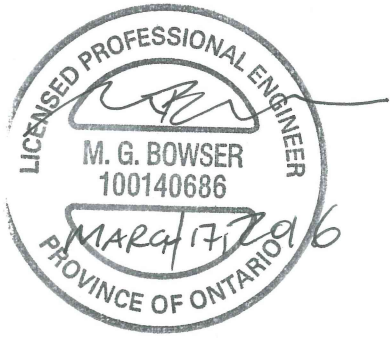
Project Title PARRY SOUND Ontario

WASAUKSING SWING BRIDGE
REHABILITATION

Project Number R.078886.002

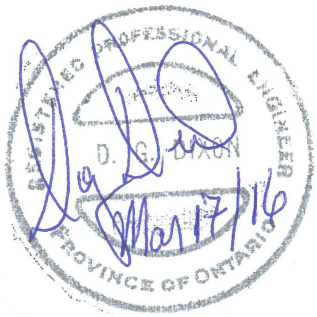
Project Date 2016-03-17

Structural Engineer:



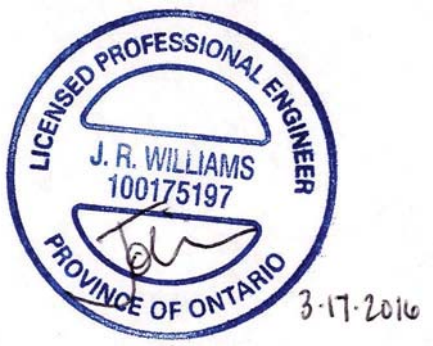
Matthew Bowser, P.Eng.

Structural Engineer:



Doug Dixon, P.Eng.

Mechanical Engineer:



John Williams, P.Eng.

Electrical Engineer:

Doug MacLean, P.Eng.

PART 1 - GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract generally comprises structural, mechanical, and electrical repairs for the Wasauksing Swing Bridge. All as indicated in the Contract Documents and/or Sections.

.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.

1.2 WORK SEQUENCE AND COMPLETION DATES

.1 Comply with operational constraints, milestones, and completion dates. Work must be monitored and completed to meet the goals at the milestones and at the completion date.

.2 Complete the repairs as indicated in the Contract Documents and maintain a single lane of traffic at all times during construction on the Wasauksing Swing Bridge except as permitted in the Contract Documents.

.3 The bridge swing span shall remain operational at all times during the work within the navigational season.

.4 Milestone dates for work under this Contract are as follows:

.1 Prior to preparation of shop drawings and procurement of materials the Contractor is to verify all site measurements required to complete the work. Contractor is to notify the Departmental Representative in writing of any discrepancies between site measurements by the Contractor and the dimensions shown on the Contract drawings.

.2 Shop drawings and product information requiring review shall be submitted by July 15, 2016.

.3 The anemometer shall be installed and functioning by August 1, 2016.

.4 All electrical work, replacement of steel beam guide rails, and miscellaneous timber repairs shall be completed by October 1, 2016. The Contractor shall include provision for night work as required to complete this work without interruption to the

operation of the bridge.

.5 Removals and on-site modifications to the swing span shall not occur prior to December 01, 2016. All repairs and modifications to the swing span shall be complete and ready for commissioning by April 10, 2017.

.6 Commissioning of the bridge shall be complete and the bridge shall be re-opened to navigation by April 17, 2017.

.7 Final completion date: All work under this Contract must be completed by May 31th, 2017.

1.3 CONTRACT METHOD

.1 Construct work under the Contract Lump Sum Amount.

1.4 DOCUMENTS REQUIRED

.1 Maintain at job site, one copy of each document as follows:
- .1 Contract Drawings.
- .2 Specifications.
- .3 Addenda and amendments.
- .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.

1.5 LUMP SUM WORK

.1 All items and tasks are carried out under the Contract Lump Sum Amount. Work under this Contract generally includes the following:
- .1 All work shown on the Contract Drawings and listed in the Contract Specifications.
- .2 Mobilization and Demobilization as deemed necessary by the Contractor.
- .3 Access and Protection to carry out all the work indicated in the Contract Documents.
- .4 All temporary traffic control requirements.
- .5 All General Requirements of Division 01.
- .6 All material testing by an independent agency (certified to carry out such testing), as indicated in the Contract Documents.

.2 No separate payment will be made for the above mentioned items.

1.6 COST BREAKDOWN

.1 Within 48 hours of notification of acceptance of bid furnish a cost

breakdown by Section aggregating contract price.
.1 Submit cost breakdown prices for the lump sum work.

.2 Within 48 hours of acceptance of bid submit a list of subcontractors.

1.7 CONTRACTOR USE OF PREMISES

.1 Contractor has 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 hour on the hour" (when required) from 6:00 AM to 10:00 PM daily (7 days a week). The winter shut down for the navigational opening of the channel will be from December 01st, 2016 to April 17th ,2017 (Non-navigation season).

.2 Contractor shall limit use of premises for Work, for storage, and for access, to allow:
.1 Owner occupancy.
.2 Public usage of the bridge (vehicular and pedestrian).
.3 Public usage of "Rose Point Road" (vehicular and pedestrian).
.4 Permit passage of boat/vessel traffic. The swing span shall remain operational and shall "open every hour on the hour" (when required).

.3 Coordinate use of premises under direction of Departmental Representative.

.4 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 beyond April 10, 2017.

.5 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 the bridge operator's house 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 hour on the hour" (when required). The Contractor should make allowance for additional openings.

.3 The Contractor shall be responsible for operating the bridge as required for construction during the non-navigation season and during commissioning. The Contractor is only responsible to operate the bridge for commissioning purposes and is not required to open the bridge for navigational purposes.

.4 Cooperate with Departmental Representative in scheduling operations to minimize conflict and to facilitate Owner usage.

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 EXISTING SERVICES

.1 Prior to commencement of Work, arrange to locate underground utilities and service connections that may be affected by Work.

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

.3 Where Work involves breaking into or connecting to existing services, carry out work at times as directed by utility companies and relevant authorities with minimum disturbance to pedestrian and vehicular traffic.

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

.5 Repair existing services damaged during construction as directed by Departmental Representative and relevant utility authority at no additional cost for this contract.

.6 Record locations of maintained, re-routed, and abandoned services.

.7 There is an existing buried and submarine cable at the site providing power and controls to the bridge.

1.2 ROAD CLOSURES

.1 To enable the commissioning of the bridge 15 minute closures for vehicle traffic will be permitted. At the end of each 15 minute closure period the bridge must be re-opened and the queued traffic must be permitted to pass before a subsequent road closure is permitted.

.2 To facilitate work in this Contract the Contractor is permitted eight (8) overnight work periods. Each overnight work period consists of three (3) short duration closures of the bridge as detailed in the table below. There is no alternate land based route to and from Parry Island and the main land; therefore, at all times during each short duration closure period the Contractor shall re-open the bridge immediately to allow for passage of emergency vehicles. The overnight work periods are not permitted to start on a Friday, Saturday, or Sunday. Overnight work periods are not permitted to start on a Holiday or extend into a Holiday. The Contractor shall advise the Departmental Representative a minimum of 14 days prior to each overnight work period.

Short Duration Closures Permitted for the Wasauksing Swing Bridge

11:00 PM to 1:00 AM	BRIDGE CLOSED*
1:00 AM to 1:30 AM	Bridge shall be re-opened for 30 minutes
1:30 AM to 3:30 AM	BRIDGE CLOSED*
3:30 AM to 4:00 AM	Bridge shall be re-opened for 30 minutes
4:00 AM to 6:00 AM	BRIDGE CLOSED*
6:00 AM	Bridge re-opens to regular traffic

*Contractor shall re-open the bridge at any time during a Closure to allow emergency vehicles to pass.

The Contractor shall supply and erect one 1200mm x 1200mm sign at each end of the bridge advising residents of the dates and times for each closure. The sign shall be installed seven (7) days prior to the closure.

1.3 TRAFFIC CONTROL

.1 The Contractor shall provide all traffic control required to complete the work. Traffic Control shall be in accordance with Ontario Traffic Manual (OTM) Book 7.

1.4 LOAD RESTRICTION ON BRIDGE

.1 The Wasauksing Swing Bridge is posted with a maximum 10-tonne axle limit. The Contractor must observe this posting at all times during construction.

1.5 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 will be from December 01st, 2016 to April 17th, 2017.

PART 2 - PRODUCTS

.1 Not used.

PART 3 – EXECUTION

.1 Not used.

END OF SECTION

PART 1 – GENERAL

1.1 GENERAL

.1 The provisions of OPSS 404 and OPSS.MUNI 539 shall apply to this item except as amended or extended herein or in other Sections. The term "Contract Administrator" shall be removed and replaced with "Departmental Representative" in the above referenced OPSS specification.

.2 The existing Bridge Operators House is not available for use for storage or staging, by the Contractor, at anytime during this Contract.

.3 No access and protection may be suspended from the swing span when the bridge is considered "operational" (during the navigation season) as additional or unbalanced load may damage the bridge span or render it inoperable.

.4 The Contractor will be permitted to use an area of approximately 12m x 24m located northwest of the bridge. This area may be used for site trailers, parking, or staging/laydown.

1.2 OUTLINE OF WORK

.1 Provide safe and adequate access, scaffolding, work platforms, containment systems and staging, on and around the structure to do the all Work indicated in the Contract Documents. The Contractor shall:
.1 Ensure a safe working environment.
.2 Facilitate progress of Work in an efficient manner.
.3 Eliminate debris from falling to the waterway below.
.4 Protect areas or features adjacent to the Work during procedures which may damage those areas or features.
.5 Protect Work and products against dampness and cold.
.6 Provide ambient temperatures and humidity levels for storage, application, installation and curing of materials.
.7 Allow inspection of the work and provide boat access (including a boat operator and all necessary safety equipment) for the Departmental Representative for such inspections at the Contractor's expense.

.2 The work involves both works on and off site. The work must be completed in environmental conditions that allow maximum quality of work and protection for the natural environment.

.3 All access shall conform with the most current Laws, Regulations, or Statutes that apply to this type of work.

.4 The requirements of this section apply to all other sections

of the specification and anywhere dust and/or cold weather protection, to provide an appropriate environment to complete the work as required to achieve the best quality of the finished product.

.5 Be responsible for all re-grading of existing roads, fencing, guard rails, landscaping and access routes to suit the Contractor's purposes for site access. The Contractor shall also be responsible for the restoration of all existing roads, fencing, guard rails and landscaping, including sodding of disturbed areas, to pre-construction conditions or better. Any damage to trees or other property caused by the Contractor's site access shall be corrected to the Departmental Representative's satisfaction at the Contractor's expense.

.6 Design, construct, maintain, and remove temporary "access to" and "egress from" work areas including, but not limited to, barges, stairs, runways, ramps or ladders, scaffolding, containment systems and staging, work platforms independent of finished surfaces.

.7 Provide safe and adequate access to the Departmental Representative for inspection and measurement of all areas of the substructure and superstructure.

.8 Prevent all debris, cutwater, or other deleterious material from falling, flowing or otherwise finding its way into nearby waterways and roadways.

.9 Protect the surrounding environment and properties, the public, vehicular and pedestrian traffic in a manner acceptable to the Departmental Representative's satisfaction at each stage of the work.

.10 Supply and apply water and/or dust suppressants for dust control when directed by the Departmental Representative.

.11 Safely remove and dispose of all staging, access, containment and protection systems, scaffolds and platforms upon completion of the work.

.12 Typical locations and areas of work are shown directly or implied through reference or detail to associated working areas on the drawings. The Contractor shall provide access and protection to carry out work in these areas.

.13 Maintain access to all commercial, institutional, and private entrances at all times.

.14 Maintain free of snow and ice all work areas. The Contractor shall provide such winter maintenance while not interfering with snow removal on Rose Point Road which will be undertaken by others.

.15 Provide a fire suppression plan that addresses all work on and near the timber trestles and timber deck.

1.3 REFERENCES

.1 Ontario Provincial Standard Specifications
.1 OPSS 404 November 2010 Construction Specification for Support Systems.
.2 OPSS.MUNI 539 November 2014 Construction Specification for Temporary Protection.

1.4 SITE BARRIERS

.1 Site barriers must be sufficient to protect public and exclude them from the work area.

1.5 SCAFFOLDING & ACCESS

.1 Provide all scaffolding, suspended platforms, ladders, access, lifting equipment, to carry out the work. Field measure to ensure proper fit. Transition area from the ladder(s) or structure to the scaffolding shall be clear of obstructions and cross bracing so people and materials can easily enter.

.2 Carry out all work in accordance with the Occupational Health and Safety Act and the Site-Specific Safety Plan. Make all changes required by Ministry of Labour officials and address all concerns of the Departmental Representative.

.3 Make regular inspections of scaffolding and work platforms as the work progresses.

.4 The Contractor is not permitted to make holes in the structural steel or timber members. Remove all anchors installed in the concrete as part of the scaffolding and housing work. Ensure all holes are filled to the satisfaction of the Departmental Representative as scaffolding is dismantled.

.5 If a barge is utilized for construction access, the contractor must provide a written plan to the Departmental Representative ten (10) days prior to using the barge that identifies a work plan which demonstrates that there will be no conflicts between the barge (including the spud piles and

anchors) and the submarine cable. Barges shall not be kept within the navigational openings. Barges kept on-site overnight must have lights in accordance with the requirements set by Transport Canada.

1.6 LIGHTING

.1 In all areas of work ensure sufficient and good lighting is provided to complete and inspect the work.

.2 Especially during night time work or in dark areas, provide additional lighting in work areas and to Public ways to compensate for the lack of natural lighting.

.3 Provide for the use of the Departmental Representative additional work lights for inspection.

1.7 SUBMISSIONS

.1 The Contractor shall submit to the Departmental Representative for review, a detailed proposal for carrying out removal, rehabilitation, and replacement for each applicable work item a minimum of one (1) week prior to the commencement of any removals. Those proposals shall outline the removal and restoration techniques, sequence of operations and shall detail and dimension the Contractor's proposed staging, temporary supports/shoring, access, protection, and containment systems.

.2 Submissions for access platforms shall bear the seal and signature of a Professional Engineer licensed in the Province of Ontario, who shall be responsible for the detailed design and subsequent inspection of the access platforms/protection system as installed on site, and shall certify in writing its compliance with the design requirements.

.3 Six (6) sets of working drawings and documents shall be submitted to the Departmental Representative for review of access and protection schemes. Work shall not proceed until the Departmental Representative has reviewed the drawings and provided written authorization for the Contractor to proceed with the work.

.4 The Departmental Representative's approval shall not release the Contractor from liability for any damage or any consequence as a result of inadequate protection design.

.5 Fire suppression plan to be submitted prior to any work on near the timber trestles.

1.8 MEASUREMENT AND PAYMENT

.1 There shall be no measurement for this work.

.2 Payment will be under the Contract Lump Sum Amount and such payment shall be full compensation of all design, labour, equipment and materials necessary to complete the work.

PART 2 – PRODUCTS

2.1 GENERAL

.1 In accordance with OPSS 404 and OPSS.MUNI 539 except as amended or extended herein or in other Sections. The term "Contract Administrator" shall be removed and replaced with "Departmental Representative" in the above referenced OPSS specification.

2.2 MATERIALS

.1 The following alternatives are acceptable:
.1 New materials; or,
.2 Used, salvaged or recycled materials, in good condition, subject to the approval of the Departmental Representative; or,
.3 Prefabricated, portable components in a good, safe condition, approved by the Contractor's design engineer as to type, materials and detail.

PART 3 – EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Inspecting and testing by inspection firms and/or testing laboratories designated by Departmental Representative. This does not replace testing that the Contractor is required to perform.

1.2 RELATED REQUIREMENTS

.1 Particular requirements for inspection and testing to be carried out by testing laboratory designated by Departmental Representative.

1.3 APPOINTMENT AND PAYMENT

.1 Departmental Representative will appoint and pay for services of testing laboratory on regulatory authority **except** 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 the Contractor under supervision of the Departmental Representative.

.2 Where tests or inspections by a designated testing laboratory reveal Work not in accordance with contract requirements, Contractor to 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 any 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 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 4 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 Departmental Representative, meeting participants and affected parties not in attendance.

.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 seven (7) days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities. Meeting is to occur within fourteen (14) days after award of Contract.

.2 Departmental Representative, Contractor, and major Subcontractors, shall be in attendance.

.3 Establish location of meeting and notify parties concerned minimum two (2) days before meeting.

.4 Agenda to include:
.1 Appointment of official representative of participants in the Work.
.2 Schedule of Work: in accordance with Section 01 32 16.1.5.
.3 Schedule of submission of shop drawings. Provide submittals in accordance with Section 01 33 00.
.4 Requirements for temporary facilities, in accordance with Section 01 52 00.

.5 Delivery schedule of specified equipment.
.6 Site security in accordance with Section 01 56 00.
.7 Health and safety in accordance with Section 01 35 29.
.8 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
.9 Record drawings and specifications in accordance with Section 01 33 00.
.10 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00.
.11 Monthly progress claims, administrative procedures, photographs, hold backs.
.12 Appointment of inspection and testing agencies or firms.
.13 Insurances, transcript of policies.
.14 Subcontractors and suppliers.
.15 Quality control/quality assurance.

1.3 PROGRESS MEETINGS

.1 During course of Work attend progress meetings every second week. Attend additional scheduled meetings as required.

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

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

.4 Agenda to include the following:
.1 Review of any outstanding action items from minutes of previous meetings.
.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 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 Health and safety issues.
.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, Certificate of Substantial Performance and Certificate of Completion as defined times of completion are of essence of this contract.

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

1.3 SUBMITTALS

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

.2 Submit Project Schedule to Departmental Representative within 72 hours of Award of Contract.

1.4 SCHEDULE

.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 72 hours.

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

.4 Accepted revised schedule will govern and be used as baseline for updates.

1.5 PROJECT SCHEDULE

.1 Ensure detailed Project Schedule includes as a minimum the milestone and activity types as follows:
- .1 Award.
- .2 Submission and return dates for shop Drawings, samples, etc.
- .3 Mobilization
- .4 Site Measurements by Contractor.
- .5 Structural steel repairs
- .6 Mechanical repairs
- .7 Electrical repairs
- .8 Demobilization

1.6 PROJECT SCHEDULE REPORTING

.1 Update Project Schedule every two (2) weeks reflecting activity changes and completions, as well as activities in progress.

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. Only extreme one in 50 year weather events will be considered for adjustments to schedule.

.3 No progress payment will be made until the construction progress schedule is approved and no subsequent payment will be made without an updated schedule.

.4 Distribute copies of approved schedule to:
.1 Job site office (must be hard copy).
.2 Sub-contractors.
.3 Other parties as directed.

.5 Instruct recipients to report to Contractor within 5 days, any problems anticipated by timetable shown in schedule.

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 SECTION INCLUDES

.1 Shop drawings and product data.

.2 Samples.

.3 Certification and transcripts.

.4 Fees and permits.

.5 Health and Safety.

1.2 ADMINISTRATIVE

.1 The Contractor shall submit to Departmental Representative submittals as specified 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.

.11 Submit number of hard copies specified for each type and format of submittal and also submit in electronic format as pdf files. Forward pdf, NMSEdit Professional spp, MS Word, MS Excel, MS Project, and Autocad dwg files on USB compatible with PWGSC encryption requirements or through email or alternate electronic file sharing service such as ftp, as directed by Departmental Representative.

1.3 SHOP DRAWINGS AND PRODUCT DATA

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

.2 Where technical sections specify that shop drawings shall bear the stamp of a Registered Professional Engineer, registered in the Province of Ontario, Canada, submit same with contact information for the Contractor’s engineer.

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

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

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

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

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

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

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

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

for project.

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

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

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

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

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

.18 Delete or identify 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 Public Works and Government Services Canada (PWGSC) is for sole purpose of ascertaining conformance with general concept.
.1 This review shall not mean that PWGSC 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.

1.4 SAMPLES

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

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

.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.

1.5 CERTIFICATES AND TRANSCRIPTS

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

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.

1.7 CORRESPONDENCE

.1 All correspondence shall conform to a standard such that is easily identifiable and referenced.

.2 Each submittal shall be numbered and shall include a title page describing the date and version of the submittal.

.3 Electronic submissions shall:

.1 All have a title format that identifies the project, the nature of the submittal, the number of the submittal and the contents of the submittal such that they are easy to electronically sort and identify. The titles will be similar in form to "Project R.078886.002 Wasauksing Swing Bridge: Shop Drawing X – Location";

.2 The format of electronic submissions shall be pdf.

.3 The electronic mail submissions shall be divided into sections such that the file size of each submission is less than 5 megabytes.

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 Ministry of Transportation Ontario (MTO)
  .1 Ontario Traffic Manual (OTM) Book 7 - Temporary Conditions.
  .2 Occupational Health and Safety Act (OHSA) and Regulations for Construction Projects, R.S.O. 1990 and R.R.O. 213/91.

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 INFORMATIONAL 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 both 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.

.10 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 temporary traffic signals (PTTS) including timing.
- .6 Contract specific work restrictions including operational constraints.
- .7 Lane closures and detours.
- .8 Night time 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 present minimum of 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 with 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, unless another means of road access exists that meets approval of Departmental Representative.

1.5 – INFORMATIONAL AND WARNING SIGNS

.1 Supply, install and maintain signs, flashing warning signs, and other devices required to indicate construction activities or temporary and unusual conditions resulting from 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 required signs and other devices. Incorporate requirements into TCP. If the situation on site changes, revise and resubmit TCP to Departmental Representative.

.4 Navigable Water

.1 Signs stating “Construction Ahead” 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.

.5 Continually maintain traffic control devices.

.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 persons, trained and properly equipped:

.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.

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 TCP and as reviewed by Departmental Representative to protect and control public traffic

1.8 MEASUREMENT AND PAYMENT

.1 The Contract Lump Sum Amount shall include all costs for traffic control persons, PTTS, signs, crash trucks, delineators and all other traffic control devices to be used on the job for whatever purpose required by the terms of the contract and in accordance with the directions to be given to the Contractor by the Departmental Representative. Daily moving of these devices shall be the responsibility of the Contractor and no additional payment shall be made for these operations. The Contractor shall ensure that sufficient devices are readily available to satisfy all these requirements.

.2 Payment shall include all labour, equipment and materials necessary to complete the work.

PART 2 – PRODUCTS

2.1 SIGNAGE

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

.2 Do not erect advertising signage.

PART 3 – EXECUTION

3.1 GENERAL

.1 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 REFERENCES

.1 Province of Ontario:
.1 Occupational Health and Safety Act Revised Statutes of Ontario 1990, Chapter O.1 as amended, and Regulations for Construction Projects, O. Reg. 213/91 as amended.
.2 O. Reg. 490/09, Designated Substances.
.3 Workplace Safety and Insurance Act, 1997.
.4 Other municipal, provincial, and federal statutes having jurisdiction.

.2 Canadian Standards Association (CSA): Canada
.1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.

.3 National Building Code 2010 (NBC):
.1 NBC 2010, Division B, Part 8 Safety Measures at Construction and Demolition Sites.

.4 National Fire Code 2010 (NFC):
.1 NFC 2010, Division B, Part 5 Hazardous Processes and Operations, subsection 5.6.1.3 Fire Safety Plan.

1.2 SUBMITTALS

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

.2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
.1 Results of site specific safety hazard assessment.
.2 Results of safety and health risk or hazard analysis for site tasks and operations.
.3 Contractor’s and Sub-contractor’s Safety Communication Plan.
.4 Measures and controls to be implemented to address identified safety hazards and risks.
.5 Contingency and Emergency Response Plan addressing standard operating procedures specific to the project site to be implemented during emergency situations. Coordinate plan with existing Emergency Response Plan requirements and procedures, which is included in Annex D.

.3 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 10 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.

.4 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

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

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

.7 Submit copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative monthly.

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

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

.10 Submit Material Safety Data Sheets (MSDS).

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

1.3 FILING OF NOTICE

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

1.4 SAFETY ASSESSMENT

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

1.5 MEETINGS

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

1.6 REGULATORY REQUIREMENTS

.1 Comply with the Acts and regulations of the Province of Ontario.

.2 Comply with specified standards and regulations to ensure safe operations at site.

1.7 PROJECT/SITE CONDITIONS

.1 Work at site will involve contact control of the site, work near water and work in the vicinity of a swing bridge. The Owner will operate the bridge every hour on the hour between 06:00 AM and 10:00 PM daily (7 days a week). In previous years the winter shut down for the navigational opening of the channel has been from approximately December 20th through to April 10th (Navigation season).

.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 Work near water.
- .5 Work near utilities, including overhead utilities.
- .6 Work on the roadway.
- .7 Working at heights.
- .8 Heavy and moving equipment.
- .9 High voltage cables.

1.9 GENERAL REQUIREMENTS

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

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

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

1.10 COMPLIANCE REQUIREMENTS

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

1.11 RESPONSIBILITY

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

.2 Comply with and enforce compliance by employees with safety

requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

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

1.12 UNFORSEEN HAZARDS

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

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

1.13 HEALTH AND SAFETY CO-ORDINATOR

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

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 Province of Ontario, and in consultation with Departmental Representative.
.1 Contractor's Safety Policy.
.2 Constructor's Name.
.3 Notice of Project.
.4 Name, trade, and employer of Health and Safety Representative or Joint Health and Safety Committee members.
.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 aid personnel 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 WORK STOPPAGE

.1 Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

.2 Assign responsibility and obligation to stop or start Work when, at Health and Safety Coordinator's discretion, it is necessary or advisable for reasons of health or safety. Departmental Representative may also stop Work for health and safety considerations.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.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 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

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

.3 Prior to commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Departmental Representative.

.4 Environmental Protection Plan must include comprehensive overview of known or potential environmental issues to be addressed during construction.

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

.6 Include in Environmental Protection Plan:
.1 Name(s) of person(s) responsible for ensuring adherence to Environmental Protection Plan.
.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 Erosion and sediment control plan identifying type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal,

Provincial, and Municipal laws and regulations.

.6 Drawings indicating locations of proposed material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.

.7 Traffic Control Plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather.

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

.8 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use.

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

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

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

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

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

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

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

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

.16 Fire protection plan including emergency response procedures, instructions, and reports to be used in event of fire.

1.4 FIRES

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

1.5 DRAINAGE

.1 Develop and submit erosion and Sediment Control Plan (ESC)

identifying type and location of erosion and sediment controls provided. Plan to include monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.

.2 Storm Water Pollution Prevention Plan (SWPPP) to be substituted for erosion and sediment control plan.

.3 Provide temporary drainage and pumping required to keep excavations and site free from water.

.4 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

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 and storage areas.

.3 Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.

.4 Minimize stripping of topsoil and vegetation.

.5 Restrict tree removal to areas designated by Departmental Representative.

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

.5 Design and construct temporary crossings to minimize erosion to

waterways.

.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.

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

.3 Prevent extraneous materials from contaminating air and waterways beyond application area.
.1 Provide temporary enclosures where required to carry out the work or as directed by Departmental Representative.

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

1.9 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 or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.

.2 Contractor: after receipt of such notice, inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.
.1 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

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES AND CODES

.1 Perform Work in accordance with the Canadian Highway Bridge Design Code (CHBDC) CSA S6-14, including all amendments up to bid closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply as directed by the Departmental Representative.

.2 Meet or exceed requirements of:
.1 Contract Documents.
.2 Specified standards, codes and referenced documents.

1.2 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.

1.3 BUILDING SMOKING ENVIRONMENT

.1 Comply with smoking restrictions.

1.4 RELICS AND ANTIQUITIES

.1 Relics and antiquities, and items of historical or scientific interest such as cornerstones and contents, commemorative plaques, inscribed tables, and similar objects found on site shall remain the property of Parks Canada. Protect such articles and request directives from Departmental Representative.

.2 Should historic objects be uncovered during excavating, stop work immediately and notify the Departmental Representative. Do not resume work until directed to by the Departmental Representative.

1.5 TAXES

.1 Pay applicable Federal, Provincial and Municipal taxes.

1.6 EXAMINATION

.1 Examine existing conditions and determine conditions affecting 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 ABBREVIATIONS AND ACRONYMS

.1 The abbreviations and acronyms are commonly found in the Project Manual and represent the associated organizations or terms.

1.2 MATERIALS, EQUIPMENT AND METHODS

.1 A:
- .1 AB: anchor bolt.
- .2 AC: acoustic.
- .3 AC PAN: acoustic panel.
- .4 ACU: acoustic unit ceiling.
- .5 AFF: above finished floor.
- .6 AC PLAS: acoustic plaster.
- .7 ACT: acoustic tile.
- .8 ACR CU LVR: acrylic cube louvre.
- .9 ADH: adhesive.
- .10 ADJ: adjustable.
- .11 A/C: air conditioner.
- .12 AHU: air handling unit.
- .13 AL: aluminum.
- .14 ANOD: anodized.
- .15 APPROX: approximate.
- .16 ARCH: architecture.
- .17 ARCH BLK: architectural block.
- .18 AVB: air vapour barrier.

.2 B:
- .1 B: base.
- .2 BEAST: benthic assessment of sediment.
- .3 BH: bore hole.
- .4 BHP: brake horse power.
- .5 BL: bottom layer.
- .6 BLK: block.
- .7 BLKD: bulkhead.
- .8 BM: beam.
- .9 BOT: bottom.
- .10 BMP: best management practice.
- .11 B PL: base plate.
- .12 BRG: bearing.
- .13 BRK: brick.
- .14 BSMT: basement.
- .15 BTEX: benzene, toluene, ethylbenzene and xylenes.
- .16 BUR: built-up roof.

.3 C:
- .1 CAL: caliper.

.2 CANTIL: cantilever.
.3 CB: catch basin.
.4 CC: centre to centre.
.5 CCN: contemplated change notice.
.6 CDF: controlled density fill.
.7 CEC: Canadian Electrical Code.
.8 CF: chair fabric.
.9 CHAN: channel.
.10 CHBDC: Canadian Highway Bridge Design Code
.11 CHS: Canadian hydrographic service.
.12 CJ: construction joint.
.13 CL: centerline.
.14 CK: cork.
.15 CLG: ceiling.
.16 CLR: clear.
.17 COL: column.
.18 CONC: concrete.
.19 CONC BLK: concrete block.
.20 CONC BRK: concrete brick.
.21 CONT: continuous.
.22 CONT J: control joint.
.23 COMPL: complete.
.24 CM: centimeter. (Nursery stock).
.25 CP: circulating pump.
.26 CPL: cement plaster.
.27 CPM: critical path method.
.28 CPT: carpet.
.29 CPTT: carpet tile.
.30 CT: ceramic tile.
.31 CTE: connect to existing.
.32 CV: control valve.
.33 CVT: conductive vinyl tile.
.34 C/W: complete with.

.4 D:
.1 D: deep.
.2 dB: decibels.
.3 DB: dry-bulb.
.4 DD: Dutch door.
.5 DEG: degree.
.6 DF: drinking fountain.
.7 DIA: diameter.
.8 DIM: dimension.
.9 DL: dead load.
.10 DMNT: demountable.
.11 DP: Dampproofing.
.12 DR: door.
.13 DRP: drapery.
.14 DWL: dowel.

.5 E:

.1 EA: each.
.2 EC: epoxy coating.
.3 ECF: engineered containment facility.
.4 EE: each end.
.5 EF: each face (architectural/structural).
.6 EF: exhaust fan (mechanical/electrical).
.7 EL: elevation.
.8 ELEC: electric.
.9 ELEV: elevator.
.10 EM: expanded metal.
.11 ENCL: enclosure.
.12 EQ: equal.
.13 ET: expansion tank.
.14 EXH: exhaust.
.15 EXIST: existing.
.16 EXPJ: expansion joint.
.17 EXP STRUCT: exposed structure.
.18 EXT: exterior.
.19 EW: each way.
.20 EWT: entering water temperature.

.6 F:

.1 FC: fuel contributed.
.2 FD: floor drain.
.3 FDN: foundation.
.4 FEAT W: feature wall.
.5 FEXT: fire extinguisher.
.6 FH: fire hose.
.7 FHC: fire hose cabinet.
.8 FHR: fire hose rack.
.9 FIN: finish.
.10 FIP: federal identity program.
.11 FL: floor.
.12 FLD: field.
.13 FLUOR: fluorescent.
.14 FR: frame.
.15 FRR: fire resistance rating.
.16 FTG: footing.

.7 G:

.1 GALV: galvanized steel.
.2 GB: grab bar.
.3 GBD: gypsum board.
.4 GC: General Conditions.
.5 GF: ground floor.
.6 GFCI: ground fault circuit interrupter.
.7 GL: glass or glazing.

.8 GL BLK: glass block.
.9 GPC: gypsum plaster ceiling.
.10 GPW: gypsum plaster wall.
.11 GT: glass tile.

.8 H:
.1 HB: hose bib.
.2 HC: hollow core.
.3 HCWD: hollow core wood door.
.4 HD: hand dryer.
.5 HDW: hardware.
.6 HDWD: hardwood.
.7 HEX: heat exchanger.
.8 HM: hollow metal.
.9 HOR: horizontal.
.10 HOR EF: horizontal each face.
.11 HP: hydro pole.
.12 HPA: Hamilton Port Authority.
.13 HR: hour.
.14 HRV: heat recovery ventilator.
.15 HT: height.
.16 HTR: heater.
.17 HUM: humidifier.
.18 HWT: hot water tank.
.19 HYD: hydrant.
.20 HZ: Hertz frequency, cycles per second.

.9 I:
.1 ICF: insulated concrete formwork.
.2 ID: inside diameter.
.3 INS: insulation.
.4 INTLK: interlock.

.10 J:
.1 JT: joint.

.11 K:
.1 KPL: kick plate.

.12 L:
.1 LAT: leaving air temperature.
.2 LAV: lavatory.
.3 LDG: landing.
.4 LG: long.
.5 LINO: linoleum.
.6 LL: live load.
.7 LT: light.
.8 LWT: leaving water temperature.

.13 M:

.1 MAS: masonry.
.2 MAS FL: masonry flashing.
.3 MAX: maximum.
.4 MBG: metal bar grating.
.5 MCL: metal cube louvre.
.6 MECH: mechanical.
.7 MET: metal.
.8 MET DK: metal deck.
.9 MET FL: metal flashing.
.10 MET GRID CLG: metal grid ceiling.
.11 MET GRTG: metal grating.
.12 MET LIN CLG: metal linear ceiling.
.13 MET T PTN: metal toilet partition.
.14 MH: maintenance hole.
.15 MIN: minimum.
.16 MLP: metal lath and plaster.
.17 MO: masonry opening.
.18 MR: marble.
.19 MT: metal threshold.
.20 MWP: membrane waterproofing.

.14 N:

.1 NBC: national building code.
.2 NC: normally closed.
.3 NF: near face.
.4 NFC: national fire code.
.5 NIC: not in contract.
.6 NO: number.
.7 NRC: noise reduction coefficient.
.8 NRP: non removable pin.
.9 NTS: not to scale.

.15 O:

.1 OA: outside air.
.2 OBC: Ontario building code.
.3 OC: on centre.
.4 OD: outside diameter.
.5 OPNG: opening.
.6 OPR: operator.
.7 OVHD: overhead.
.8 OWSJ: open web steel joist.

.16 P:

.1 P: prefinished.
.2 PAH: polynuclear aromatic hydrocarbons.
.3 PARG: parging.
.4 PCC: precast concrete.

.5 PCT: porcelain ceramic tile.
.6 PED ACS FLG: pedestal access flooring.
.7 PF: panel fabric.
.8 PH: phase.
.9 PL: plate.
.10 PLAM: plastic laminate.
.11 PLAS: plaster.
.12 PLYWD: plywood.
.13 PR: pair.
.14 PREFAB: prefabricated.
.15 PREFIN: prefinished.
.16 PRESS: pressure.
.17 PRFL: profile.
.18 PRV: pressure regulating valve.
.19 PT: paint.
.20 PTD: paper towel dispenser.
.21 PTN: partition.
.22 PVC: polyvinyl chloride.

.17 Q:
.1 QTB: quarry tile base.
.2 QTF: quarry tile floor.
.3 QTR: quarry tile roof.

.18 R:
.1 R: radius.
.2 RA: return air.
.3 RAD: return air damper.
.4 RB: resilient base.
.5 RC: reinforced concrete.
.6 RCPT: receptacle.
.7 RD: roof drain.
.8 REINF: reinforced/reinforcing.
.9 REQD: required.
.10 REQT: requirement.
.11 RFT: rubber floor tile.
.12 RM: room.
.13 RO: rough opening.
.14 RP: radiant panel.
.15 RRS: recycled rubber sheet.
.16 RRT: recycled rubber tile.
.17 RSD: rolling steel door.
.18 RSF: rubber sheet flooring.
.19 RT: rubber tile.
.20 RTU: roof top unit.
.21 RWL: rain water leader.

.19 S:
.1 SA: supply air.

.2 SAN SEW: sanitary sewer.
.3 SCHED: schedule.
.4 SC: solid core.
.5 SCRN: screen.
.6 SCWD: solid core wood door.
.7 SD: smoke developed.
.8 SDT: static dissipative tile.
.9 SECT: section.
.10 SH: sill height.
.11 SIM: similar.
.12 SL: sliding.
.13 SLR: sealer.
.14 SPEC: specification.
.15 SS: stainless steel.
.16 STD: standard.
.17 STL: steel.
.18 STL BM: steel beam.
.19 STC: sound transmission class.
.20 STL FL DK: steel floor deck.
.21 STL PL: steel plate.
.22 STN: stone.
.23 STR: structure or structural.
.24 ST SEW: storm sewer.
.25 S&U: stain and urethane.
.26 S&V: stain and varnish.
.27 SVT: solid vinyl tile.

.20 T:
.1 T: top.
.2 T&B: top and bottom.
.3 TCB: turbidity control plan.
.4 TEL: telephone.
.5 TER: terrazzo.
.6 TERT: terrazzo tile.
.7 THKNS: thickness.
.8 THR: threshold.
.9 TMPD: tempered.
.10 TOPG: topping.
.11 TRANSV: transverse.
.12 TYP: typical.

.21 U:
.1 U: urethane.
.2 U/C: undercut.
.3 UGRD: underground.
.4 UNO: unless noted otherwise.
.5 UOS: unless otherwise specified.
.6 U/S: underside.
.7 UR: urinal.

.22 V:
- .1 V: volt.
- .2 VCF: vinyl coated fabric.
- .3 VCT: vinyl composition tile.
- .4 VEL: velocity.
- .5 VERT: vertical.
- .6 VERT B: vertical blinds.
- .7 VERT EF: vertical each face.
- .8 VSF: vinyl sheet flooring.
- .9 VPT: vinyl plank flooring.
- .10 VT: vinyl tile.
- .11 VWC: vinyl wall covering.

.23 W:
- .1 WB: wet-bulb.
- .2 WC: water closet.
- .3 W-C: wall connectors.
- .4 WD: wood.
- .5 WDV: wood veneer.
- .6 WG: water gauge.
- .7 WH: wall hydrant.
- .8 WHMIS: workplace hazardous materials information system.
- .9 WP: waterproofing.
- .10 WR: washroom.
- .11 WSIB: workplace safety and insurance board.
- .12 WT: weight.
- .13 WTP: water treatment plant.

1.3 STANDARDS ORGANIZATIONS

.1 Standards writing organizations:
- .1 AA - Aluminum Association.
- .2 ACPA - American Concrete Pipe Association.
- .3 ANSI - American National Standards Institute.
- .4 ASHRAE - American Society of Heating and Refrigerating and Air-Conditioning Engineers.
- .5 ASTM - American Society for Testing and Materials.
- .6 AWI/AWMAC - Architectural Woodwork Institute/Architectural Woodwork Manufacturers Association of Canada.
- .7 AWPA - American Wood Preservers' Association.
- .8 AWWA - American Water Works Association.
- .9 BHMA - Builders Hardware Manufacturers Association.
- .10 CCDC - Canadian Construction Documents Committee.
- .11 CCMPA - Canadian Concrete Masonry Producers Association.
- .12 CGSB - Canadian General Standards Board.
- .13 CNTA - Canadian Nursery Trades Association.
- .14 CPCA - Canadian Painting Contractors Association.
- .15 CRCA - Canadian Roofing Contractors Association.
- .16 CSA - Canadian Standards Association.

.17 CSC - Construction Specifications Canada.
.18 CSDMA - Canadian Steel Door Manufacturers Association.
.19 CSI - Construction Specifications Institute.
.20 CSSBI - Canadian Sheet Steel Building Institute.
.21 CRCA - Canadian Roofing Contractors Association.
.22 DHI - Door and Hardware Institute.
.23 EEMAC - Electrical and Electronic Manufacturer's Association of Canada.
.24 ESA - Electrical Safety Authority.
.25 FCC - Fire Commissioner of Canada.
.26 FSC - Forest Stewardship Council.
.27 GANA - Glass Association of North America.
.28 HMMA - Hollow Metal Manufacturers Association.
.29 IEEE - Institute of Electrical and Electronics Engineers Inc.
.30 ISO - International Organization for Standardization.
.31 IWFA - International Window Film Association.
.32 LEED - LEED Canada, Leadership in Energy and Environmental Design.
.33 MPI - Master Painters Institute.
.34 NAAMM - National Association of Architectural Metal Manufacturers.
.35 NCPI - National Clay Pipe Institute.
.36 NEMA - National Electrical Manufacturers Association.
.37 NFPA - National Fire Protection Association.
.38 OPSD - Ontario Provincial Standard Drawings.
.39 OPSS - Ontario Provincial Standard Specifications.
.40 PPI - Plastics Pipe Institute.
.41 SDI - Steel Door Institute.
.42 SCAQMD - South Coast Air Quality Management District.
.43 TIA - Telecommunications Industry Association.
.44 TIAC - Thermal Insulation Association of Canada.
.45 TTMAC - Terrazzo Tile and Marble Association of Canada.
.46 UL - Underwriters Laboratories.
.47 ULC - Underwriters Laboratories of Canada.
.48 US EPA - United States Environmental Protection Agency.
.49 WH – Warnock Hersey.

1.4 FEDERAL GOVERNMENT DEPARTMENTS AND AGENCIES

.1 Departments, agencies and crown corporations.
.1 CEAA - Canadian Environmental Assessment Agency.
.2 CSC - Correctional Service Canada.
.3 CRA - Canada Revenue Agency.
.4 DND - Department of National Defence.
.5 EC - Environment Canada.
.6 FHBRO - Federal Heritage Buildings Review Office.
.7 HC - Health Canada.
.8 HCD - Heritage Conservation Directorate.
.9 LC - Labour Canada.

.10 PC - Parks Canada.
.11 PWGSC - Public Works and Government Services Canada.
.12 RCMP - Royal Canadian Mounted Police.
.13 TBS - Treasury Board Secretariat.
.14 TC - Transport Canada.

1.5 PROVINCIAL GOVERNMENT DEPARTMENTS AND AGENGIES

.1 MOEE - Ontario Ministry of Environment and Energy.

.2 MOL - Ontario Ministry of Labour.

.3 MTO and MOT - Ontario Ministry of Transportation.

.4 TSSA - Technical Standards and Safety Authority.

1.6 INTERNATIONAL GOVERNMENT DEPARTMENTS AND AGENCIES

.1 DOHMH - New York City Department of Health and Mental Hygiene, USA.

.2 GSA - Government Services Administration, USA.

1.7 UNITS OF MEASURE METRIC

.1 The following abbreviations of units of measure are commonly found in the Project Manual:
.1 C: Celsius.
.2 cm: centimeter.
.3 kg: kilogram.
.4 kg/mü: kilogram per cubic metre.
.5 kN: kilonewton.
.6 kPa: kilopascals.
.7 kw: kilowatts.
.8 l/s: liter per second.
.9 m: metre.
.10 mü: cubic metre.
.11 mg/kg: milligrams per kilogram.
.12 mg/L: milligrams per liter.
.13 mm: millimeters.
.14 MPa: megapascal.
.15 NTU: nephelometric turbidity unit.
.16 ppm: parts per million.
.17 ug/L: micrograms per liter.
.18 ug/mü: micrograms per cubic metre.

1.8 UNITS OF MEASURE IMPERIAL

.1 The following abbreviations of units of measure are commonly found

in the Project Manual:

.1 BTU: British thermal units.
.2 CFM: cubic feet per minute.
.3 F: Fahrenheit.
.4 ft: foot/feet.
.5 FPI: fins per inch.
.6 FPM: feet per minute.
.7 ga: gauge.
.8 gpm: gallons per minute.
.9 in: inches.
.10 lbs: pounds.
.11 NTU: nephelometric turbidity unit.
.12 psi: pounds-force per square inch.
.13 PSIG: PSI gauge.
.14 ppm: parts per million.
.15 RPM: revolutions per minute.

1.9 LEED TERMS

.1 Acronyms specific to LEED:
.1 CI: commercial interiors.
.2 EQ: environmental quality.
.3 MR: material and resources.
.4 NC: new construction.

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 SECTION INCLUDES

.1 Inspection and testing, administrative and enforcement requirements.

.2 Tests and mix designs.

.3 Mill tests.

.4 Equipment and system adjust and balance.

1.2 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 may order any 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 shall pay cost of examination and replacement.

1.3 INDEPENDENT INSPECTION AGENCIES

.1 Independent Inspection/Testing Agencies will be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work as described in Section 01 29 83, above and beyond those required of the Contractor. 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 re-testing and re-inspection.

1.4 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.

1.5 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 an orderly sequence so as not to cause delay 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.

1.6 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 may deduct from Contract Amount difference in value between Work performed and that called for by Contract Documents, amount of which shall be determined by Departmental Representative.

1.7 REPORTS

.1 Submit four copies of inspection and test reports to Departmental

Representative when the Contactor is required to provide reports.

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

.3 All report submissions to be provided as pdf.

1.8 TESTS AND MIX DESIGNS

.1 Furnish concrete test results, and concrete mix designs as requested.

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

1.9 MILL TESTS

.1 Submit mill test certificates as for all steel. Mill certificate dates shall reasonably match the dates that steel is supplied as well as illustrating that the steel meets the requirements of the specification.

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 SECTION INCLUDES

.1 Construction aids.

.2 Office and sheds.

.3 Parking.

.4 Project identification.

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-1.189-2000, Exterior Alkyd Primer for Wood.
- .2 CAN/CGSB-1.59-97, Alkyd Exterior Gloss Enamel.

.2 Canadian Standards Association (CSA International)
- .1 CSA A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .2 CSAO121-08(R2013), Douglas Fir Plywood.
- .3 CSA Z797-09(R2014), Code of practice for Access Scaffold.
- .4 CAN/CSA-Z321-96(R2006), Signs and Symbols for the Occupational Environment, withdrawn but still available from CSA, CCOHS and Techstreet.

.3 U.S. Environmental Protection Agency (EPA)/ Office of Water
- .1 EPA 833-R-06-004, May 2007, Developing Your Stormwater Pollution Prevention Plan - A Guide for Construction Sites.

1.3 SUBMITTALS

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

1.4 INSTALLATION AND REMOVAL

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

.2 Identify areas which have to be gravelled to prevent tracking of mud, as approved by the Departmental Representative.

.3 Indicate use of supplemental or other staging area, as approved by the Departmental Representative.

.4 Provide construction facilities in order to execute work expeditiously, as approved by the Departmental Representative.

.5 Remove from site all such work after use.

1.5 SCAFFOLDING

.1 Scaffolding in accordance with CSA Z797.

.2 Provide and maintain scaffolding, ladders, platforms, and temporary stairs as required to complete the work.

1.6 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.
.2 Hoists, cranes and barges shall be operated by a qualified operator.

1.7 SITE STORAGE/LOADING

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

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

1.8 CONSTRUCTION PARKING

.1 Parking will be permitted on site provided it does not disrupt performance of Work, as approved by the Departmental Representative.

.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.

1.9 OFFICES

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

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

.3 Departmental Representative's Site office.

.1 Provide temporary office for Departmental Representative, one (1) week prior to the commencement of the work on site. There is to be safe "off street" parking for two (2) vehicles for the Departmental Representative in use at the field office.

.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° C inside temperature at -20° 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 The office shall be equipped with wireless internet access.

.9 In addition, the office shall be equipped with a plain paper photocopier/scanner capable of producing 8½" x 11" and 8½" x 14" copies. The Contractor shall provide adequate supplies of toner cartridges for the duration of the project for the photocopier/scanner.

.10 Maintain in clean condition.

1.10 EQUIPMENT, TOOL AND MATERIALS STORAGE

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

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

1.11 SANITARY FACILITIES

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

.2 Post notices and take such precautions as required by local

health authorities. Keep area and premises in sanitary condition.

1.12 CONSTRUCTION SIGNAGE

.1 Provide and erect, within two (2) weeks before access to site, project identification site signs comprising framing, and two (2) 1200 x 2400 mm signboards as detailed by the Departmental Representative 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.

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

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

.4 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.

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

.6 Construction sign shall be of wood frame and plywood construction painted with exhibit lettering produced by a professional sign painter.

.7 Signs shall state the project title, address range, type of service, completion date, and contract number, as provided by Departmental Representative.

1.13 PROTECTION AND MAINTENANCE OF TRAFFIC

.1 Maintain and protect traffic on affected roads during construction period as indicated in the Contract Documents.

.2 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

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

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

.5 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations. **All Construction traffic associated with the Work must adhere to the bridge posting which limits the maximum axle load to 10 tonnes.**

.6 Construct access and haul roads if necessary, as approved by the Departmental Representative, as follows:

.1 Constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided.

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

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

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

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

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

.9 Allow access to the site for snow removal by others during period of Work.

1.16 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 GENERAL

.1 The exact location of the two (2) signs shall be determined on-site by the Departmental Representative prior to the commencement of the construction. Tentative locations of the signs are 100 m from each end of the bridge.

END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Barriers.

.2 Environmental Controls.

.3 Traffic Controls.

.4 Fire Routes.

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB):
.1 CAN/CGSB-1.189-2000, Exterior Alkyd Primer for Wood.
.2 CAN/CGSB-1.59-97, Alkyd Exterior Gloss Enamel.

.2 Canadian Standards Association (CSA):
.1 CSA O121-08(R2013), Douglas Fir Plywood.

1.3 INSTALLATION AND REMOVAL

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

.2 Remove from site all such work after use.

1.4 GUARD RAILS AND BARRICADES

.1 Provide secure, rigid guard rails and barricades around work areas such as, but not limited to, excavations, open stairways, openings due to removal of existing railings/barrier walls, working near the swing span when it is in its open position to permit waterway traffic below, and so on.

1.5 PUBLIC TRAFFIC FLOW

.1 Provide and maintain competent signal flag operators, traffic signals, temporary concrete barriers, TC-54 barrels, barricades and flares, lights, or lanterns as required to perform Work and protect the public.

1.6 FIRE ROUTES

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

1.7 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.

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 SECTION INCLUDES

.1 Product quality, availability, storage, handling, protection, and transportation.

.2 Manufacturer's instructions.

.3 Quality of Work, coordination and fastenings.

.4 Existing facilities.

1.2 REFERENCES

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

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

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

.4 The 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.

1.3 QUALITY

.1 Products, materials, equipment and articles (referred to as products throughout specifications) incorporated in Work shall be new, not damaged or defective, and of best quality (compatible with specifications) 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 any dispute arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.

1.4 AVAILABILITY

.1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for any 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.

1.5 STORAGE, HANDLING AND PROTECTION

.1 Handle and store products in manner to prevent damage, 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 Store timber on flat, solid supports and keep clear of ground. Slope to shed moisture.

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

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 may 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 cooperation 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 REMEDIAL WORK

.1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Coordinate 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.

1.11 EXISTING UTILITIES

.1 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, other than that caused by Owner or other Contractors.

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

.3 Clear snow and ice from access to bridge 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 clearly marked separate bins for recycling.

.7 Remove waste material and debris from site at end of each working day.

.8 Dispose of waste materials and debris off site.

1.2 CONSTRUCTION & DEMOLITION WASTE

.1 Submit proof that all waste is being disposed of at a licensed land fill site or waste transfer site. A copy of the disposal/waste transfer site's license and a letter verifying that said landfill site will accept the waste must be supplied to Departmental Representative prior to removal of waste from the demolition site.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 INSPECTION AND DECLARATION

.1 Contractor's Inspection: Contractor and all Subcontractors shall conduct an 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 that corrections have been made.
.2 Request Departmental Representative's Inspection.

.2 Departmental Representative's Inspection: Departmental Representative and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor to correct Work accordingly.

.3 Completion: submit written certificate that following have been performed:
.1 Work has been completed and inspected for compliance with Contract Documents.
.2 Defects have been corrected and deficiencies have been completed.
.3 Equipment and systems have been tested, adjusted and balanced, and are fully operational.
.4 Certificates required have been submitted.
.5 Operation of systems have been demonstrated to Owner's personnel.
.6 Work is complete and ready for final inspection.

.4 Final Inspection: when items noted above are completed, request final inspection of Work by Departmental Representative and Contractor. If Work is deemed incomplete by Departmental Representative, complete outstanding items and request re-inspection.

1.2 WASTE MANAGEMENT

.3 Remove waste and surplus materials, rubbish and construction facilities from the site in accordance with Section 01 74 20.

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 SECTION INCLUDES

.1 As-built, samples, and specifications.

.2 Equipment and systems.

.3 Product data, materials and finishes, and related information.

.4 Operation and maintenance data.

.5 Spare parts, special tools and maintenance materials.

.6 Warranties and bonds.

.7 Final site survey.

1.2 SUBMISSION

.1 If requested, furnish evidence as to type, source and quality of products provided. Defective products will be rejected, regardless of previous inspections. Replace products at own expense.

1.3 FORMAT

.1 Organize data in the form of an 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. 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 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. Bind in with text; fold larger drawings to size of text pages.

.9 Provide 1:1 scaled CAD files in dxf format on USB drive.

1.4 CONTENTS - EACH VOLUME

.1 Table of Contents: provide title of project;
- .1 Date of submission; names,
- .2 Addresses, and telephone numbers of Consultants 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 clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information.

.4 Typewritten Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00.

1.5 AS-BUILTS AND SAMPLES

.1 In addition to requirements in General Conditions, maintain at the site for Departmental Representative one record copy of:
- .1 Contract Drawings.
- .2 Specifications.
- .3 Amendments and addenda.
- .4 Change Orders and other modifications to the Contract.
- .5 Reviewed shop drawings, product data, and samples.
- .6 Field test records.
- .7 Inspection certificates.
- .8 Manufacturer's certificates.

Revise and mark-up record documents to reflect as-built conditions on-site.

.2 Store record documents and samples in field office apart from documents used for construction. 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. Label each document "PROJECT RECORD" in neat, large, printed letters.

.4 Maintain record documents in clean, dry and legible condition. 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. Submit files on USB compatible with PWGSC encryption requirements or through email or alternate electronic file sharing service such as ftp, as directed by Departmental Representative.

.7 If project is completed without significant deviations from Contract drawings and specifications submit to Departmental Representative one set of drawings and specifications marked "AS-BUILT".

1.6 RECORDING ACTUAL SITE CONDITIONS

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

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

.3 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.

.4 Contract Drawings and shop drawings: legibly mark each item to record actual construction, including:
- .1 Field changes of dimension and detail.
- .2 Changes made by change orders.
- .3 Details not on original Contract Drawings.
- .4 References to related shop drawings and modifications.
- .5 Location of internal utilities and appurtenances referenced to visible and accessible features.

.5 Specifications: legibly mark each item to record actual construction, including:
- .1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
- .2 Changes made by Amendments and change orders.

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

1.7 STORAGE, HANDLING AND PROTECTION

.1 Store components subject to damage from weather in weatherproof

enclosures.

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

1.8 WARRANTIES AND BONDS

.1 Separate each warranty or bond 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 and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work.

.4 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Certificate of Substantial Performance is determined.

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

.6 Co-execute submittals when required.

.7 Retain warranties and bonds until time specified for submittal.

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 DESCRIPTION OF WORK

.1 This section covers the requirements for the demolition and removal of:
  .1 Structural steel and fasteners as shown on the Contract Drawings.
  .2 Steel beam guiderails.
  .3 Timber posts and timber rails.
  .4 Mechanical components as specified.
  .5 Electrical components as specified.
  .6 Miscellaneous temporary removal and reinstatement of items that are necessary for completion of the work, including but not limited to removal and reinstatement of sensors, limit switches, cable supports, and all other components requiring temporary removal/disconnection and reinstatement/ reconnection.

1.2 RELATED REQUIREMENTS

.1 Section 05 12 33 - Structural Steel for Bridges.

1.3 REFERENCES

.1 Reference Standards:
  .1 Canadian Environmental Protection Act (CEPA) 1999.
  .2 Canadian Environmental Assessment Act (CEAA), 1992 c37
  .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
    .1 Material Safety Data Sheets (MSDS).
  .4 Transport Canada (TC)
    .1 Transportation of Dangerous Goods Act, 1992 (TDGA), c. 34.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Storage and Protection.
  .1 Protect existing items designated to remain and items designated for salvage. In event of damage to such items, immediately replace or make repairs to approval of Departmental Representative and at no cost to Departmental Representative.

1.5 SITE CONDITIONS

.1 The Contractor is advised that a previous re-coating contract at the Wasauksing Swing Bridge included removal of the original lead paint.
.2 Site Environmental Requirements.

.1 Perform work in accordance with Section 01 35.
.2 Ensure that selective demolition work does not adversely affect adjacent mechanical/electrical systems, watercourses, or contribute to excess air and noise pollution.
.3 Do not dispose of waste of 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 the project.
.4 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers or onto adjacent properties.
.5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authorities and as directed by Departmental Representative.

PART 2 - PRODUCTS

2.1 EQUIPMENT

.1 Equipment and heavy machinery used to meet or exceed all applicable emission requirements.

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

.3 Sawing equipment shall not be used unless it can be demonstrated that no damage will occur to the structural steel of the bridge. This includes control of sparks and cutting, nicking or otherwise affecting the existing members.

.4 Chipping hammers shall be 7.0 kg maximum.

.5 Air compressor shall supply a minimum pressure of 620 kPa within 3 m of the hose.

.6 See Section 05 12 33 for acceptable methods and equipment for rivet removals and reaming of rivet holes.

.7 New bolt holes shall be made by drilling or coring existing steel elements.

.8 Existing steel members shall be cut only by abrasive steel cutting wheels or other non- thermal means.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Inspect site with Departmental Representative and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage and items to remain.

.2 Locate and protect all mechanical and electrical components.

3.2 REMOVAL OPERATIONS

.1 Remove items as indicated.

.2 Do not disturb items designated to remain in place.

.3 Disposal of Material:
  .1 Dispose of materials not designated for salvage or reuse on site at authorized facilities.

.4 Provide adequate access to facilitate performance of the work and inspection by the Departmental Representative.

3.3 RESTORATION

.1 Restore areas and existing works outside areas of demolition to conditions that existed prior to beginning of Work.

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 77 00.

.3 Waste Management: separate waste materials for reuse, recycling in accordance with Section 01 74 20.
  .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 PROTECTION

.1 Repair damage to adjacent materials or property caused by selective site demolition.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 03 20 00 - Concrete Reinforcing.

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

1.2 REFERENCES

.1 Canadian Standards Association (CSA)
- .1 CSA A23.1-14/A23.2-14, Concrete materials and methods of concrete construction/Test methods and standard practices for concrete.
- .2 CSA O86-14, Engineering Design in Wood (Limit States Design).
- .3 CSA O121-08(R2013), Douglas Fir Plywood.
- .4 CSA O151-09(R2014), Canadian Softwood Plywood.
- .5 CSA S269.1-1975(R2003), Falsework for Construction Purposes.
- .6 CSA S269.3-M92(R2013), Concrete Formwork.

.2 Council of Forest Industries of British Columbia (COFI).
- .1 COFI Exterior Plywood for Concrete Formwork.

1.3 SHOP DRAWINGS

.1 Submit shop drawings for formwork and falsework in accordance with Section 01 33 00.

.2 Indicate method and schedule of construction, shoring, stripping, arrangement of joints, ties, liners, and locations of temporary embedded parts. Comply with CSA S269.1, for falsework drawings. Comply with CSA S269.3 for formwork drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Formwork materials:
- .1 Use wood and wood product formwork materials to CSA O121 and CSA O86.

.2 Form release agent: non-toxic, biodegradable, low VOC.

.3 Form stripping agent: colorless mineral oil, non-toxic, biodegradable, low VOC, free of kerosene, with viscosity between 15 to 24 mm^2 /s at 40°C, flashpoint minimum 150°C, open cup.

PART 3 - EXECUTION

3.1 FABRICATION AND ERECTION

.1 Verify lines, levels and centers before proceeding with formwork/falsework and ensure dimensions agree with drawings and field measurements, especially in area of swing bridge.

.2 Fabricate and erect formwork in accordance with CSA S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA A23.1.

.3 Align form joints and make watertight. Keep form joints to minimum.

.4 Use 20 mm chamfer strips on external corners, unless specified otherwise.

.5 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.

.6 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections. Assure that all anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.

.7 Clean formwork in accordance with CSA A23.1, before placing concrete.

3.2 REMOVALS AND RESHORING

.1 Leave formwork in place for ten days after placing concrete.

.2 Re-use of formwork and falsework shall be subject to requirements of CSA A23.1.

3.3 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 DESCRIPTION OF WORK

.1 This section covers the requirements for concrete reinforcing.

.2 This section also covers the requirements for reinforcing steel dowels installed using an epoxy grout.

.3 Installation of threaded rods into existing concrete using an epoxy grout is also covered under this section.

1.2 RELATED SECTIONS

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

1.3 MEASUREMENT PROCEDURES

.1 All work under this Section shall be included in the Contract Lump Sum Amount.

1.4 REFERENCES

.1 Canadian Standards Association (CSA).
  .1 CSA A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and standard practices for concrete.
  .2 CSA W186-M1990 (R2012), Welding of Reinforcing Bars in Reinforced Concrete Construction.

1.5 SHOP DRAWINGS

.1 Submit shop drawings including placing of reinforcement in accordance with Section 01 33 00. Contractor to field verify site dimensions and prepare all Shop Drawings based on site dimensions.

.2 Indicate on shop drawings, bar bending details, lists, quantities of reinforcement, sizes, spacing, locations of reinforcement.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 All reinforcing to be stainless steel Type 316 LN or DUPLEX 2205 and have a minimum yield strength of 500 MPa.

.2 Dowel adhesive for reinforcing steel bars to be selected from the Ministry of Transportation of Ontario Designated Sources of Material DSM#9.30.25.

.3 Dowel adhesive for installation of threaded rods to be selected from the Ministry of Transportation of Ontario Designated Sources of Material DSM#9.30.25.

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 Welding of reinforcing steel is not required.

.3 Ship bundles of bar reinforcement clearly identified in accordance with bar bending details and lists.

2.3 SOURCE QUALITY

.1 Upon request, inform Departmental Representative of proposed source of material to be supplied.

PART 3 - EXECUTION

3.1 FIELD BENDING

.1 Do not field bend or field weld reinforcement except where authorized by Departmental Representative.

.2 When field bending is authorized, bend without heat, applying a slow and steady pressure and proper bending tools. Replace bars which develop cracks or splits.

3.2 PLACING REINFORCEMENT

.1 Place reinforcing steel as indicated on reviewed placing drawings and in accordance with CAN/CSA-A23.1.

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

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

3.3 COLD WEATHER WORK

.1 The Contractor is advised that the work requires installation of epoxy anchors during the winter navigational shut-down period.

The Contractor shall provide heating and hoarding as required to bring concrete and ambient temperatures up to the minimum temperatures recommended by the manufacturer of the epoxy adhesive. The Contractor shall also maintain these temperatures for the durations recommended by the manufacturer of the epoxy adhesive. If the manufacturer of the epoxy adhesive does not have specific recommendations for the cold weather installation then the Contractor shall follow the requirements in Section 03 30 00 for the housing and heating.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION OF THE WORK

.1 The work of this section covers the requirements for the supply and placement of concrete and grout.

1.2 RELATED SECTIONS

.1 Section 03 10 00 – Concrete Forming and Accessories.

.2 Section 03 20 00 – Concrete Reinforcing.

1.3 REFERENCES

.1 All concrete supply and placement shall conform to CSA A23.1/A23.2-14, Concrete Materials and Method of Concrete Construction/Test methods and standard practices for concrete.

.2 All formwork shall conform to CSA-S269.3-M92 (R2013), Concrete Formwork as supplemented by the contract specifications.

.3 All falsework shall conform to CSA S269.1-1975, Falsework for Construction Purposes.

.4 Canadian Standards Association (CSA).
.1 CSA-A3000-13, Cementitious materials compendium.
.2 CSA A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test methods and standard practices for concrete.

.5 Abrasive blast cleaning of concrete to general method and cleanliness of SSPC-SP6, Commercial Blast Cleaning (NACE 3).

.6 ASTM International.
.1 ASTM C109/C109M-13, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars.
.2 ASTM C1090-10, Standard Test Method for Measuring Changes in Height of Cylindrical Specimens of Hydraulic-Cement Grout.

1.4 CERTIFICATES

.1 Submit certificates for concrete in accordance with Section 01 33 00.

.2 A minimum of 2 weeks prior to starting concrete work, submit to Departmental Representative manufacturer's test data and certification by qualified independent inspection and testing

laboratory that following materials will meet specified requirements:
.1 Portland cement.
.2 Blended hydraulic cement.
.3 Supplementary cementing materials.
.4 Grout.
.5 Admixtures.
.6 Aggregates.
.7 Water.
.8 Joint filler.

.3 Provide certification that mix proportions selected will produce concrete of quality, yield and strength as specified in concrete mixes, and will comply with CSA A23.1/A23.2.

.4 Provide certification that plant, equipment, and materials to be used in concrete comply with requirements of CSA A23.1/A23.2.

.5 In the case of pre-blended proprietary concrete and cement based products, provide manufacturer's data sheets and ensure that all products are delivered in original manufacturer's labelled packaging. If any doubt exists regarding the source or quality of the material, provide shipping records or other suitable certification that the product was delivered to the site. Such certification must be provided from the manufacturer.

1.5 QUALITY ASSURANCE

.1 A minimum of 2 weeks prior to starting concrete work, submit proposed quality control procedures for Engineer's approval for following items:
.1 Cold weather concrete.
.2 Curing.
.3 Finishing.
.4 Formwork removal.
.5 Joints.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 To Section 01 35 43, with the following additional requirements:
.1 Carefully coordinate the specified concrete work with weather conditions.
.2 Choose least harmful, appropriate cleaning method which will perform work adequately.

PART 2 - PRODUCTS

2.1 SUBSTITUTION

.1 Substitution of specified products may be considered by the Departmental Representative providing the Contractor requests the use of alternative products in writing and such request includes a certificate of compliance from an independent CSA certified testing laboratory that the proposed product meets or exceeds the specified product's performance criteria tested in accordance with standards designated in the specified product manufacturer's technical data sheet.

.2 Substitute products shall be composed of constituent material similar to those comprising the specified product(s) and shall have similar performance characteristics. They must be fully compatible with other repair products specified or substituted.

.3 Submittals to Section 01 33 00.

2.2 MATERIALS

.1 Portland Cement: to CSA-A3000-13.

.2 Supplementary cementing materials: to CSA-A3000-13.

.3 Cementitious hydraulic slag: to CSA-A3000-13.

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

.5 Aggregates: to CSA A23.1/A23.2. Coarse aggregates to be normal density.

.6 Abrasives for blast cleaning shall be angular or sub-angular in shape and, not more than 1% shall pass the 300 sieve. Adjustments to the type and angularity of the aggregate shall be made as necessary to produce the desired results.

.7 Air entraining admixture: to ASTM C260/C260M.

.8 Chemical admixtures: to ASTM C 494. Engineer to approve accelerating or set retarding admixtures during cold and hot weather placing.

2.3 CONCRETE MIXES

.1 Proportion normal density concrete in accordance with CSA A23.1/A23.2, and the following:
.1 Class C-1;

.2 Minimum compressive strength: 32 MPa;
.3 Air Content Category 2 as per Table 4;
.4 Cement Type GU (General Use);
.5 Water cement ration as per Table 2;
.6 Nominal aggregate size of coarse aggregate 20 mm diameter except for thin sections where 9.5 mm diameter may be used. Grouts should contain no coarse aggregate.
.7 Chemical admixtures: in accordance with ASTM C 494. Do not use calcium chloride or compounds or admixtures containing calcium chloride.
.8 Plasticizing admixtures are to be used to increase the workability of the concrete and ensure that the concrete can be placed.

.2 Ensure that aggregate sources conform to the requirements of Clause 4.2.3.5, "Deleterious Reactions" of CSA A23.1/A23.2 and, that performance certification includes certification that the aggregate is non-reactive.

2.4 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.

.3 Grout shall have shrinkage compensating admixtures to provide a non-shrink grout.

.4 Grout can be a ready mix grout meeting the specified requirements or a proprietary product.

2.5 EQUIPMENT

.1 Vibrators.
.1 Vibrators shall be used during the placing of concrete to ensure that voids are eliminated and the cavity is completely filled. The use of the vibrator shall be coordinated with the amount of admixtures to ensure that the concrete does not segregate.

PART 3 - EXECUTION

3.1 HOUSING AND HEATING

.1 Protection - General.
.1 The Contractor shall protect the concrete **and grout** during cold weather.
.2 The protection system shall be designed for the worst conditions that can be reasonably anticipated from local

weather records, forecasts, site conditions and past experience for the time period during which the protection is required. Schedule work to avoid unusual conditions and allow flexibility in schedule to avoid poor weather.

.3 The Contractor shall monitor the conditions and modify the protection system as required.

.2 Protection - Minimum Requirements

.1 The formwork **and existing concrete** shall be heated to a temperature of 5 degrees C for a period of 36 hours prior to pouring concrete.

.2 During the seven days following placing, the concrete and grout temperature shall not fall below 10°C or exceed 70°C.

.3 For cold weather conditions, protection of concrete and grout shall at least conform to Table 1. However the temperature of the concrete and grout shall be checked to ensure that at least the minimum temperature specified above is maintained at all times.

TABLE 1 - MINIMUM COLD WEATHER PROTECTIVE MEASURES

ALL CONCRETE AND GROUT

Anticipated Minimum Air Temperature (°C)	Thickness >1.0 m	1.0-0.5 m	<0.5-0.25 m	<0.25m
+5 to 0	pm1	pm1	pm1	pm2
-1 to -10	pm2	pm2	pm3	pm4
-11 to -20	pm3	pm3	pm4	pm5
less than -20	pm4	pm5	pm5	pm5

Maximum Allowable Drop in Concrete and Grout Temperature / 24h

>2.0 m	-	10°C
1.0-1.99 m	-	15°C
<1.0 m	-	20°C

PROTECTIVE MEASURE

pm1 - Cover concrete and grout with a moisture vapor barrier as specified for curing with moisture vapor barrier

pm2 - Cover concrete and grout as for pm1, then cover the moisture vapor barrier with insulation having an R-Value of 0.67**.

pm3 - Cover concrete and grout as for pm1, then cover the moisture vapor barrier with insulation having an R-Value of 1.33**.

pm4 - Cover concrete and grout as for pm1, then cover the moisture vapor barrier with insulation having an R-Value of 2.00**.

pm5 - House and heat as specified for housing and heating.

****NOTE: All R values are metric. The conversion factor** from metric to imperial is Metric "R" value x 5.678 = Imperial "R" value.

.3 Housing and Heating

.1 The design of the protective housing shall take into account the effects of construction activities such as placing concrete, grouting and patching. Heating equipment of sufficient capacity to establish and maintain the specified curing conditions shall be used throughout the curing period and for such time thereafter as is necessary for the completion of the work. Heating equipment used within the housing shall be vented outside the housing. Heating equipment having an open flame will not be permitted.

.2 The ambient air temperature adjacent to the concrete or formwork within the housing shall not be permitted to vary, from location to location, by more than 8°C.

.4 Withdrawal of Protection

.1 The cold weather protection shall be gradually removed or reduced in such a manner that the maximum allowable drop of concrete or grout temperature for each 24 h period as specified in Table 1 is not exceeded.

.2 The protection shall not be totally removed nor shall the concrete or grout be fully exposed to the air until the average temperature is within 10°C of the air temperature.

3.2 PREPARATION

.1 Obtain Departmental Representative's written approval before placing concrete or grout. Provide 72 hours' notice prior to placing of concrete or grout.

.2 Pumping of concrete is permitted only after approval of equipment and mix. The mix supplier and mix designer must certify that the

mix can be pumped using the proposed equipment and not affect the concrete properties.

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

.4 Before placing concrete or grout, obtain Departmental Representative's written approval of proposed method for protection of concrete during placing and curing.

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

3.3 CONSTRUCTION

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

.2 Do grouting work in strict conformance to patching manufacturer's recommendations.

.3 Finishing.

.1 Finish concrete in accordance with CSA A23.1/A23.2. Patching to match finish on adjacent concrete surfaces.

.2 Use procedures acceptable to Departmental Representative or those noted in CSA A23.1/A23.2 to remove excess bleed water. Ensure surface is not damaged.

.3 Chamfer and rub exposed sharp edges of concrete or patching with carborundum to produce 3 mm radius edges unless otherwise indicated.

3.4 PLACEMENT AND CURING

.1 Before placing concrete, thoroughly dampen the concrete surfaces to promote bond. Immediately before placing concrete, place bonding agent to ASTM C1059 or cement slurry bonding agent. In the case of patching, prepare surface in strict conformance to patching manufacturer's recommendations.

.2 Install wet burlap and white plastic over the newly placed concrete after it has initially set and so the placement of the burlap and plastic will not damage the surface. Install cold weather protection. Maintain moist curing on the concrete for a minimum of 4 days. Use this same procedure for patch repairs unless otherwise stipulated by the patch material manufacturer.

3.5 SITE TOLERANCE

.1 Unless otherwise noted, concrete and patching application tolerance shall be in accordance with CSA A23.1/A23.2 straight edge method.

3.6 FIELD QUALITY CONTROL

.1 Inspection and testing of concrete and concrete materials will be carried out by a Testing Laboratory approved by Departmental Representative in accordance with CSA A23.1/A23.2.

.2 The Contractor shall pay for costs of tests. If retesting is required due to non-conformance, the Contractor shall also pay all costs associated with retesting.

.3 The Contractor shall take additional test cylinders during cold weather concreting. Cure cylinders on job site under same conditions as concrete which they represent.

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

.1 This Section covers the requirements for the following work:
- .1 Supply, fabrication and installation of structural steel required to do the work as shown on the Contract Drawings.
- .2 Replacement of rivets with new bolts for the above work.
- .3 Coring, drilling and reaming of bolt holes.

1.2 RELATED REQUIREMENTS

.1 Section 02 41 13 – Selective Site Demolition

.2 Section 09 97 19 – Painting Exterior Metal Surfaces

1.3 REFERENCES

.1 ASTM International
- .1 ASTM A325M-14, Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Minimum Tensile Strength Metric.

.2 CSA International
- .1 CSA G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CSA S6-14, Canadian Highway Bridge Design Code.
- .3 CSA S16-09, Design of Steel Structures.
- .4 CSA S269.1-1975(R2003), Falsework for Construction Purposes.
- .5 CSA W48-14, Filler Metals and Allied Materials for Metal Arc Welding.
- .6 CSA W59-13, Welded Steel Construction, (Metal Arc Welding).
- .7 CSA W47.1-09(R2014) Certification of companies for fusion welding of steel.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Removals:
- .1 Attend a pre-removals meeting on-site one week prior to beginning work of this Section. The purpose of the meeting is to:
  - .1 Verify project requirements.
  - .2 Review removals/installation procedures.
  - .3 Review installation and substrate conditions.
  - .4 Co-ordination with other sub-trades.
  - .5 Review bridge operation, marine and vehicular traffic restrictions.
- .2 Departmental Representative, Contractor’s Site Supervisor, Project Manager, and subcontractor representatives shall attend

the pre-removals meeting.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Shop Drawings:
- .1 Submit shop drawings that clearly indicate shop and erection details including shop splices, cuts, copes, connections, holes, threaded fasteners, and welds. Indicate welds by CSA W59, welding symbols.
- .2 Proposed welding procedures to be approved by Canadian Welding Bureau. Welding to the original members of the bridge is not required and is not permitted on this project.
- .3 Submit description of methods, sequence of removals and type of equipment proposed for use in removing structural steel.
- .4 Submit description of methods, sequence of erection and type of equipment proposed for use in erecting structural steel.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00.

.2 Storage and Handling Requirements:
- .1 Provide protective blocking for lifting, transportation and storing.
- .2 Ensure that no portion of steel comes into contact with ground.

1.7 QUALITY ASSURANCE

.1 The Contractor is responsible for the verification of all necessary measurements required to do the work. All field measurements required to perform fabrication and to record the base-line reference dimensions/alignment of bridge elements where structural removals are to take place shall be taken by the Contractor to verify existing conditions.

.2 The Contractor is responsible for correct fabrication and fit of all fabricated components and shall submit documentation of said verification to the Departmental Representative, prior to commencing removals.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Structural steel: to CSA G40.20/G40.21, grade as shown on the Contract Drawings.

.2 High strength bolts, nuts and washers: to ASTM A325M.

.3 Welding electrodes: to CSA W48 series, low hydrogen (H16 or less).

2.2 SOURCE QUALITY CONTROL

.1 Steel producer qualifications: certified in accordance with CSA G40.20/G40.21.

.2 Submit to Departmental Representative Mill Certificate for every batch of steel supplied.

.3 Submit to Departmental Representative Test Reports and Mill Certificates of products delivered to site.

.4 Provide suitable facilities and co-operate with Departmental Representative in carrying out inspection and tests required.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates for existing members are acceptable for structural steel installation.
  .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 PREPARATION

.1 Clean steel surfaces as directed by Departmental Representative when staining or defacing occurs.

.2 Verify location of substructure units, elevations of bearing seats and location of anchor bolts before erection of structural steel; report discrepancies to Departmental Representative.

.3 Restrict drifting during assembly to minimum required to bring parts into position without enlarging or distorting holes, and without distorting, kinking or sharply bending metal of any unit.

.1 Enlarge holes if necessary by reaming only after receipt of written approval from Departmental Representative.
.2 Reamed holes shall be a maximum of 2 mm larger than bolt size used.

3.3 REMOVALS

.1 The Contractor is alerted to the presence of sensitive mechanical and electrical components in the vicinity of the work, and shall take all required precautions to prevent damage of components or contamination of lubricants from all operations on site.

.2 The Contractor shall submit to the Departmental Representative the proposed method for removal of structural steel a minimum of 10 working days prior to the scheduled work. Such removal operations will not be permitted until the removal method has been approved by the Departmental Representative.

.3 Acceptable removal methods shall conform to the following:
.1 Any thermal method (such as a torch or thermal lance), which has potential of damaging, weakening or changing any property of the adjacent steel, as determined by the Departmental Representative, shall not be used.
.2 Any mechanical removal method must be controlled so as to prevent damage to the parent steel.

.4 In the event that the Departmental Representative determines that removal work is resulting in damage to the structure, the Contractor shall cease removal operations until a modified method of removal has been submitted to the Departmental Representative and approved.

.5 Any paint or material to remain that is damaged as a result of the Contractor’s operations, shall be repaired at the Contractor’s expense. The Contractor shall develop a proposed repair methodology, and submit to the Departmental Representative for review and approval prior to commencing work.

.6 The Contractor is advised that there is significant corrosion and rust jacking in the parent steel at several of the connection points for the new steel. As part of the removals the Contractor shall remove the corrosion and rust jacking in the parent steel within the limits of contact for any new structural steel members.

3.4 REMOVAL OF EXISTING FASTENERS

.1 Removal of existing fasteners (rivets and bolts) is required to complete the designated repairs. It is anticipated that some or all of the existing bolts will be seized and may need to be cut in order to perform removals. The Contractor shall allocate sufficient

resources to perform fastener removal to enable the work to proceed within the allocated time and the cost shall be deemed to be included in the lump sum amount.

.2 The Contractor shall submit to the Departmental Representative the proposed method for rivet / seized bolt removal a minimum of 10 working days prior to the scheduled replacement of fastener removals. Removal of such fasteners will not be permitted until the removal method has been approved by the Departmental Representative.

.3 Acceptable removal methods shall conform to the following:

.1 The sequence of removal and replacement, and the number of fasteners that can be removed at any time shall be such that the global and local structural integrities are not compromised.

.2 Any thermal method (such as a torch or thermal lance), which has potential of damaging, weakening or changing any property of the adjacent steel, as determined by the Departmental Representative, shall not be used.

.3 Any mechanical removal method must be controlled so as to prevent damage to the parent steel and also prevent enlarging of the existing hole in the structural steel through which the existing fastener passes.

.4 In the event that the Departmental Representative determines that fastener removal work is resulting in damage to the structure, the Contractor shall cease fastener removal operations until a modified method of removal has been submitted to the Departmental Representative and approved.

.5 Difficult fastener removal is anticipated due to the presence of restricted access to the existing fasteners. In addition, the multiple plies of material are likely to result in misaligned holes that will further resist fastener removal. The Contractor is to account for these difficulties and include these factors when pricing the work.

.6 Where fasteners are removed and the holes require enlargement due to misalignment, the holes shall be enlarged by **NOT** more than 2mm and only after the proposed enlargement is reviewed and approved by the Departmental Representative. Holes shall be enlarged by reaming. Full compensation for enlarging holes up to 2mm shall be considered as included in the contract lump sum price for removal of rivets and replacement with bolts.

.7 At locations where surrounding material is damaged as a result of the Contractor’s operations, the surrounding material shall be repaired. When reaming of more than 2mm in diameter greater than the nominal rivet diameter and installing an oversize bolt is required

for the repair, the cost of the reaming, furnishing and installing the oversize bolts shall be at the Contractor's expense. This method of repair shall not be used without the prior approval of the Departmental Representative for each fastener hole.

.8 At locations where small nicks and burrs in the vicinity of the fastener head are created, they shall be ground smooth to result in a less than 10:1 slope provided the bolt will be properly seated and the thickness of the plate to remain is acceptable as verified by the Departmental Representative.

.9 At locations where fastener holes contain cracked, torn, or otherwise damaged material due to conditions other than the Contractor's operations, The Contractor shall immediately contact the Departmental Representative for review prior to fastener removal and installation of the new bolt.

3.5 INSTALLATION

.1 Do falsework in accordance to CSA S269.1.

.2 Do fabrication and erection of structural steel in accordance with CSA S6 CHBDC.

.3 Do welding in accordance with CSA W59, except where specified otherwise.
- .1 All deposited weld metal to have Charpy V-Notch value not lower than that of the specified Charpy V-Notch value of the parent steel.
- .2 Do welding in shop unless otherwise indicated on the Contract Drawings or permitted by the Departmental Representative.
- .3 Weld only at locations indicated on shop drawings.

.4 High strength bolting: in accordance with CSA S16 CHBDC. Use 'turn-of-nut' tightening method. Only new bolts shall be installed.

.5 All bolts shall be new. All bolts which have been installed and fully tensioned, but for any reason require loosening or removal, shall be discarded and replaced with new bolts.

.6 Finish: members true to line, free from twists, bends, open joints, sharp corners and sharp edges.

.7 Allowable tolerance for bolt holes:
- .1 Shall be as shown on the Contract Drawings. Where not specified, the following tolerances shall apply:
  - .1 Matching holes for bolts to line up so that a dowel 2 mm less in diameter than hole passes freely through assembled members at right angles to such members.

.2 Finish holes not more than 2 mm in diameter larger than diameter of bolt unless otherwise specified by Departmental Representative.

.3 Centre-to-centre distance between any two holes of group to vary by not more than 1 mm from dimensioned distance between such holes.

.4 Centre-to-centre distance between any two groups of holes to vary not more than maximum of the following:

Centre-to-Centre distance in metres	Tolerance in plus or minus mm
less than 10	1
10 to 20	2
20 to 30	3

.5 Correct mispunched or misdrilled members only as directed by Departmental Representative.

.8 Do not shop splice.

.9 Mark members in accordance with CSA G40.20/G40.21.

.1 Do not use die stamping.

.2 Place marking at locations hidden when viewed from exterior after erection when steel is to be left in unpainted condition.

.10 Match marking: shop mark.

.11 Provide temporary support to items attached to the steel members to be replaced which may include electrical equipment, limit switches etc.

3.6 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 77 00.

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

END OF SECTION

PART 1 - GENERAL

1.1 SCOPE OF WORK

.1 This section covers the supply and installation of all lumber/timber in the Contract Drawings.

.2 This section also covers the replacement of steel beam guiderail.

.3 All fasteners used for connections to new or existing timbers are included in this section.

1.2 RELATED SECTIONS

.1 Section 05 12 33 - Structural Steel for Bridges.

1.3 REFERENCES

.1 ASTM International:
- .1 ASTM A123/A123M-15, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .2 ASTM A653/A653M-15, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .3 ASTM A307-14, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60000 PSI Tensile Strength.
- .4 ASTM F844-07a(2013), Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use.

.2 ASTM D1761-12, Standard Test Methods for Mechanical Fasteners.

.3 CSA International:
- .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
- .2 CSA O141-05(R2014), Softwood Lumber.
- .3 CSA 086-14, Engineering Design in wood.

.4 SAE International:
- .1 SAE J995(R2012), Mechanical and Material Requirements for Steel Nuts.

.5 Forest Stewardship Council:
- .1 FSC-STD-01-001-2004, Criteria for Forest Stewardship.

.6 National Lumber Grades Authority (NLGA):
- .1 Standard Grading Rules for Canadian Lumber 2014.

.7 Sustainable Forestry Initiative:
- .1 SFI-2010-201) Standard.

.8 International Organization for Standardization(150):
.1 150 898-1:2013, Mechanical properties of fasteners made of carbon steel and alloy steel.

.9 Ontario Provincial Standard Drawings (OPSD):
.1 OPSD 912.101 Guide Rail System, Steel Beam Rail Component

1.4 QUALITY ASSURANCE

.1 All lumber shall be Spruce Pine Fir (SPF) No. 1/2 or better. Preservative treated wood shall be used for all handrails. Rough cut timber does not need to be preservative treated.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Wood: All wood shall be new and conform to the grade, species, size and surface finish specified.

.2 Steel beam guide rail and fasteners shall be in accordance with OPSD 912.101.

2.2 ACCESSORIES

.1 Fasteners: all fasteners, nuts, washers and plate washers called for on the drawings shall conform to the applicable referenced standard and shall be galvanized.

.2 Nails, spikes, and staples to CSA B111.

.3 Bolts: 19 mm diameter unless indicated otherwise, complete with nuts and washers to ASTM A307.

.4 New steel plate washers to be hot dipped galvanized and fabricated in accordance with Section 05 12 33.

2.3 FINISHES

.1 Galvanizing: to ASTM A123/A123M, use galvanized fasteners for all work.

PART 3 - EXECUTION

3.1 HANDLING, STORAGE AND CARE OF WOOD

.1 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.

END OF SECTION

PART 1 - GENERAL

1.1 SCOPE OF WORK

.1 This section covers the requirements for the painting of all new structural steel shown in the Contract Drawings and all existing steelwork affected by any other work of this Contract.

.2 This section also includes a description of the Contractor's requirement for quality control and verification procedures.

.3 All painting of new steelwork shall be completed in the shop with only touch-up painting required in the field.

.4 Paint all existing steel only at locations where existing steelwork is affected by work of this Contract.

1.2 RELATED SECTIONS

.1 Section 05 12 33 – Structural Steel for Bridges

1.3 REFERENCES

.1 Ontario Provincial Standard Specification OPSS 1704 April 2010 Material Specification for Paint Coating Systems for Structural Steel.

.2 Ministry of Transportation (MTO) Designated Sources List DSM # 9.20.39.

.3 American Society for Testing and Materials
- .1 ASTM D610-08(2012), Standard Practice for Evaluating Degree of rusting on Painted Steel Surfaces.
- .2 ASTM D2369-10(2015)e1, Standard Test Method for Volatile Content of Coatings.
- .3 ASTM D2832-92 (2011), Standard Guide for Determining Volatile and Non-volatile Content of Paint and Related Coatings.

.4 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-1.171-98, Inorganic Zinc Coating.
- .2 CAN/CGSB-1.207-98, Low Temperature Curing epoxy compound.
- .3 CAN/CGSB-1.212-95, Chromate and lead free Marine primer for Steel and Light Alloy Services.

.5 Environmental choice Program (ECP)
- .1 ECP-67-95, Recycled Water-borne Surface Coatings.
- .2 ECP-76-98, Surface Coatings.

.6 Federal Standard (FS)
.1 FS-595B-98, Paint Colours

.7 The Society for Protective Coatings (SSPC)
.1 SSPC-SP 1-03(R2015), Solvent Cleaning.
.2 SSPC-SP 2-82(R2004), Hand Tool Cleaning.
.3 SSPC-SP 3-82(R2004), Power Tool Cleaning.
.4 SSPC-SP 6/NACE No. 3-07, Commercial Blast Cleaning.
.5 SSPC-SP 10/NACE No. 2-07, Near White Blast Cleaning.
.6 SSPC-VIS-3-11, Guide and Reference Photographs for Steel Surfaces Prepared By Power and Hand Tool Cleaning.
.7 SSPC-VIS-1-89(R2002), Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning (Steel Structures Painting Manual, Chapter 2 – Surface Preparation Specs).
.8 SSPC-PA 2-04(R2015), Measurement of Dry Coat Thickness with Magnetic Gauges.
.9 SSPC Good Painting Practices, Volume 1, 4th Edition.
.10 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.

1.4 ACTIONS 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 include product characteristics, performance criteria, physical size, finish and limitations.
.2 Submit 2 copies of WHMIS MSDS.

.4 Samples:
.1 Upon request, Departmental Representative will furnish qualified products list of paints.
.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 one (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 Submit test reports showing compliance with specified performance characteristics and physical properties.

1.5 QUALITY ASSURANCE

.1 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.6 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.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Paint system: Inorganic Zinc/Epoxy/Polyurethane (IZEP) system to Ministry of Transportation of Ontario Designated Sources of Material DSM # 9.20.39 and conform to the provisions of OPSS 1704.

.2 Paint components shall comprise a coating system from a single manufacturer, suitable for application to steel surfaces.

.3 Paint applied in the shop shall be comprised of:

.1 Primer Coat 1: shall be inorganic zinc and conform to the requirements of the IZEP system according to MTO designated Sources of Materials DSM # 9.20.39.

.2 Intermediate Coat 2: to conform to the requirements of the IZEP system according to MTO designated Sources of Materials DSM # 9.20.39.

.3 Topcoat 3: Aliphatic Polyurethane to CAN/CGSB-1.177.

.4 Paint applied in the field shall be comprised of the following coating system components.

.1 Primer Coat 1: shall be aluminum flake filled epoxy mastic, applied to a dry film thickness of 5 to 7 mils DFT.

.2 Intermediate Coat 2: to conform to the requirements of the IZEP system according to MTO designated Sources of Materials DSM # 9.20.39.

.3 Topcoat 3: Aliphatic Polyurethane to CAN/CGSB-1.177.

.5 Colours: All new structural steel shall be painted black. All touch ups of existing steel shall be painted black.

.6 All materials must be applied in a climate controlled environment which is in accordance with the manufacturer's recommendations and this specification.

.7 All primer must have an unlimited recoat time to allow areas to be painted in stages.

2.2 ALTERNATIVES

.1 Due to compatibility issues alternatives will not be considered.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for painting exterior metal surfaces 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 corrected and after receipt of written approval to proceed from Departmental Representative.

3.2 PREPARATION

.1 Remove existing loose paints and rusted steel from exterior metal surfaces as required to complete the work as shown in the Contract Drawings.

.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 and other foreign substances in accordance with following.
    .1 Solvent cleaning to SSPC-SP 1.
    .2 Power tool cleaning **with vacuum shrouding**: to SSPC-SP 3.
  .2 Solvent cleaning shall be used to remove grease and oil prior to vacuum shrouded power tool cleaning.
  .3 Scrape edges of old paint back to sound material where remaining paint is thick and sound, feather exposed edges.

.3 New metal surfaces to be painted in the shop:
  .1 Clean surfaces of new steel in accordance with following:
    .1 Solvent cleaning to SSPC-SP 1
    .2 Near white blast cleaning to SSPC-SP 10.
  .2 Solvent cleaning shall be used to remove grease and oil prior to abrasive blast cleaning.

.4 Compressed air to be free of water and oil before reaching nozzle.

.5 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.

.6 Silicone sealant shall be applied to all upward facing edges of joints and connections between mating members and other elements mated to gusset plates, splice plates, shear tab, clip angles, beam webs to each other etc.

.7 Silicone sealant shall be applied after the finish coat has cured then touched up to match paint colour. Provide minimum of 25 mm long downward extensions of sealing material at each end of horizontal/inclined seals.

.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-VIS 3 for field painting and SSPC-VIS 1 for shop painting.
  .1 Apply primer, paint, or pre-treatment 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 (shop painting):
- .1 One primer coat to minimum dry film thickness of 75 µm.
- .2 One intermediate coat to minimum dry film thickness of 100 µm.
- .3 One top coat to a minimum dry film thickness of 50 µm.

.12 Number of paint coats (field painting):
- .1 One primer coat to minimum dry film thickness of 75 µm.
- .2 One intermediate coat to minimum dry film thickness of 100 µm.
- .3 One top coat to a minimum dry film thickness of 50 µm.

.13 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.

3.3 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 Seal open seams at contact surfaces of built up members with sealant approved by Departmental Representative when top coat is fully cured.

.5 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.

.6 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 When temperature is not within the range of acceptable temperatures given the coating manufacturer.

.7 Adequate ventilation shall be provided to ensure proper curing and a safe working environment.

.8 Supply cover when paint must be applied in damp or cold weather. Supply, 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.

.9 Remove paint from areas which have been exposed to freezing, excess humidity, rain, snow or condensation. Prepare surface again and repaint.

.10 Apply each coat of paint as continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.11 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.

.12 Spray application:

.1 Provide and maintain equipment that is suitable for intended purpose, capable of properly atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
.2 Provide traps or separators to remove oil and water from compressed air and drain periodically during operations.
.3 Keep paint ingredients properly mixed in spray pots or containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.
.4 Apply paint in uniform layer, with overlapping at edges of spray pattern.
.5 Brush out immediately runs and sags.
.6 Use brushes to work paint into cracks, crevices and places which are not adequately painted by spray. In areas not accessible to spray gun, use brushes, daubers or sheepskins.
.7 Remove runs, sags and brush marks from finished work and repaint.

.13 Shop Painting:

.1 Do shop painting after fabrication and before damage to surface

occurs from weather or other exposure.

.2 Spray paint contact surfaces of field assembled, bolted, friction type joints with primer coat only. Do not brush primer after spraying.

.3 Do not paint metal within 50 mm of edge to be welded. Give unprotected steel one coat of approved primer after shop fabrication is completed.

.4 Remove weld spatter before painting. Remove weld slag and flux by methods as specified in paragraph 3.2.2 Metal surfaces to be repainted in the field.

.5 Copy previous erection marks and weight marks on areas that have been shop painted.

.14 Field Painting:

.1 Paint steel structures as soon as practical after erection.

.2 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.

.3 Field paint surfaces (other than joint contact surfaces) which are accessible before erection but which are not to be accessible after erection.

.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.

.15 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.

3.4 FIELD QUALITY CONTROL

.1 Site Tests, Inspections:

.1 Measure the wet film thickness of each coat during application.

.2 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.

3.5 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 77 00.

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

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

3.6 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.

.3 Repair damage to adjacent materials caused by painting exterior metal surface application installation at no cost to the Departmental Representative.

END OF SECTION

PART 1 - GENERAL

1.1 MANUFACTURE OF HYDRAULIC EQUIPMENT

.1 The supply of new components for modification of the existing hydraulic system shall be the responsibility of one company only. This company shall be a recognized manufacturer of high pressure oil-hydraulic systems and shall be acceptable as such to the Departmental Representative.

.2 The hydraulic system shall be constructed as shown on the drawings and designed for low maintenance requirements and to facilitate easy troubleshooting.

1.2 SUPPLIER QUALIFICAIONS

.1 Fabrication of all hydraulic system components shall be done in a qualified shop with a minimum of 10 years of experience in the design and manufacture of hydraulic systems for the movable bridge industry.

.2 Design review, calculations, preparations of shop drawings, fabrication, shop testing and commissioning must be supervised by a Professional Engineer who has been responsible for the design of at least three hydraulic systems for movable bridge operating systems.

.1 The Professional Engineer must: make and sign and submit all calculations, check, seal and sign all shop drawings; witness all shop tests, inspect at the installation site installed hydraulic systems and accessories that they were properly installed, have all required components, are mechanically sound and are safe to operate. A certificate of conformance, stamped by the Professional Engineer, must be provided to the Departmental Representative on completion of commissioning.

.3 Piping, flushing, installation and adjustment of hydraulic components shall be done under the direction of a Certified Fluid Power Technician, Certified Fluid Power Specialist or Certified Fluid Power Engineer with a minimum of 5 years and 3 prior jobs experience within the movable bridge field.

1.3 STANDARDS

.1 All new hydraulic components must meet the requirements of the Canadian Highway Bridge Design Code CSA S6-14, hereinafter referred to as CHBDC.

.2 Record as-built changes in accordance with National Fluid Power Association Standard Section 7.4.3.

.3 Standards referred to in the Contract Documents are published by the following organizations and are directly applicable to the material and workmanship required by this item.
.1 ASTM – American Society for Testing and Materials.
.2 ANSI – American National Standards Institute.
.3 CSA – Canadian Standards Association.
.4 AWS – American Welding Society.
.5 SSPC – The Society for Protective Coatings.
.6 NFPA – National Fluid Power Association.
.7 DNV – Det Norske Veritas.

1.4 SUBSTITUTIONS

.1 Items specified by manufacturer name or part number on the Contract Plans may be replaced by an equivalent item by another manufacturer, subject to approval by the Departmental Representative, with the understanding that all changes required by the substitution are made at no additional cost. Item equivalency 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, load capacity (static and dynamic), durability, availability and other criteria as deemed appropriate by the Departmental Representative.

1.5 PERFORMANCE

.1 The hydraulic system supplier is responsible for final sizing and selection of all components. Even if no changes to the circuit are made, the hydraulic system supplier shall be responsible for the design and ensuring that the system will meet the performance requirements herein. If, in the opinion of the hydraulic system supplier, significant modifications are necessary to meet any of the requirements, this shall be brought to the attention of the Departmental Representative prior to the submission of quotation. Any troubleshooting, including materials and labor to modify the circuit during field start up, which is necessary to achieve acceptable performance of the completed system shall be performed at no additional cost.

.2 The performance requirements of the hydraulic system are as follows:
.1 Hydraulic Power Unit
.1 The existing hydraulic power unit (HPU) shall be re-used.
.2 The hydraulic system supplier shall field verify the components of the existing HPU and determine the

system limitations in terms of pressure and flow that affect the design of the swing circuit.

.3 The HPU shall be drained, the tank shall be cleaned, and the entire hydraulic system shall be flushed to remove contaminants.

.1 Wedge Motor Circuit

.1 Replace all flexible hoses and flush the wedge motor circuit.

.2 Latch Cylinder Circuit

.2 Replace all flexible hoses and flush the latch cylinder circuit.

.3 Swing Circuit:

.1 Replace the existing swing circuit including the motor, manifolds, valves, and piping/hose runs from the HPU to the motor. Provide shutoff valves adjacent to the hydraulic motor. Ensure the case drain port is utilized and piped to the HPU tank per manufacturer's recommendations.

.2 The swing circuit shall provide two separate valves for motor control:

.1 One valve (referred to as the holding valve) shall be a two position (open/closed) valve with a spring return to the closed position. This valve shall function as a brake when the span is not moving or the circuit is not energized and shall function as an emergency stop in the event that the operator releases the valve during operation.

.2 One valve (referred to as the swing valve) shall be a three position open center directional control valve with infinitely adjustable flow to allow for smooth acceleration of the swing motor from a stop to a maximum speed of 118 RPM. Preferred method of flow control by the operator is via a lever with a spring return to the open center (coast) position. Alternative methods may be submitted for review. The directional control valve shall be properly sized to the required flow. Full swing circuit flow, defined by a motor rotation speed of 118 RPM, shall not be reached until at least 75% of the physical travel of the valve/lever has occurred.

.3 The swing circuit shall be designed by the hydraulic system supplier to meet CHBDC requirements and include all necessary relief

valves or other components to meet the following performance requirements:

.1 Provide a minimum of 141 Nm of motor torque from 0-118 RPM whether driving or overhauling with the pressure and flow limitations of the existing HPU.

.2 Limit maximum motor torque to 176 Nm from 0-118 RPM whether driving or overhauling with the pressure and flow limitations of the existing HPU.

.3 Provide motor holding torque of 141 to 176 Nm at 0 RPM when the "holding valve" is closed.

.4 Provide motor braking torque of 141 Nm if the "holding valve" is closed when the motor is running at 118 RPM without undue pressure spikes or shock loads exceeding 176 Nm.

.5 Smoothly accelerate the motor from 0-118 RPM while driving under load ranging from no load to 141 Nm without cogging, unacceptable pressure or flow fluctuations, or objectionable noise, heat or vibration.

.6 Smoothly decelerate the motor from 118-0 RPM while overhauling under load ranging from no load to 141 Nm without cogging, unacceptable pressure or flow fluctuations, or objectionable noise, heat or vibration.

.7 All adjustable components, including but not limited to needle valves, relief valves, time delays, etc. shall be tamper resistant. Key lockable covers are preferred. Orifice plugs that are installed under subplate mounted components that require disassembly for adjustment are also acceptable. If orifice plugs are to be used, the Contractor shall supply a range of sizes to allow field tuning to be performed.

.8 Pressure test ports shall be supplied within .305 m (1 foot) of the swing drive motor. Test ports shall be stainless steel with captive caps.

.9 All new components shall be integrated into the existing hydraulic control enclosure, or be provided with a new enclosure. The valve operators shall be provided with a hinged, padlockable cover to prevent tampering when not in use. The valve

operators shall be located in close proximity to the existing hydraulic controls and shall be located in such a fashion as to permit safe, efficient, and ergonomic operation of the span. The location of all enclosures and controls shall be reviewed by the Departmental Representative.

1.6 ADMINISTRATIVE

.1 Submit to the 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 the 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 is coordinated.

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

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

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

1.7 DIMENSIONS/CERTIFIED DRAWINGS

.1 Dimensions indicated on the Contract Drawings are nominal and intended for information. Many of the dimensions indicated on the Contract Drawings have been obtained from existing drawings or from information provided by various machinery manufacturers. The dimensions have not been field verified or obtained from certified drawings from the various manufacturers. All dimensions indicated on the Contract Drawings must be verified in the field or from certified drawings from the various machinery manufacturers by the Contractor. Notify the Departmental Representative of any dimensional deviations found during the verification. Make all required field measurements and obtain certified dimensions for all manufactured products necessary before shop drawings, fabrication, and installation may proceed. The Contractor is solely responsible for converting dimensions from metric to Imperial units, or vice versa, as required.

1.8 SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Shop drawings, testing procedures, final record drawings, and other required submittals specified herein, shall be submitted in accordance with the requirements of the Contract.

.3 Submit complete drawing packages for all hydraulic system submittals. Any submittals that do not contain all documents required for the manufacture, assembly and erection of the machinery system will be returned without review.

.4 Submit calculations for hydraulic system operation showing each system flow, horsepower, and pressure for the required motor torque and speed. Show estimates for pressure drop of all elements in the system based on cold temperature (8 deg. C) and warm (32 deg. C) temperature operation. It is important to choose component sizes such that the horsepower losses due to pressure drops & flow for opening & closing are adequate to achieve the operating objectives.

.5 Submit a swing circuit test procedure for review with the submittal package. A comprehensive test of the swing circuit will be performed prior to shipment to the field.

.6 Submit a start-up and flushing procedure. Include requirements for testing the incoming hydraulic fluid for cleanliness as well as performing final fluid testing upon the completion of all functional testing.

1.9 SHOP DRAWINGS AND PRODUCT DATA

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

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

.3 Draw all shop drawings to scale (hydraulic schematic drawings excluded) and provide the scale on the drawings. Ensure that details of a given part are clearly visible at the scale selected for that part with the exception that enlarged views of small details within a part may be used to improve clarity and prevent excessively large drawings.

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

.5 Identify conflicts between manufacturers' instructions and Contract Documents and submit resolution for review and approval.

.6 Identify variations between Contract Documents and product or system limitations that may be detrimental to the successful performance of the completed work.

.7 Submit copies of producer or manufacturer data. This includes specifications, tests and installation instructions for the following items, but not excluding other items or materials not specifically mentioned.

- .1 Mill reports and physical tests of all metals
- .2 Bolts, nuts, washers and other fasteners
- .3 Paint
- .4 Lubricants
- .5 Standard stocked items

.8 Allow seven (7) days for the Departmental Representative's review of each submission.

.9 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 the Departmental Representative prior to proceeding with Work.

.10 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.

.11 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 A sequential number. Number resubmittals with the original submittal number and an alphabetic suffix.
- .6 Other pertinent data.

.12 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 A complete shop bill of materials for all machinery parts.
- .6 Details of appropriate portions of Work as applicable:
  - .1 Fabrication.
  - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
  - .3 Setting or erection details.
  - .4 Capacities.
  - .5 Performance characteristics.
  - .6 Standards.
  - .7 Operating weight.
  - .8 Wiring diagrams.
  - .9 Single line and schematic diagrams.
  - .10 Relationship to adjacent work.
  - .11 Instructions for painting the machinery.
  - .12 All appropriate weld symbols along with stress relieving process for weldments.
  - .13 The surface finish of machined surfaces and tolerances for each dimension for which a specific fit is required. Fit and finish per CHBDC section 13.8.20.2.

.14 Dimension parts to ensure that components of a common purpose that are fabricated from the same detail are interchangeable.

.15 Tolerances for all drawing dimensions, either directly or via a standard title block, as necessary to obtain proper fit and function of assembled components.

.16 The required tension method of tightening and all other pertinent information for all machinery connection bolts.

.7 Proprietary parts shown in outline on the drawings with sufficient dimensions and data to determine the clearances required for installation and operation.

.8 Certified dimension prints from equipment manufacturers stating pertinent ratings of the equipment, and indicating, when applicable, provisions for adding, draining, and checking the lubricant, method of lubrication, amount and type of lubricant required and type of fittings, the location of inspection openings and the location and type of venting devices.

.9 Complete assembly and erection drawings shall be furnished. These drawings shall be given identifying marks and essential dimensions for locating each part or assembled unit with respect to the bridge or equipment foundation. Every part shall be cross referenced to the sheet on which it is detailed. Contract Plans shall not be submitted as a substitute for assembly or erection drawings.

.10 Indicate on the shop drawings, for review by the Departmental Representative, the type of tightening, type of wrench and the value of torque or other pertinent information of all connection bolts for all items and machinery.

.13 After the Departmental Representative's review, distribute copies.

.14 Submit electronic copies of product data sheets or brochures for requirements requested in the specifications where shop drawings will not be prepared due to standardized manufacture of product.

.15 Submit electronic copies of test reports for requirements requested in the specifications and as requested by the 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.

.16 Submit electronic copies of certificates for requirements requested in the specifications and as requested by the 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.

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

.18 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by the Departmental Representative.

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

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

.21 Delete information not applicable to project.

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

.23 If upon review by the Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, reviewed electronic documents will be returned and fabrication and installation of Work may proceed. If shop drawings require significant corrections, a 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.

1.10 SYSTEM REQUIREMENTS

.1 Identify, in accordance with National Fluid Power Association Standards, all components including those located within manifolds, mounting plates, pads or fittings. Design the system

so that all components are easily installed, adjusted, inspected, and maintained.

1.11 INSTALLATION PROCEDURE

.1 Prepare a detailed written installation procedure for the installation of all hydraulic machinery. Include sequence of installation start-up & flushing procedure, bolt tightening methods and required tension values for all bolts. Include resumes for all Certified Fluid Power Technicians, Specialists or Engineers who will be responsible for the work with the written installation procedure.

.2 Demonstrate to the Departmental Representative that the Contractor has full knowledge of hydraulic procedures and that the work will be performed by qualified Certified Fluid Power Technicians.

.3 Begin installation of the system after the procedures and resumes have been submitted by the Contractor and they are satisfactory in the sole opinion of the Departmental Representative. Correct and resubmit the procedure and/or submit resumes for alternate personnel as necessary to the satisfaction of the Departmental Representative. This resubmission procedure, if required, is not cause for delay.

.4 Ship machinery items to the job site after the Contractor has submitted a satisfactory installation procedure.

1.12 SHIPPING AND HANDLING

.1 Valve stands shall be shipped to the site fully assembled. Prior to shipment, securely seal hydraulic equipment fluid ports. Prior to installation, store units fully assembled indoors in a clean, dry, dust-free environment.

1.13 FINAL RECORD DRAWINGS (“AS BUILT DRAWINGS”)

.1 Submit reproducible drawings for all materials as fabricated following fabrication. Clearly indicate any deviations from the reviewed shop drawings. Make reproducible drawings using the Department’s standard title block. Stamp these drawings “As Built”, immediately above the title block.

1.14 MAINTENANCE MANUAL

.1 Contents of Manual:
  .1 Table of contents, in the following order.

.2 Manufacturer’s literature describing each piece of equipment and giving manufacturer’s model number and drawing number.
.3 Copies of all warranties on equipment supplied to the project. For each item of work defined in this specification, provide a warranty of two (2) years of both materials and workmanship for all failures, repair.
.4 Copies of all reviewed testing procedures.
.5 Copies of all assembly, erection and shop drawings. These drawings to be included “as built” in the final version of the manual.
.6 List of nearest local suppliers of all equipment parts.
.7 List of parts and supplies that are to be furnished as part of the Contract.
.8 Name, address, and telephone number of the local manufacturer's representative and of the service company for each piece of equipment so that prices or spare parts can easily be obtained.
.9 Copies of hydraulic cylinder pressure strip chart recordings made during start up testing.
.10 Normal operating procedure (this item limited to normal operation of the modified swing circuit).

.2 Submit an electronic copy of the manual prior to shipment of machinery to the site. Complete the preliminary manual in all respects with regard to material content, organization and legibility for review by the Departmental Representative. Preliminary copies need not comply with presentation requirements including page size, paper weight, paper reinforcement and protection including oil, moisture and wear resistant covers, and copy method.

.3 The initial submittal will be reviewed and the changes made will be incorporated in to the final manual. Submit an electronic copy and two hard copies of the final manual after the machinery is in operation. Incorporate into the final manual the Departmental Representative’s comments on the preliminary manual and all field changes made during construction and installation. Ensure permanence of the manuals by complying with all presentation requirements.

.4 Provide electronic copies of the manual in Portable Document Format (PDF).

.5 Furnish manufacturer's operating and maintenance manuals giving complete instructions relative to assembly, installation, operation, adjustment, lubrication, maintenance, and carrying complete parts lists for every item of equipment furnished by the Contractor.

.6 Manuals may be manufacturer's standard publications provided that they comply with specified requirements relative to quantity and quality of information and data.

.7 Neatly imprint the covers and title page with a descriptive title and that contain the name of the bridge, owner, and location. Include on the title page the names of the Departmental Representative, the Contractor, and the date of issue. Separate the various sections which comprise the manual with divider pages. All parts information must be correct for the equipment provided under this Contract. Modify standard parts drawings to be suitable and block out irrelevant material. Modify all general information used as necessary to show pertinence to the equipment furnished under this Contract, and remove irrelevant material. Submit the arrangement of the manual, method of binding, including material and text to the Departmental Representative for review.

.8 Illustrations must be clear. Printed matter, including dimensions and lettering on drawings, must be easily legible. If reduced drawings are incorporated into the manuals, darken the original lines and letters if necessary to retain their legibility after reduction. Larger drawings may be folded into manuals to page size. Reproduce diagrams and prints used in the manual to a size less than 279 mm by 432 mm. Include diagrams on white paper and vacuum seal in transparent plastic material impervious to moisture and oil, and resistant to abrasion. Other formats which are equal in clarity, sharpness, durability and permanence will be considered.

.9 Prepare the manuals from the following materials:
- .1 Tear, water, and grease resistant paper.
- .2 Page size, 216 mm by 279 mm.
- .3 Fold out diagrams and illustrations.
- .4 Reproducible by dry copy xerography method.
- .5 Oil, moisture and wear resistant hard or flexible plastic covers.

.10 Furnish a minimum of one hydraulic schematic for the system. Produce the schematic on a 559 mm by 864 mm sheet and laminate. Submit the laminated schematic to the Departmental Representative for review and use at the bridge.

PART 2 - PRODUCTS

2.1 GENERAL MATERIALS AND WORKMANSHIP

.1 All materials shall be new and conform to NFPA standards and other standards listed in these Specifications and on the Contract Plans, unless noted otherwise.

.2 Supply materials from manufacturers who have manufactured similar materials for similar applications for a period of not less than ten years.

2.2 FASTENERS

.1 Bolts smaller than 1 1/2 in. (38 mm): high strength heavy hex bolts made from material equal to ASTM A325-14 unless otherwise specified on the Contract Drawings.

.2 Bolts greater than 1 1/2in. (38 mm): made from material equal to ASTM A449-14.

.3 All bolts: conform to the Unified Thread Standards, coarse thread series, for threads on bolts, nuts, and cap screws with a Class 2A tolerance for bolts and Class 2B tolerance for nuts, in accordance with ANSI/ASME B1.1-2003, unless otherwise specified. Bolt head and nut bearing surfaces must be flat and square with the axis of the bolt holes. Spot face as necessary to produce no less than 80% contact between mating surfaces.

.4 Hex socket head cap screws: ASTM A574-13.

.5 Hex socket flat countersunk head cap screws: ASTM F835-13.

.6 Stainless steel hex cap screws: ASTM F593-13a.

.7 Hex cap screws: ASTM A449-14.

.8 Lock washers: ASME B18.21.1-2009.

.9 Brass hex socket flat countersunk head cap screws: ASTM F468-15.

.10 Furnish positive type lock nuts and hardened washers for all bolts and for all flat countersunk head cap screws used as bolts. Double heavy hex nuts conforming to ASTM A563-15 are required unless indicated otherwise on the Contract Drawings. Submit alternate locking methods to the Departmental Representative for review. All hardened steel washers: in accordance with ASTM F436M-11.

.11 Tighten fasteners to provide a tension of 50% of the bolt's ultimate tensile strength unless otherwise specified on the drawings. Provide the method of tightening and of verifying the tension in all bolts on the Shop Drawings for review by the Departmental Representative.

2.3 VALVES (GENERAL)

.1 All system valving shall be rated for its intended flow and pressure with a minimum pressure rating of 31 MPa on all pressure valves. Use ANSI standard sub plate mounted valves for ease of servicing, wherever possible.

2.4 PIPINGS, FITTINGS, AND MANIFOLDS

.1 Piping includes all pipe, tubing and flexible hose. Piping, fittings, manifolds and the piping system shall conform to CSA Standards, except as otherwise noted. All rigid plumbing, field or local to HPUs, shall be seamless type 316 stainless steel tubing or pipe. All fittings shall be 37 degree O-ring seal, face seal, or flange type 316 stainless steel. Use SAE straight thread connections wherever possible. Pipe threads shall not be permitted on the hydraulic system without prior written permission from the Departmental Representative. Do not permit installed piping to come into direct contact with metal or concrete structures and protect piping from abrasion. Use vibration damping clamps suitable for piping under 20.7 MPa pressure with type 316 stainless steel hardware and plates to support piping.

.2 Flexible hose and Fittings shall be SAE rated for intended working pressures with a minimum working pressure rating of 20.7 MPa with a minimum safety factor of 4. Hose ends shall be 37 degree JIC, face seal, of flange type manufactured from type 316 stainless steel and shall be crimped. Use of flexible hoses should be at an absolute minimum except on motor connections and anywhere on the HPU where vibration may unreasonably reduce the working life of rigid plumbing connections. Protective sleeves shall be used to protect hoses from abrasion due to contact with hose supports, the structure, other hoses or adjacent equipment. The material to be used shall be submitted for review.

.3 All manifolds shall conform to CSA Standards.

.4 Test port connection fittings shall be of the checked female type, be provided with a metal cap that is tethered to the fitting with an M16x2.0 thread. Fitting, cap and tether type 316 stainless steel. Only one style of test port shall be provided.

2.5 SPARE PARTS

.1 All spare parts shall be new. Spare parts shall be provided in sturdy storage containers suitable for long term storage. Small spare parts shall be provided in cases with divided compartments for each size or type of component and shall be labeled. Caps or protective plugs shall be provided for all open fittings or ports to prevent contamination. All manufacturer's recommended long term storage procedures shall be performed on all spare parts. Heavy items, including but not limited to cylinders and pumps shall be provided in heavy wooden crates.

.1 (1) Spare flexible hose for each size and length provided.

.2 (1) Spare parts kit containing minimum (2) of each size and style of .2 o-ring or other replaceable seals gaskets, fasteners, etc. required for routine maintenance and servicing of the system.

.3 (1) Spare pressure gauge for each type provided

.4 (2) Spare test port connectors

.5 (2) Pressure gauges, rated 0-34 MPa, with max pressure tell-tales, equipped with mating test port connectors. Provide jumper hoses if required to ensure pressure gauges can be installed at any test port on the hydraulic system during operation to measure operating pressures. Provide plugs or caps for test connectors when not in use. Provide a sturdy case to store the pressure gauges at the site.

.6 (1) Test port connector equipped with valve and short length of tubing, to be used for sampling hydraulic oil from any test port in the system.

PART 3 - EXECUTION

3.1 DIMENSIONAL VERIFICATION

.1 Prior to fabricating new machinery components, review the Plans and/or field survey and measure the structure, as required to ensure that the components as selected by the hydraulic system supplier will fit into the structure as intended. Perform all such reviews and measurements before preparation of the shop drawings or working drawings and before performing work at the bridge.

3.2 CONSTRUCTION DETAILS

.1 Supply all apparatus, tools, devices, materials and labour to manufacture, ship, install, erect, align, adjust, lubricate, test, and paint, to complete machinery as provided in the Contract Documents. Furnish any apparatus, tools, devices, materials and labour incidental to the work, but not specifically stated or included at no additional cost.

3.3 QUALITY

.1 Products, materials, equipment and articles incorporated in Work shall be new (unless specified otherwise in the contract documents), 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 the 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.

3.4 INSPECTION

.1 The Departmental Representative reserves the right to inspect all machinery at the factory, prior to shipping. Provide the Departmental Representative with full access to the manufacturer’s fabrication facility for such inspections.

.2 Inspections are based on the requirements of the Specifications and Contract Drawings, referenced codes or standards, and the Contractor's submittal documents. The Departmental Representative has the authority to stop fabrication or shipment of any material, component, or assembly that does not comply with specified requirements. Replace or repair to the satisfaction of the Departmental Representative any such rejected item. All such replacements or repairs are made at the Contractor's expense.

.3 The Departmental Representative will make inspections of equipment throughout the construction period. Correct defects, deficiencies, or deviations from the Contract Drawings or Specifications discovered during such inspections at no additional cost. Shop inspection of machinery does not relieve the Contractor from making such repairs as directed by the Departmental Representative.

3.5 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 the Departmental Representative as failing to conform to Contract Documents. Replace or re execute in accordance with Contract Documents.

3.6 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 Coat finished metal surfaces and unpainted metal surfaces that would be damaged by corrosion, as soon as practical after finishing with a corrosion inhibitor. Remove this coating from all surfaces prior to lubrication for operation and from all surfaces prior to painting after erection.

.3 Mount assembled units on skids or otherwise crate for protection from weather, dirt and all other injurious conditions during shipment and storage as approved by the machinery manufacturer. Submit in advance information as to methods and materials which will be used for protection for review by the Departmental Representative.

.4 Store machinery items as to permit easy access for inspection and identification. No outdoor storage of machinery components is permitted regardless of the methods of protection provided.

.5 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.

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

.7 Correct damage that occurs to the machinery components as a result of improper protection during shipment or storage by the Contractor to the satisfaction of the Departmental Representative at no additional cost.

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

3.7 MANUFACTURER’S INSTRUCTIONS

.1 Unless otherwise indicated in specifications, install, assemble or erect products in accordance with manufacturer's instructions.

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

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

3.8 INSTALLATION

.1 Commence demolition of existing and installation of new components after all required components have been manufactured, inspected, shop tested, preparations by others where required have been satisfactorily completed and installation procedure have been reviewed.

.2 All hydraulic connections, system flushing and start up shall be performed under the direction of a Certified Fluid Power Technician whose certification number shall be listed on the resume submitted for review. The system flushing procedure must be submitted for review.

3.9 FILLING AND FLUSHING OF HYDRAULIC SYSTEMS

.1 Prior to connecting piping or flexible hoses to any system component, clean with a pneumatically powered projectile cleaning system repeating until a fresh clean projectile exists with no visible debris.

.2 After completion of work on any hydraulic system, the system shall be topped off with new hydraulic fluid. Any fluid that is drained from the system in order to perform the work shall be removed and properly disposed of in accordance with all applicable local, provincial and federal laws.

.3 Any hydraulic fluid that is added to the system shall be pumped into the reservoir through a 5 micron filter.

.4 All components of the affected systems (pumps, valves, manifolds, supply and return lines, reservoirs, etc.) shall be thoroughly flushed by looping hoses at the cylinders. The main pump may be used for flushing. All system filter elements shall be replaced as required during flushing and new filter elements shall be installed at the conclusion of the flushing. A suitable portable filtration unit may also be used. Flushing for all systems shall be continued until a particle count below 17/15/12 per ISO 4406 (or more stringent requirement if recommended by the manufacturer of any new component installed in the system) is achieved for two

consecutive contamination tests. A certified laboratory fluid analysis/report shall confirm that the required range has been achieved and that there is an acceptable level of water in each system. Copies of the certified laboratory reports shall be submitted to the Departmental Representative. Flushing shall be performed under the direction of a Certified Fluid Power Technician.

3.10 SHOP TESTING

.1 The Contractor shall test and perform shop adjustments to the hydraulic system prior to delivery of the components to the jobsite. A shop test procedure shall be prepared and submitted to document in detail all of the steps needed to adjust system pressures and flows as needed to obtain the system performance as specified. All design pressure and flow values shall be independently verified by the Engineer responsible for the design of the system and preparation of the test procedure who shall witness the tests, prepare and submit a shop test report for review by the Departmental Representative. Minimum test requirements are as follows:

- .1 Shop testing shall be performed on the swing drive circuit. The Contractor shall provide a hydraulic power unit, measurement equipment, and all other accessories required to perform the test.
- .2 Record pressures, speed, and torque dynamically at a 50 Hz sample rate. Provide strip chart recordings of the pressure readings identifying when hydraulic controls are manipulated.
  - .1 Motor output torque
  - .2 Motor shaft speed
  - .3 Motor port pressure (two channels, port A and port B)
- .3 Acceptance will be governed by the following criteria:
  - .1 Maximum motor torque under any condition: 176 Nm.
  - .2 Minimum motor torque at any speed from 0-118 RPM: 141 Nm.
  - .3 Cogging, unacceptable pressure or flow fluctuations, or objectionable noise, heat or vibration will be cause for rejection.
- .4 The shop testing procedure shall include the following tests, at a minimum:
  - .1 With no load on the motor, run the motor at 118 RPM for 6 minutes. Repeat this test in the opposite direction.
  - .2 With no load on the motor, smoothly accelerate, over a period of 10 seconds, the motor from a stop up to a full speed of 118 RPM. Operate the motor at full speed for three minutes, and then smoothly decelerate the motor to a stop. Repeat this test in the opposite

direction. This test is intended to demonstrate that the swing valve provides effective speed control for the range of physical travel of the operator.

.3 With a load applied on the motor, smoothly accelerate, over a period of 10 seconds, the motor from a stop up to a full speed of 118 RPM. Operate the motor at full speed for three minutes, and then smoothly decelerate the motor to a stop. Repeat this test in the opposite direction. This test shall be performed with a load of 35, 70, 105, and 141 Nm.

.4 With an overhauling load of 141 Nm at a speed of 118 RPM applied to the motor, move the control lever in the direction that will oppose the rotation of the motor. Confirm that the motor will develop torque resisting the overhauling load without undue pressure spikes or shock loads exceeding 176 Nm.

.5 With the HPU operating and the hydraulic control in its centered position, and the locking valve closed, measure the torque required to rotate the motor shaft. Back drive the motor from stopped up to a speed of 118 RPM. Confirm that the motor will develop torque resisting the overhauling load without undue pressure spikes or shock loads exceeding 176 Nm.

.6 With the HPU operating and the hydraulic control in its centered position, and the locking valve open, measure the torque required to rotate the motor shaft. Back drive the motor from stopped up to a speed of 118 RPM. Confirm that the motor can be rotated with less than 22 Nm.

.5 If adjustments to components are required during the testing sequence to achieve an acceptable result, the testing procedure shall be repeated from the beginning. Repetition of the no-load test may be omitted at the discretion of the Engineer.

.6 At the completion of testing, document the adjustments that were performed and record position of all adjustable components (needle valves, relief valves, etc.) and incorporate into the as-built record.

3.11 START UP AND COMISSIONING

.1 The Contractor shall test and perform field adjustments to the hydraulic system prior to operating the swing bridge. A detailed procedure sealed by a Professional Engineer licensed in Ontario, Canada, shall be submitted to the Departmental Representative for review at least 2 weeks prior to testing the system. Prior to tests, isolate all equipment or other parts which are not designed to withstand test pressures or forces. Minimum test requirements are as follows:

.2 Carry out static pressure tests at 31 MPa to demonstrate that the system is free of leaks.

.3 Use an electronic chart recorder to record the following system parameters during all tests: electric motor voltage and current, pressure at the hydraulic motor test ports, and motor speed. Motor speed may be recorded at the reducer output shaft if necessary due to accessibility. A Departmental Representative will monitor and record shaft torque at the main pinion shaft via strain gages.

.4 Repeat all shop test procedures to verify that system pressures, flows and speeds have not been altered since the shop test.

.5 Perform swing span test openings and verify that maximum pressures and motor torques are not exceeded. Using torque measurements by the Departmental Representative, confirm that the motor produces a minimum of 141 Nm under the complete range of speeds and that maximum torque does not exceed 176 Nm under any condition.

.6 Perform emergency stop tests by releasing the holding valve with the span moving in both directions at 50%, 75%, and full speed. Using torque measurements by the Departmental Representative, confirm that the motor produces a minimum of 141 Nm under the complete range of speeds and that maximum torque does not exceed 176 Nm.

.7 After all adjustments and other testing is complete, perform a final record test of as-built system performance as follows: Simultaneously record motor pressures during normal operation. Record pressures dynamically at a 50 Hz sample rate. Provide strip chart recordings of the pressure readings identifying when the motor starts, stops and direction of travel for 3 cycles in both directions of operation. Include documentation of these test results as part of the maintenance manuals.

.8 If adjustments to components are required during the testing sequence to achieve an acceptable result, the testing procedure shall be repeated from the beginning.

3.12 PAINTING

.1 Paint steel components in accordance with the requirements for painting in Section 29 05 00.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 It is the intent of this Specification that only individuals of high competence and experience be utilized to perform the Work of this Section.

.2 It is not the intent of the Contract Documents to identify all necessary methods, means, equipment, or appurtenances that will be required in order to accomplish the work of the Contract Documents.

.3 This section describes the requirements for the Work to be done which includes furnishing all labour, materials, equipment and tools required to complete and leave ready for operation the installation of all items of electrical Work in accordance with the Contract Documents.

1.2 RELATED REQUIREMENTS

.1 Section 011400 – Work Restrictions

1.3 MEASUREMENT PROCEDURES

.1 Electrical work will not be measured separately for payment.

1.4 WORK INCLUDED

.1 Electrical:
- .1 Remove and replace existing incandescent lamps with new LED lamps.
- .2 Remove and replace existing service equipment with new service which is to include a manual transfer switch for future temporary generator connection.
- .3 Remove and replace existing vehicle detector unit.
- .4 Install new anemometer sensor on top of structure. Sensor to communicate to remote receiver which is to be installed in adjacent bridge operations building.
- .5 Provide training to PWGSC Bridge Operators, O&M Manuals, as-built drawings and specifications.
- .6 Equipment grounding.

1.5 REFERENCES

.1 Canadian Standards Association (CSA)
- .1 CSA C22.1-2015, Canadian Electrical Code, Part I (22nd Edition), Safety Standard for Electrical Installations.
- .2 CAN/CSA-Z462-11, Workplace Electrical Safety.

.2 Electrical and Electronic Manufacturer's Association of Canada (EEMAC).

.3 Health Canada / Workplace Hazardous Materials Information System (WHMIS).

.1 Material Safety Data Sheets (MSDS).

.4 Institute of Electrical and Electronics Engineers (IEEE) Standard 519-1992 - Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems.

.5 National Electrical Contractor Association - NECA 1-2010 - Standard Practice of Good Workmanship in Electrical Contracting.

.6 The Ontario Electrical Safety Code 2015, and all bulletins (Ontario).

.7 Hydro requirements and local applicable codes and regulations.

1.6 DESIGN REQUIREMENTS

.1 Operating voltages: to CAN3-C235.

1.7 SUBMITTALS

.1 In accordance with Sections 01 33 00 and 01 78 00.

.2 Submit the number of copies that the Contract requires.

.3 Supplement manufacturers' standard data to provide information unique to this project.

1.8 AS BUILT DRAWINGS AND OPERATION MANUAL

.1 At the completion of the project, provide a complete set of as-built drawings as well as operations and maintenance manuals.

.2 Compile operations and maintenance manuals of the manufacturer's catalogue data, installation, operation, and maintenance instructions of all equipment supplied and installed.

1.9 QUALITY ASSURANCE

.1 Quality Control: in accordance with Section 01 45 00.

.2 Qualifications: electrical Work to be carried out by qualified, licensed electricians who hold valid Master Electrical Contractor license or apprentices in accordance with authorities having jurisdiction.

.3 Employees registered in provincial apprentices program: permitted, under direct supervision of qualified licensed electrician, to perform specific tasks.

.4 Permitted activities: determined based on training level attained and demonstration of ability to perform specific duties.

.5 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.

1.10 SYSTEM STARTUP

.1 Instruct Departmental Representative and operating personnel in operation, care and maintenance of systems, system equipment and components.

1.11 TRAFFIC CONTROL

.1 The Contractor is advised that the bridge is a single lane bridge with traffic controlled by signals at the east and west approaches to the bridge. Should construction operations impact traffic operations of the bridge the Contractor shall provide flag persons at the approaches to the bridge to provide traffic control.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

.1 Provide material and equipment in accordance with Section 01 61 00.

.2 Material and equipment to be CSA, ULC or UL certified. Where CSA, ULC or UL certified material and equipment are not available, obtain special approval from the Departmental Representative before delivery to site and submit such approval as described in Section 01 33 00.

.3 Factory assemble control panels and component assemblies.

.4 Furnish and install all new conduit, wiring, disconnect switches, panelboards, controls and relays, wiring devices, boxes.

.5 Ensure all electrical equipment used outside is suitable for use in a marine environment.

2.2 WIRING TERMINATIONS

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

PART 3 - EXECUTION

3.1 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 specified otherwise.

.3 Install grounding connections to typical equipment included in, but not necessarily limited to following list. Service equipment, manual transfer switches and duct systems.

3.2 NAMEPLATES AND LABELS

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

3.3 MOUNTING HEIGHTS

.1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.

.2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

.3 Install electrical equipment at following heights unless indicated otherwise.

.1 Local switches: maximum 48 in (1200 mm) for accessible space.

.2 Panelboards: as required by Code or as indicated.

3.4 COORDINATION OF PROTECTIVE DEVICES

.1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

3.5 CLEANING

.1 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 26 05 00 – Common Work Results For – Electrical

.2 Section 011400 – Work Restrictions

.3 Section 01 74 20 - Construction/Demolition Waste Management and Disposal

1.2 REFERENCES

.1 Canadian Standards Association (CSA International).

.2 ICES-005-07, Radio Frequency Lighting Devices.

.3 Underwriters' Laboratories of Canada (ULC).

1.3 SCOPE OF WORK

.1 Remove existing service equipment and replace with new service equipment. The completed work is to include a manual transfer switch and external plug for future connection of portable generator which can be temporarily connected during power failure.

.2 Work to include coordination with Hydro Supply Authority.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

1.5 EXISTING SERVICE

.1 The existing service equipment consists of an aerial feed from adjacent hydro pole. This service feed connects to a hydro meter which intern feeds to a cabinet housing a fusible disconnect switch and an enclosed branch breaker (40 A).

PART 2 - PRODUCTS

2.1 CABINETS

.1 Construction: welded stainless steel sized to suit proposed internal equipment as indicated complete with continuous hinged door, lockable handle and catch.

.2 Cabinet to be NEMA 4 rated.

.3 Complete with pole mounting hardware.

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2.2 DISCONNECT SWITCHS

.1 Fusible disconnect switch in CSA Enclosure NEMA 12, to CAN/CSA C22.2 No.4 100 A size.

.2 Provision for padlocking in off switch position by two locks.

.3 Mechanically interlocked door to prevent opening when handle in ON position.

.4 Fuses: size as to match existing.

.5 Quick-make, quick-break action.

.6 ON-OFF switch position indication on switch enclosure cover.

2.3 MANUAL TRANSFER SWITCHS

.1 Interlocking 40 A breakers that provide manual transfer of between supply power source and externally connected generator.

.2 Breakers to be housed in CSA Enclosure NEMA 12.

2.4 RECEPTACLES

.1 Pin and sleeve type, waterproof complete with closure cap. 100 A rating, 3P4W

.2 Mounted on exterior of cabinet.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Remove existing service equipment.

.2 The Contractor is responsible for all access and traffic control as required to install the new service equipment. Temporary traffic control shall be in accordance with Ontario Traffic Manual (OTM): Book 7 - Temporary Conditions.

.3 The Contractor is advised that the bridge is a single lane bridge with traffic controlled by signals at the east and west approaches to the bridge. When the Contractor disconnects power to facilitate the work the signals will be out of service and the Contractor shall provide flag persons at the approaches to the bridge to provide traffic control.

.4 Install service equipment.

3.2 CLEANING

.1 Site Cleaning.

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

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

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 26 05 00 – Common Work Results For – Electrical

.2 Section 01 74 20 - Construction/Demolition Waste Management and Disposal

1.2 REFERENCES

.1 Canadian Standards Association (CSA International).

.2 ICES-005-07, Radio Frequency Lighting Devices.

.3 Underwriters' Laboratories of Canada (ULC).

1.3 SCOPE OF WORK

.1 Install new anemometer sensor on structure. System to be complete with remote receiver to be located in Bridge Operations Building.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

PART 2 - PRODUCTS

2.1 WEATHER MONITORING UNIT

.1 Wind and Direction Sensors.

.1 Wind speed sensor to be solid state magnetic.

Resolution and Units. 1 mph, 1 km/h, 0.4 m/s, or 1 knot (user-selectable)
Range.1 to 200 mph, 1 to 173 knots, 0.5 to 89 m/s, 1 to 322 km/h
Update Interval .Instant Reading: 2.5 to 3 seconds, 10-minute Average: 1 minute

.2 Wind direction sensor to be wind vane style with potentiometer.

Range 0 - 360°
Display Resolution 16 points (22.5°) on compass rose, 1° in numeric display

` Accuracy . ±3°
Update Interval 2.5 to 3 seconds

.2 Crossarm Assembly.
.1 To be complete with termination box.
.2 To be complete with bolted mounting bracket

.3 Power Supply Unit.
.1 Suitable for 120 volt input

.4 Remote Receiver.
.1 Complete with AC power Adapter
.2 LCD transflective display
.3 LED backlight
.4 Wireless communication to sensors
.1 300 m range

.5 Recommended Suppliers
.1 Davis Equipment
.2 La Cross Technology
.3 Vaisala

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Install bridge mounted sensors at the top of the swing span truss near mid span. The Contractor is responsible for all access and traffic control as required to install the bridge mounted sensors. The Contractor shall propose the method and exact location for mounting the sensors to the Departmental Representative for review.

.2 Install remote sensor unit in Bridge Operations Building.

3.2 CLEANING

.1 Clean existing luminaires.
.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

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

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 26 05 00 – Common Work Results For – Electrical

.2 Section 01 74 20 - Construction/Demolition Waste Management and Disposal

1.2 REFERENCES

.1 Canadian Standards Association (CSA International).

.2 ICES-005-07, Radio Frequency Lighting Devices.

.3 Underwriters' Laboratories of Canada (ULC).

1.3 SCOPE OF WORK

.1 Replace existing incandescent lamps with new LED lamps.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

PART 2 - PRODUCTS

2.1 LAMPS

.1 LED lamps to be clear, A19, 18 Watt with 25000 hour lamp life, rough-service rated; or as indicated.

.2 Rating: 120 V, 60 Hz, to replace existing 100W incandescent lamps.

.3 Color Rendering Index >80 CRI.

.4 Color temperature 5000K, 1600 lumen output.

.5 Recommended product by Cree or equivalent.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Install new LED lamps.

3.2 CLEANING

.1 Clean existing luminaires.
  .1 Remove surplus materials, excess materials, rubbish, tools and equipment.

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

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 26 05 00 – Common Work Results For – Electrical

.2 Section 01 74 20 - Construction/Demolition Waste Management and Disposal

1.2 REFERENCES

.1 Canadian Standards Association (CSA International).

.2 Transportation Association of Canada (TAC)
  .1 Manual of Uniform Traffic Control Devices for Canada - March 2000 Update.

1.3 SCOPE OF WORK

.1 Replace existing vehicle detector unit with new vehicle detector unit.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
  .1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

PART 2 - PRODUCTS

2.1 DETECTOR UNIT

.1 Shall be stand-alone, single channel model.

.2 Shall be self-tuning.

.3 Shall be complete with twelve switch-selectable sensitivity levels.

.4 Shall be complete with four switch-selectable frequencies minimize to crosstalk.

.5 Shall be complete with four selectable operating modes: Pulse, Presence, Short Presence, and Presence Timing (Texas Presence).

.6 Shall be complete with adjustable gap timing in pulse mode.

.7 Shall be complete with delay and extension timing.

.8 Shall be complete with Detection LED provides separate indications for presence, delay, and extension.

.9 Shall be complete with Diagnostic LEDs indicate four types of faults.

.10 Shall be complete with reset button to clear faults and re-tune.

.11 Shall meet or exceed NEMA TS1 specifications for inductive loop detectors.

.12 Shall be Naztec Model 710-TX/I or equal.

PART 3 - EXECUTION

3.1 INSTALLATION

.1 Remove existing detector unit and replace with new detector unit.

.2 Reprogram existing traffic signal controller from vehicle recall to detector unit input.

3.2 CLEANING

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

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

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 Under the Mechanical Work section, the Contractor shall furnish a new rack pinion shaft and keys, rehabilitate the existing rack pinion and gear G2, replace the end wedge bronze nuts and wedge base shims, rehabilitate the existing machinery brake system, install full open and closed bumpers, clean and lubricate all machinery. All work shall be performed as detailed on the Contract Drawings and as detailed in the Specifications.

.2 The contractor shall also remove and dispose off-site of existing components that are not being re-used for the project in accordance with the Contract Specifications.

.3 The Contractor shall be responsible for the coordination of the mechanical work with all other work items as necessary to produce completed systems which meet the requirements of the Contract Documents.

.4 This work includes furnishing all labour, materials, tools, services and equipment required to perform the removal, installation, adjustment, lubrication and testing of the mechanical machinery shown on the Contract Documents and as indicated herein.

1.2 LIMITS OF WORK

.1 The limits of work included for this section are as indicated on drawings M1 to M7 of the Contract Drawings and as specified herein.

1.3 STANDARDS

.1 All new machinery items must meet the requirements of the Canadian Highway Bridge Design Code CSA S6-14, hereinafter referred to as CHBDC.

.2 Standards referred to in the Contract Documents are published by the following organizations and are directly applicable to the material and workmanship required by this item. Use the latest available standard unless otherwise noted.

.1 ASTM - American Society for Testing and Materials.
.2 ANSI - American National Standards Institute.
.3 CSA - Canadian Standards Association.
.4 AWS - American Welding Society.
.5 SSPC - The Society for Protective Coatings.

1.4 SUBSTITUTIONS

.1 Items specified by manufacturer name or part number on the Contract Documents may be replaced by an equivalent item by another manufacturer, subject to approval by the Departmental Representative, with the understanding that all changes required by the substitution are made at no additional cost to Departmental Representative. Item equivalency 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, load capacity (static and dynamic), durability, availability and other criteria as deemed appropriate by the Departmental Representative.

1.5 AVAILABILITY

.1 Immediately upon signing the Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify the Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work. The following items are anticipated to require long lead times: Bronze castings for the end wedge nuts.

1.6 ADMINISTRATIVE

.1 Submit to the 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 the Departmental Representative. This review shall confirm 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 coordinate existing conditions with the Work.

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

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

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

1.7 DIMENSIONS/CERTIFIED DRAWINGS

.1 Dimensions indicated on the Contract Drawings are nominal and intended for information. Many of the dimensions indicated on the Contract Drawings have been obtained from existing drawings or from information provided by various machinery manufacturers. The dimensions have not been field verified or obtained from certified drawings from the various manufacturers. All dimensions indicated on the Contract Drawings must be verified in the field or from certified drawings from the various machinery manufacturers by the Contractor. Notify the Departmental Representative of any dimensional deviations found during the verification. Make all required field measurements and obtain certified dimensions for all manufactured products necessary before proceeding with shop drawings, fabrication, and installation. The Contractor is solely responsible for converting dimensions from Imperial to metric units, or vice versa, as required.

1.8 MACHINERY LUBRICATION

.1 The contractor is advised that the machinery lubrication work is included in the scope for mechanical work.

.2 Provide two weeks notice to the Departmental Representative prior to starting the cleaning of components. Coordinate the scheduling of this work with the Departmental Representative to permit the Departmental Representative access over two days to inspect the components after cleaning and prior to application of new lubricants that would hinder visual inspection (e.g. open gear grease).

.3 If contractor personnel identify any damage to components in the process of cleaning, immediately notify the Departmental Representative.

.4 Solvent clean all components in accordance with the requirements of SSPC-SP1. Remove existing accumulated lubricant and debris present in the vicinity of the components (i.e. lubricants that have dripped or flung off onto the piers or nearby structural supports). Take care to avoid damage to existing coatings for components that are painted.

.5 Employ means and methods for removing and disposing of lubricants that will adhere to all applicable environmental laws and regulations and protect against contamination of the environment. Pressure or steam washing shall not be used.

.5 Lubricate machinery with products that have been submitted for review in a manner consistent with manufacturer recommendations.

.6 The following is list of the mechanical components to be cleaned and lubricated.
- .1 Enclosed Speed Reducers
- .2 Rim bearing roller wheels
- .3 Span drive machinery and end wedge machinery plain bearings.
- .4 Span drive and end wedge open gearing
- .5 End wedges
- .6 Center latch

1.9 SUBMITTALS

.1 Shop drawings, erection drawings, machinery installation procedures, final record drawings, and other required submittals specified herein, shall be submitted in accordance with the requirements of the Contract.

.2 Submit complete drawing packages for all mechanical machinery system submittals as follows:
- .1 Span Drive Replacement Components and Assembly
- .2 End Wedge Replacement Components
- .3 Machinery Lubrication Product Data Sheets

.3 Any submittals that do not contain all documents required for the manufacture, assembly, and erection of the machinery system will be returned without review.

1.10 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 Draw all shop drawings to scale and provide the scale on the drawings. Ensure that details of a given part are clearly visible at the scale selected for that part with the exception that enlarged views of small details within a part may be used to improve clarity and prevent excessively large drawings.

.3 Identify variations between Contract Documents and product or system limitations that may be detrimental to the successful performance of the completed work.

.4 Submit copies of producer or manufacturer data. This includes specifications, tests and installation instructions for the following items, but not excluding other items or materials not specifically mentioned.
- .1 Mill reports and physical tests of all metals
- .2 Bolts, nuts, washers and other fasteners
- .3 Paint
- .4 Lubricants
- .5 Standard stocked items

.5 Allow 7 days for the Departmental Representative's review of each submission.

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

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

.8 Accompany submissions with transmittal letter containing:
- .1 Date.
- .2 Project title and number
- .3 Contractor's name and address.
- .4 Identification and quantity of each shop drawing, product data and sample.
- .5 A sequential number. Number resubmittals with the original submittal number and an alphabetic suffix.
- .6 Other pertinent data.

.9 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 A complete shop bill of materials for all machinery parts.

.6 Details of appropriate portions of Work as applicable:
.1 Fabrication.
.2 Layout, showing dimensions, including identified field dimensions, and clearances.
.3 Setting or erection details.
.4 Capacities.
.5 Performance characteristics.
.6 Standards.
.7 Operating weight.
.8 Wiring diagrams.
.9 Single line and schematic diagrams.
.10 Relationship to adjacent work.
.11 Instructions for painting the machinery.
.12 All appropriate weld symbols along with stress relieving process for weldments.
.13 The surface finish of machined surfaces and tolerances for each dimension for which a specific fit is required. Fit and finish per CHBDC section 13.7.6.
.14 Dimension and provide tolerances for all parts to ensure that components of a common purpose that are fabricated from the same detail are interchangeable.
.15 Tolerances for all drawing dimensions, either directly or via a standard title block, as necessary to obtain proper fit and function of assembled components.
.16 The required tension, method of tightening and all other pertinent information for all machinery connection bolts.

.7 Proprietary parts shown in outline on the drawings with sufficient dimensions and data to determine the clearances required for installation and operation.

.8 Certified dimension prints from equipment manufacturers stating pertinent ratings of the equipment, and indicating, when applicable, provisions for adding, draining, and checking the lubricant, method of lubrication, amount and type of lubricant required and type of fittings, the location of inspection openings and the location and type of venting devices.

.9 Complete assembly and erection drawings shall be furnished. These drawings shall be given identifying marks and essential dimensions for locating each part or assembled unit with respect to the bridge or equipment foundation. Every part shall be cross referenced to the sheet on which

it is detailed. Contract Documents shall not be submitted as a substitute for assembly or erection drawings.

.10 Indicate on the shop drawings, for review by the Departmental Representative, the type of tightening, type of wrench and the value of torque or other pertinent information of all connection bolts for all items and machinery.

.10 Submit electronic copies of product data sheets or brochures for requirements requested in the specifications where shop drawings will not be prepared due to standardized manufacture of product.

.11 Submit electronic copies of test reports for requirements requested in the specifications and as requested by the 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.

.12 Submit electronic copies of certificates for requirements requested in the specifications and as requested by the 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.

1.11 SHOP INSPECTION REPORTS

1. Prepare and submit shop assembly and testing reports for all components that are not of standard manufacture to certify that all shop assembly and testing requirements have been completed satisfactorily for review by the Departmental Representative.

2. Upon completion of the shop drawings, develop shop quality control (QC) forms that identify all component dimensions and features that affect the fit or function of that component within its' assembly. Submit QC forms for review by the Departmental Representative. As a minimum, the shop inspection forms shall identify the feature to be inspected, the applicable tolerance or acceptance criteria, provide space to record the result of the measurement for each component. The full name and signature of the individual who performed the measurement shall be provided along with the date that the measurements were performed.

3. Permanently mark and serialize each component. Perform 100% inspection of all components and identify all measurements by component serial number to permit independent verification of component measurements at a later time by the Departmental Representative.
4. For any features that do not conform to the requirements of the shop drawings, Plans or Specifications, prepare and submit a non-conformance report identifying the non-conformance and proposing corrective action as necessary for acceptance of the non-conforming feature for review of the proposed corrective action by the Departmental Representative.

5. Upon completion of shop inspection work and prior to assembly of the components, submit shop inspection reports for review and confirmation that the inspection reports are complete. No components may be assembled or released for shipment from the shop without review of completed shop inspection reports indicating parts are in conformance or have non-conformance issues documented in non-conformance reports that have been reviewed by the Departmental Representative.

1.12 MACHINERY INSTALLATION PROCEDURE

.1 Prepare a detailed written installation procedure for the installation of all mechanical machinery. Include sequence of installation, alignment methods, bolt tightening methods and required tension values for all bolts. Include resumes for all supervising engineers and millwrights associated with machinery installation and alignment with the written installation procedure.

.2 Demonstrate to the Departmental Representative that the Contractor has full knowledge of machinery connections and alignment procedures and that the work will be performed by qualified millwrights.

.3 As part of the machinery installation procedure, develop field inspection report forms to document installation and alignment tolerances for all components and systems as the work progresses.

.4 Begin installation of the machinery after the procedures and resumes have been submitted by the Contractor and are determined to be satisfactory in the sole opinion of the Departmental Representative. Correct and resubmit the procedure and/or submit resumes for alternate personnel as necessary to the satisfaction of the Departmental Representative. This resubmission procedure, if required, is not cause for delay.

.5 Ship machinery items to the job site after the Contractor has submitted a satisfactory installation procedure.

1.13 FIELD INSPECTION REPORTS

.1 Prepare and submit field inspection reports to document and certify proper installation of all components.

.2 Use the field inspection report forms developed as part of the machinery installation procedure to document that all of the alignment requirements have been met.

1.14 FINAL RECORD DRAWINGS ("AS-BUILT" DRAWINGS)

.1 Submit reproducible hard copies of drawings of all materials as fabricated following fabrication. Clearly indicate any deviations from the final shop drawings. Make reproducible drawings using the Department's standard title block. Stamp these drawings "As Built", immediately above the title block. Also provide an electronic copy in portable document format (PDF).

PART 2 - PRODUCTS

2.1 GENERAL MATERIALS AND WORKMANSHIP

.1 All materials shall be new and conform to ASTM standards and other standards listed in these Specifications and on the Contract Documents, unless noted otherwise.

.2 Supply materials from manufacturers who have manufactured similar materials for similar applications for a period of not less than ten years.

.3 Brinell or Rockwell hardness tests shall be made and results included on inspection reports for all materials for which hardness values are required on the Contract Documents, in the material specifications, or specified herein.

.4 Do not fabricate, machine, weld, cast or forge items without sufficient advance notification to the Departmental Representative to permit scheduling of required inspection. Furnish all facilities and provide for free access at the plant or shop for the inspection of materials and workmanship, and to witness shop tests. The inspector has the authority to recommend to the Departmental Representative rejection of material or workmanship that does not meet the requirements of the Contract Documents. The Departmental Representative shall make the final decision for rejection.

.5 Unless otherwise provided, furnish without charge, test specimens required herein, and all labor, testing machines, tools and equipment necessary to prepare the specimens and to make the

physical tests and chemical analyses. Submit copies of test reports and various tests to the Departmental Representative.

2.2 FASTENERS

.1 For any fasteners that are loosened or removed as part of the work, provide new fasteners, except for turned bolts which may be cleaned and inspected to confirm that their condition is suitable for re-use.

.2 All bolts: conform to the United Thread Standards, coarse thread series, for threads on bolts, nuts, and cap screws with a Class 2A tolerance for bolts and Class 2B tolerance for nuts, in accordance with ANSI/ASME B1.13-2005(R2015) unless otherwise specified. Bolt head and nut bearing surface must be flat and square with the axis of the bolts holes. Spot face as necessary to produce no less than 80% contact between mating surfaces.

.3 Finished high-strength bolts shall meet the requirements of ASTM A449-14. High-strength bolts shall have finished bodies and regular hexagonal heads. Holes for high-strength bolts shall be not more than 0.25 mm (0.01 in) larger than the actual diameter of individual bolts, and shall be drilled to match the tolerances for each bolt. The clearance shall be checked with 0.28 mm (0.011 in) wire. The hole shall be considered too large if the wire can be inserted into the hole together with the bolt.

.4 Turned bolts are called out by nominal thread diameter on the Contract Documents. The bodies of turned bolts shall be 1.6 micrometers (63 microinch) finish or finer, and as defined by CHBDC 13.7.22, unless noted otherwise on the Contract Documents. Turned bolt body diameters shall be 1.6 mm larger than thread diameter. Turned bolt heads shall be standard hex for bolts of the next nominal size larger than the thread diameter or heavy hex for nominal thread diameter, unless noted otherwise on the Contract Documents. Unless otherwise noted, bolt holes in machinery parts required for connecting to supporting steel may be sub-drilled (in the shop) smaller than the turned bolt diameter and shall be reamed together with supporting structural steel either during assembly or at erection to provide an LC6 fit, after the parts are correctly assembled and aligned.

.5 Hex socket head cap screws: ASTM A574-13.

.6 Hex socket flat countersunk head cap screws: ASTM F835-13.

.7 Hex cap screws: ASTM A449-14.

.8 Lock washers: ASME B18.21.1-2009

.9 Furnish positive type lock nuts and hardened washers for all bolts and for all flat countersunk head cap screws used as bolts. Double heavy hex nuts conforming to ASTM A563/A563M-15 are required unless indicated otherwise on the Contract Drawings. Submit alternate locking methods to the Departmental Representative for approval. All hardened steel washers shall be in accordance with ASTM F436M-11.

.10 Tighten fasteners to provide a tension of 50% of the bolt's ultimate tensile strength unless otherwise specified on the drawings. Provide the method of tightening and of verifying the tension in all bolts on the shop drawings for review by the Departmental Representative.

2.3 CASTINGS

.1 Castings shall be free of defects such as sand and slag inclusions, cracks, cold shuts, shrink holes, blow holes, porosity, free of loose scale and sand, fins, seams, gates, risers and irregularities. Unfinished edges shall be neatly cast with rounded corners and inside angles shall have ample fillets.

.2 Unless otherwise indicated on the Contract Documents, perform visual surface examinations of steel castings per ASTM A802-95(2015), liquid-penetrant exams in accordance with ASTM E165/E165M-12, or magnetic particle exams in accordance with ASTM E709-15 in the manufacturer’s shop, for each casting.

.3 Unless otherwise indicated in the Contract Documents, perform visual surface examinations of bronze castings per MIL-STD-271F, or liquid-penetrant exams in accordance with ASTM E165/E165M-12 in the manufacturer’s shop, for each casting.

.4 Identify and remove unacceptable surface discontinuities in accordance with ASTM A802-95(2015). Obtain approval from the Engineer before making any necessary major weld repairs (as defined in ASTM A781/A781M-14b S16 Weld Repair Charts). Perform radiographic examination of welds per ASTM E94-04(2010). Any aberrant indications must be brought to the Departmental Representative’s attention for review and may result in rejection of the weld repair.

2.4 LUBRICATION

.1 All lubricants selected for use on new or existing components shall be compatible with lubricants currently in use by the Department. Submit written documentation indicating compatibility for any lubricant which is not in current use by the Department.

.2 The following information applies to lubricants for the various machinery components:

.1 Enclosed Gear Reducers are proprietary units. Use lubricants recommended by the manufacturer.

.2 Plain Bearings: The lubricant chosen shall be approved for use in sleeve bearings by the lubricant manufacturer. Recommended Lubricant: NLGI No. 2 grease with rust and oxidation inhibiting additives, 280 Worked Penetration at 25 deg. C (77 deg. F), 171 deg. C (340 deg. F) (or higher) ASTM Drop Point, SUS 900 @ 38 deg. C (100 deg. F), water resistant, and anti-wear/extreme pressure.

.3 Open Gearing: The open gear lubricant utilized must bond strongly to gear teeth to maintain a continuous film on contact surfaces despite high loading and high load repetition, contain an EP (Extreme Pressure) additive, repel water, resist throw-off and dripping, maintain consistency over wide temperature variations, and allow for ease in application and removal. The lubricant shall have an operating range of -18 deg. C to 99 deg. C (0 deg. F to 210 deg. F) and shall be considered heavy-bodied, adhesive-type open gear lubricant by its reputable lubricant manufacturer. The lubricant shall also meet the following minimum requirements: unleaded, non-diluent type, non-chlorinated open gear grease, SUS 7,000 at 38 deg. C (100 deg. F) viscosity, water resistant, anti-wear/extreme pressure.

.4 Wedges: The wedge lubricant must bond strongly to the wedge contact surfaces to maintain a continuous film on the wedge surfaces despite high loading, contain an EP (Extreme Pressure) additive, repel water and resist wash-off, maintain consistency over wide temperature variations, and allow for ease in application and removal.

.5 Center Latch: The latch lubricant shall be the same lubricant as that used at the end wedge.

.3 Replace any fittings damaged during cleaning or disassembly of the span drive machinery in kind.

.4 Furnish and apply open gear lubrication and grease after installation of the machinery and prior to operational testing.

.5 All speed reducers shall be filled with the recommended oil to proper levels prior to operational testing.

.6 The Contractor shall furnish an additional supply for future maintenance use to include 4.5 Kg (10 lb.) of each type of grease and 19 l (5 gal.) of oil for the speed reducers.

.7 Protect all lubricants used during construction from contamination.

2.5 PAINT

.1 All machinery components that are provided by or sent to the shop shall be painted in the shop.

.2 Painting and touch-up of field damaged paint for all non-machined surfaces shall be in accordance with the requirements for painting of structural steel.

.3 Provide two coats of an epoxy mastic high build, aluminum filled primer.

.4 Exercise caution to prevent cleaning and painting materials from entering machinery components and coming into contact with sliding surfaces which would be damaged by such intrusion. Exercise extreme care to protect all lubricated and faying surfaces. Do not paint lubricated, sliding and faying surfaces.

.5 The colour for the final coat of moving mechanical parts: safety orange. The colour for the final coat of stationary mechanical parts: safety green.

.6 Include all painting instructions on the Shop Drawings.

2.6 SHAFTINGS AND PINS

.1 Provide rolled shafts and pins that meet the requirements of ASTM A675/A675M-14 Grade 75 unless indicated otherwise on the contract drawings.

.2 Finish shafts and pins accurately, round, smooth and straight. Straightness: 0.025 mm per meter (0.003 inches per foot).

.3 Provide a 60 degree lathe center with clearance hole at the exact center of the shaft for finished ends of forged shafts.

.4 Prepare the ends of forged shafts with bored holes for a device equivalent to the lathe center.

.5 For stepped shafts, finish fillets smoothly to adjacent surfaces without tool marks or scratches. The maximum surface finish roughness for fillets is 0.8 micrometers (32 microinch) according to ANSI B46.1-2009 unless a finer finish is required.

2.7 SHIMS

.1 Produce shims required for leveling and alignment of machinery and equipment from brass or type 316 stainless steel for thicknesses 3.2 mm (1/8”) or less and from brass, ASTM A36/A36M-

14, or type 316 stainless for thicknesses greater than 3.2 mm (1/8").

.2 Neatly trim the shims to the dimensions of the assembled part base and drill for all bolts that pass through the shims.

.3 Furnish sufficient shims to provide for a total thickness of not less than two times the dimensions given as "nominal shims", with one shim equal to the nominal thickness.

.4 Provide shims to allow adjustments of 0.075 mm (0.003 inch) for machinery parts unless otherwise noted on the contract drawings.

.5 Make every effort to use full-size shims and achieve full contact between the shims and mating components to achieve the specified alignment requirements. In some cases, the use of partial or custom-machined tapered shims may be required to achieve the alignment requirements. Partial shims shall only be used when the gaps produced between mating parts by the use of partial shims is less than 0.4mm (1/64 inch).

.6 At least one bolt must pass through any partial shim that is used.

.7 In cases where partials shims would produce a gap greater than or equal to 0.4 mm (1/64 inch), use a custom-machined tapered shim. The cost of any partial or custom shims (including materials, manufacturing, engineering, shipping, field measurements, etc.) is considered incidental to the work and no additional compensation will be made for providing partial or custom shims.

.8 Assemble shims not installed after final alignment and tag with the part number from the shop drawings, then deliver to a location determined by the Departmental Representative for future use. Shims shall be provided in a substantial, weather proof crate so that unused shims can be stored without deterioration for future usage. A laminated index sheet shall be provided with the crate listing all shim contents, and each shim set shall be given a unique identification mark and cross referenced to its part.

2.8 MACHINERY BRAKE

.1 Prior to removing the existing brake assembly, document the alignment/contact between the shoes and the drum for later reference.

.2 Remove the existing machinery brake assembly and send to the factory for refurbishment. The existing brake wheel shall not be removed from its' shaft. It is acceptable for the brake

manufacturer to replace the brake assembly in lieu of refurbishing. If this alternative is selected any work required to integrate the new brake assembly into the existing brake supports and brake drum shall be performed at no additional cost.

.3 Remove and replace the existing master cylinder assembly, foot pedal operator, reservoir, and hoses. All replacement components shall be new and designed to function as intended with the refurbished brake assembly.

.4 Reinstall the brake system at the bridge. Use new mounting hardware for all components. Locate the new hydraulic hoses/lines, master cylinder assembly and foot pedal operator at the direction of the Departmental Representative.

.5 Document the alignment/contact between the shoes and the drum. Bed the shoes to achieve acceptable contact.

2.9 FULL OPEN AND CLOSED BUMPERS

.1 Full open and closed bumper assemblies shall be provided to absorb energy of the span should it over travel at the full open position and to assist in centering the span at the full closed position. Bumpers shall be marine duty elastomeric trapezoidal dock bumpers suitable for absorption of high energy impacts.

.2 The full closed bumper shall be capable of absorbing 500 kg-meter per meter of length at 51 mm of deflection resulting in a load of 14,900 kg per meter of length at the same deflection. The length of the full closed bumper shall be 460 mm (18”). A single mounting hole and access hole shall be provided in the bumper to suit the mounting details shown on the structural drawings.

.3 The full open bumper shall be capable of absorbing 750 kg-meter per meter of length at 57 mm of deflection resulting in a load of 18,600 kg per meter of length at the same deflection. The length of the full closed bumper shall be 305 mm (12”).

.4 Acceptable products include Longwood Trapezoidal dock fenders, Size 10 (full open bumper) and Size 13 (full closed bumper) or equal.

.5 Relocate the full open limit switches, limit switch supports, and limit switch targets to avoid interference with the full open bumper.

PART 3 - Execution

3.1 CONSTRUCTION DETAILS

.1 Supply all apparatus, tools, devices, materials and labour to manufacturer, ship, install, erect, align, adjust, lubricate, test, and paint, to complete machinery as provided in the Contract Documents. Furnish any apparatus, tools, devices, materials and labour incidental to the work, but not specifically stated or included at no additional cost.

.2 Match mark all existing machinery assemblies prior to disassembly.

3.2 QUALITY

.1 Products, materials, equipment and articles incorporated in Work shall be new (unless specified otherwise in the contract documents), 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 the Departmental Representative based upon requirements of the Contract Documents.

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

3.3 INSPECTION

.1 The Departmental Representative reserves the right to inspect all machinery at the factory prior to shipping, during shop testing or in the field to augment the Contractors quality control procedures. Provide the Department Representative with full access to the manufacturer’s fabrication facility, testing facilities and the bridge site for such inspections.

.2 Inspections are based on the requirements of the Specifications and Contract Drawings, referenced codes or standards, and the Contractor’s submittal documents. The Departmental Representative has the authority to stop fabrication or shipment of any material, component, or assembly that does not comply with

specified requirements. Replace or repair to the satisfaction of the Departmental Representative any such rejected item. All such replacements or repairs are made at the Contractor's expense.

.3 The Department Representatives will make inspections of equipment and machinery throughout the construction period. Correct defects, deficiencies, or deviations from the Contract Drawings or Specifications discovered during such inspections at no additional cost. Shop or field inspection of machinery does not relieve the Contractor from making such repairs as directed by the Departmental Representative if defects are found at a later time.

.4 If inspection by the Departmental Representative identifies discrepancies between component measurements and the measurements recorded on the Shop Inspection Reports, this may be cause for rejection of the Shop Inspection Reports. If this occurs, the Contractor shall re-measure the components with different personnel.

3.4 SHOP ASSEMBLY AND TESTING

.1 All machinery components shall be fully assembled at the shop and tested as follows:

.1 Rack Pinion Shaft Assembly – Demonstrate assembly of the G2 gear and P1 pinion on the shaft. Install tapered keys with bluing to demonstrate contact. The contact check shall demonstrate a minimum of 80% contact. Document the contact results photographically and submit this documentation as part of a shop assembly report. Mount assembly in a lathe and check radial and face runout of pinion and gear. These checks shall demonstrate less than 1mm runout.

.2 End Wedge Bronze Nut – Confirm that the bronze nuts can be installed on their respective shafts and the nuts can move through the required range of movement for wedge operation without binding.

.3 Span Drive Reducer – Assemble reducer to shaft and demonstrate proper fit up of the taper lock hub to the shaft and key. Assemble hydraulic motor to reducer and demonstrate proper fit up of the motor splined shaft with the reducer input shaft.

.2 Provide seven (7) days advance notice of all required shop tests to permit the Departmental Representative to arrange to be present to witness tests.

.3 The Department Representatives will make inspections of equipment and machinery throughout the construction period. Correct defects, deficiencies, or deviations from the Contract Drawings or Specifications discovered during such inspections at no additional cost. Shop inspection of machinery does not relieve

the Contractor from making such repairs as directed by the Departmental Representative.

3.5 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 the Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

3.6 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.

.1 Coat finished metal surfaces and unpainted metal surfaces that would be damaged by corrosion, as soon as practical after finishing with a corrosion inhibitor. Remove this coating from all surfaces prior to lubrication for operation and from all surfaces prior to painting after erection.

.3 Mount assembled units on skids or otherwise crate for protection from weather, dirt and all other injurious conditions during shipment and storage as approved by the machinery manufacturer. Submit in advance information as to methods and materials which will be used for protection for review by the Departmental Representative.

.4 Store machinery items to permit ease of access for inspection and identification. No outdoor storage of machinery components is permitted regardless of the methods of protection provided.

.5 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.

.6 Store products subject to weather damage in weatherproof enclosures.

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

.8 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.

.9 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.

.10 Correct damage that occurs to the machinery components as a result of improper protection during shipment or storage by the Contractor to the satisfaction of the Departmental Representative at no additional cost.

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

3.7 MANUFACTURER'S INSTRUCTIONS

.1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions.

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

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

3.8 MACHINERY INSTALLATION

.1 Commence installation of new components after all required components have been manufactured, inspected and tested as required, preparations by others where required have been satisfactorily completed and machinery installation procedure has been reviewed.

.2 Provide millwrights and supervisory personnel with a minimum of three movable bridge jobs as previous experience working on movable bridge machinery, one of which shall be a swing span. The installation and adjustment of all machinery is to be led by millwrights with a minimum of ten years of experience that includes working on moveable bridge machinery in this class of work. It is not acceptable for the installation and alignment of machinery to be led by workers of any trade other than the millwright trade.

3.9 SEQUENCE OF WORK

.1 As part of the installation procedure, provide a complete sequence of installation for review by the Departmental Representative.

.2 Coordinate the complete sequence of work with the suggested sequence of work for the end wedge rehabilitation presented on the contract documents.

3.10 ALIGNMENT

.1 General

.1 All standard manufactured components shall be aligned to the tolerances specified by the manufacturer of that component unless otherwise noted on the contact documents or the specifications. Submit the manufacturers recommended alignment tolerances for a new installation as part of the installation procedure.

.2 Open Gearing

.1 Rack/P1 Alignment: Document the alignment of the pinion relative to the rack prior to disassembly. Record vertical alignment, measure backlash and tooth contact. Upon assembly, set the rack pinion shaft collar such that the pre-existing vertical alignment of the rack and rack pinion is maintained within 2mm. Verify that backlash is within .75mm and contact is equal or better to the previous condition.

.2 P2/G2 Alignment: Document the pinion P2 alignment with gear G2 prior to disassembly by documenting the tooth contact, axial alignment and backlash. Upon assembly, locate the G2 gear on the shaft such that the pre-existing vertical alignment of the G2 gear and P2 pinion is maintained within 2mm. Verify that backlash is within .75mm and contact is equal or better to the previous condition.

.3 Machinery Brake

.1 Document the pre-existing contact between the shoes and drum. Notify the Departmental Representative if the existing contact is less than 60%.

.2 Bed the brake shoes with the brake wheel per the manufacturer’s recommended procedure to achieve a minimum of 60% contact between the shoes and drum.

.4 End Wedges

.1 Document the pre-existing position of each wedge when fully driven. After disassembly and re-assembly, adjust each wedge so that when fully driven it is within 6mm of the pre-existing position.

.2 Document the pre-existing vertical alignment of the roadway joint between the fixed and moving span with the wedges driven prior to disassembly of the wedges. Adjust the shims at each wedge so that the vertical alignment of the roadway joint between the fixed and moving span with the wedges driven matches the pre-existing condition within 3mm.

.3 The alignment of the end wedges will be considered acceptable when there is less than .5mm gap at all four corners between the top of the wedge and wedge guide and between the bottom of the wedge and wedge base plate with the wedge driven. End wedge contact shall be evaluated with the west end centering latch engaged.

.5 East Center Latch

.1 The swing span is considered to have proper transverse alignment when the west center latch is engaged and the gaps on either side of the latch to the strike plate are equal within 1.6 mm (1/16”).

.2 The east center latch strike plate is located on the east nose pier and is to be removed, realigned and reinstalled. The details for this work are provided in the Structural Drawings. Alignment requirements are noted here.

.3 Verify that the swing span is properly aligned in the transverse direction and adjust the east center latch strike plate so that the gaps on either side of the latch to the strike plate are equal within 1.6 mm (1/16”).

.4 The distance from the latch to the edge of the strike plate faying surface in the east west direction should be 50.8mm (2”).

.5 Verify that all linkage arm pins are secured with a cotter pin, replace any missing cotter pins with new stainless steel cotter pins.

.6 Full Closed Bumper

.1 Adjust the bumper and/or strike plate so that there is full bearing between the bumper and strike plate.

.2 Adjust the bumper so that when the swing span is held firmly against the bumper by the span drive machinery during closing, the swing span is properly aligned in the transverse direction. This adjustment may need to be repeated during final testing of the modified hydraulic system.

.7 Full Open Bumper

.1 Adjust the bumper and/or strike plate so that there is full bearing between the bumper and strike plate.

.2 Adjust the bumper so that it is in light contact when the swing span is in the open position with 200mm (7 7/8”) clearance between the main pinion and the concrete pedestal that is reinforcing the rack anchorage.

.3 Relocate the full open limit switches and targets to match the existing swing rotation indication. Install the limit switches to avoid interference with the full open bumper. See the Mechanical Drawings for details.

END OF SECTION