 Each light shall be securely bolted in place with bronze or stainless-steel lag screws or bolts of not less than 9.5mm in diameter. The connections to the lights shall be made with No. 10 AWG conductors. The feeding conduits for the lights shall be securely clamped to the piers with two stainless steel anchor bolts.

.8 The contractor shall submit outline-dimensioned drawings, of his proposed bridge swing span navigation lighting unit, mounting details, and specification in the form of catalog cuts of proposed lights to be approved by the Department’s Representative.

2.3 NAVIGATION BRIDGE SWING SPAN FENDER LIGHTS

.1 Fender lights shall be identical to the above swing span pivot pier and abutment lights with the exception that they must be suitable for vertical mounting.

.2 Standard dimension from the light base to the focal plane of the lens shall be 356 mm.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that existing conditions are acceptable for navigation lighting installation in accordance with manufacturer's written instructions.

.1 Inform Department’s Representative of unacceptable conditions immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval from the Department’s Representative to proceed.

3.2 INSTALLATION

.1 Bridge swing span navigation light layout shall be approved by Canadian Coast Guard prior to the installation work.

.2 Install the bridge swing span navigation lights in accordance with manufacturer’s recommendations and the approved shop and working drawings.

.3 Each bridge swing span navigation light shall be tested for correct operational functionality and repeatability. Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

3.3 FIELD QUALITY CONTROL

.1 Perform tests in accordance with section 26 05 00.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools, and equipment in accordance with Section 01 74 00 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Construction/Demolition Waste Management and Disposal.

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

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 05 50 00 – Metal Fabrications

.2 Section 03 37 26 – Underwater Placed Concrete and Grout

1.2 REFERENCE STANDARDS

.1 ASTM International (ASTM)

.1 ASTM A307-14e1, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.

.2 ASTM C136/C136M-19, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

.2 American Wood-Preserver's Association (AWPA)

.1 AWPA M4-15, Standard for the Care of Preservation - Treated Wood Products.

.3 CSA Group (CSA)

.1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.

.2 CSA G40.20-13/G40.21-13 (R2018), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.3 CSA G164-18, Hot Dip Galvanizing of Irregularly Shaped Articles.

.4 CAN/CSA-O80 Series-15(R2020), Wood Preservation.

.4 Canadian Wood Council

.1 Wood Design Manual - 2017.

.5 National Lumber Grades Authority (NLGA)

.1 Standard Grading Rules for Canadian Lumber 2017

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Shop Drawings:

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

.2 Submit proposed placing method for ballast to Departmental Representative for approval, prior to placing of ballast

.3 Manufacturer's Instructions:

.1 Submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

.1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.

.2 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.3 Worker protection:

.1 Workers must wear dust masks, eye protection, and protective clothing when handling, drilling, sawing, cutting, or sanding preservative treated wood and applying preservative materials.

.2 Workers must not eat, drink, or smoke while applying preservative material.

.3 Clean up spills of preservative materials immediately with absorbent material. Safely discard of adsorbent material to sanitary landfill.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 – Waste Management and Disposal.

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

.3 Ensure emptied containers are sealed and stored safely.

.4 Do not dispose of preservative treated wood through incineration.

.5 Do not dispose of preservative treated wood with other materials destined for recycling or reuse.

.6 Dispose of treated wood, end pieces, wood scraps and sawdust at a sanitary landfill.

Part 2 Products

2.1 MATERIALS

.1 Timber: use timber graded and stamped in accordance with applicable grading rules and standards of associations or agencies approved to grade lumber by Canadian Lumber Standards Accreditation Board of CSA.

.1 Species: Spruce Pine Fir (SPF).

.2 Grade: Structural Select (SS)

.3 Grading authority: NLGA.

.4 Preservative treatment: all preservatives shall be according to CSA 080 Series

.2 Miscellaneous steel:

.1 Hot dip galvanized: to CAN/CSA-G164.

.2 Wire nails, spikes, staples: to CSA-B111.

.3 Bolts, nuts, washers: to ASTM A307.

.4 Steel straps and plates: to CSA G40.20-13/G40.21, Grade 300W.

.3 Ballast for filling cribs to following requirements:

.1 Stone, consisting of hard durable particles free from clay lumps, organic material, and other deleterious materials.

.2 Gradations to be within limits specified when tested to ASTM C136/C136M.

.1 Table:

Sieve Designation	% passing
250mm	100
200 mm	-
150mm	40-80
100mm	0-10
75 mm	-
50 mm	-

Part 3 Execution

3.1 PREPARATION

.1 Remove and salvage existing ballast from fender system.

.2 Deconstruct and salvage where approved by the Departmental Representative timbers from the existing fender system.

.3 Cut existing vertical piles as specified.

3.2 APPLICATION

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

3.3 CRIB CONSTRUCTION

.1 Precut and pre-bore timber prior to preservative treatment.

.2 Bore holes for drift bolts 1.5 mm smaller diameter than bolt and for full length of bolt. Bore holes for machine bolts to same diameter as bolts.

.3 Levelling pieces:

.1 Place timber levelling pieces beneath bottom timbers to conform to shape of base area.

.2 Place levelling pieces horizontally.

.3 Secure succeeding pieces at intersections of bottom timbers and vertical posts, and other levelling pieces with machine bolts.

.4 Bottom timbers:

.1 Place bottom timbers lengthwise.

.2 Crosswise bottom timbers to be one piece.

.3 Lengthwise bottom timbers to be minimum 6 m long.

.4 Splice timbers in lengthwise direction at centre of vertical piles.

.5 Stagger butt joints in bottom timbers; joints maximum 0.5 m from crosswise timber; do not locate in same bay as joint in course below.

.6 Secure two courses of bottom timbers together with machine bolts at every intersection with each other and with vertical posts.

.5 Ballast floor:

.1 Place ballast floor on pockets on bottom or middle course of bottom timbers.

.2 Secure each ballast floor timber to bottom timbers with drift bolts securing adjacent ballast floor timbers to same bottom timber.

.6 Longitudinals:

.1 Butt joint exterior and interior longitudinals in centre of 1.5 m block.

.2 Secure block to lower timber with drift bolt at centre and secure longitudinals and splice at ends to block with drift bolts.

.3 Longitudinals minimum 6 m long.

.4 Stagger joints in longitudinal timbers: do not join in same bay or on same vertical post.

.5 Secure longitudinals to intersection of cross ties with drift bolt and to intersection of vertical posts with machine bolt every second course of longitudinals.

.7 Cross ties: one length across cribs.

.1 Secure cross ties to intersection of longitudinals with drift bolt and to intersection of vertical posts with machine bolt every second course of cross tie.

3.4 HANDLING TREATED TIMBER

.1 Handle treated material without damaging original treatment.

.1 Replace treated timber with major damage to original treatment, as instructed by Departmental Representative.

.2 Field treatment: apply and saturate cuts, minor surface damage, abrasions, and nail and spike holes with preservative to CAN/CSA-O80 Series.

3.5 BALLAST

.1 Place ballast to avoid damage to timber cribwork.

.2 Place ballast so that differential height of fill between adjacent cells, at any time, will be less than 250 mm.

3.6 CLEANING

.1 Proceed in accordance with Section 01 74 00 - Cleaning.

.2 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 REFERENCES

.1 American Society for Testing and Materials (ASTM):

.1 ASTM D4491/D4491M-20e1, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.

.2 ASTM D4595-17, Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.

.3 ASTM D4716 / D4716M - 14, Standard Test Method for Determining the (In-Plane) Flow Rate Per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.

.4 ASTM D4751-16, Standard Test Method for Determining Apparent Opening Size of a Geotextile.

.2 Canadian General Standards Board (CGSB):

.1 CAN/CGSB-4.2 No. 27.5-2008, Textile Test Methods.

.2 CAN/CGSB-148.1, Methods of Testing Geosynthetics Geotextile.

.1 No. 2-M85, Mass per Unit Area.

.2 No. 3-M85, Thickness of Geotextiles.

.3 No. 6.1-93, Bursting Strength of Geotextiles Under No Compressive Load.

.4 No. 7.3-92, Grab Tensile Test for Geotextiles.

.3 Canadian Standards Association (CSA):

.1 CAN/CSA-G40.20/G40.21-13 (R2018), General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steel.

.2 CAN/CSA-G164-18, Hot Dip Galvanizing of Irregularly Shaped Articles.

.4 Ontario Provincial Standard Drawings (OPSD):

.1 OPSD 219.260 November 2015, Turbidity Curtain.

.2 OPSD 219.261 November 2015, Turbidity Curtain, Seam Detail.

.5 Ontario Provincial Standard Specification (OPSS):

.1 OPSS.PROV 805 November 2018, Construction Specification for Temporary Erosion and Sediment Control Measures.

1.2 ACTION AND INFORMATION SUBMITTALS

.1 Submit details of the proposed turbidity curtain system to the Departmental Representative three (3) weeks prior to the start of the work.

.2 Submit to Departmental Representative details of geotextile material and seam at least two (2) weeks prior to commencing work.

.3 Complete the submission of a Sediment Control Plan to the Departmental Representative, to meet the requirements of all review agencies. Ensure compliance of the sediment control plan throughout the project.

1.3 DELIVERY AND STORAGE

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

Part 2 Products

2.1 MATERIALS

.1 Geotextile: Woven synthetic fibre fabric, supplied in rolls:

- .1 Width: Approved by the Departmental Representative.
- .2 Length: As specified on contract drawings.
- .3 Composed of: Minimum 85% by mass of polypropylene polyester with inhibitors added to base plastic to resist deterioration by ultra-violet and heat exposure for 60 days.

.2 Physical properties:

- .1 Thickness: To CAN/CGSB-148.1, No. 3, minimum 0.8 mm.
- .2 Mass per unit area: To CAN/CGSB-148.1, No. 2, minimum 220 g/m2.
- .3 Tensile strength and elongation (in any principal direction): To ASTM D4596:
  - .1 Tensile strength: Minimum 1350N, wet condition.
  - .2 Elongation at break: Minimum maximum 25%.
  - .3 Seam strength: Minimum 1350N equal to or greater than tensile strength of fabric.
  - .4 Mullen burst strength: To CAN/CGSB-4.2, method 11.2, minimum 4000N, equal to or greater than tensile strength of fabric.

.3 Hydraulic properties:

- .1 Apparent opening size (AOS): To ASTM D4751.

.4 Seams: Sewn in accordance with manufacturer's recommendations.

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

Part 3 Execution

3.1 GENERAL

.1 Complete the submission of a Sediment Control Plan in accordance with Section 01 35 43. Where directed by the Departmental Representative, submit to the review agencies, as part of any permitting requirements. Modify the Sediment and Erosion Control Plan to address the review agency comments. Ensure compliance of the Sediment Control Plan throughout the project.

.2 Supply, install, maintain and remove silt curtains when instructed by the Departmental Representative.

.3 Monitoring of water turbidity outside the silt curtain will be carried out by the Contractor as set out in Section 01 41 00. Maximum allowable increase of turbidity above background levels is 5 NTUs (Nephelometric Turbidity Units).

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 OPSS.PROV 805 and OPSD 219.260 and OPSD 219.261, as a minimum.

.3 Turbidity curtains shall be constructed as follows:

.1 The floatation shall provide support along the length of the turbidity curtain.

.2 A sleeve shall be formed and heat-sealed or sewn along the entire bottom edge of the turbidity curtain geosynthetic, to contain the ballast in the sleeve. Breaks may be made in the sleeve to facilitate pulling, provided they are a minimum 100 mm in size and spaced at minimum 3 m intervals.

.3 Where turbidity curtain geosynthetic is joined to provide a continuous run, the sections shall be connected to provide a continuous seal and prevent the escape of turbid water between the sections.

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

.5 Adjustment lines shall be placed at maximum intervals of 10 m and are to encircle the turbidity curtain from top to bottom.

.6 The turbidity curtain shall be prepared for installation by furling and tying with hurling ties every 1.5 m for the entire length of the curtain.

.7 Anchor locations shall be established as is necessary to maintain the turbidity curtain in place and functioning.

3.3 OPERATION AND MAINTENANCE

.1 Turbidity curtains shall be installed to prevent sediment passage from the area enclosed by the curtain to the remaining water body. Turbidity curtains shall be installed and maintained in a manner that avoids entry of equipment, other than hand-held equipment or boats, to the remaining water body.

.2 Equipment is permitted in the work area enclosed by the turbidity curtain.

.3 Turbidity curtains shall be operated and maintained in the specified location, with the entire top edge above the water surface.

.4 The curtain shall be free of tears and gaps and the bottom edge of the curtain is to be continuously in contact with the water course bed, so that sediment passage from the area enclosed is prevented.

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

.6 Monitor and maintain the turbidity curtain 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 debris trapped by the turbidity curtain regularly and dispose at an approved location.

.10 Remove turbidity curtain when authorized by the Departmental Representative after completion of the work.

END OF SECTION